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Analysis of Tomato Marketing System in Lalitpur District, Nepal

A Research project Submitted to

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in Partial Fulfilment of the Requirements for

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Specialization "International Agriculture"

By

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The Netherlands

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Cover photo: Woman (second left) selling tomato on 4 wheeler cart "*Thela*". Photo by Kalash Ram Chaudhary (2010)

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Wageningen — Kalash Ram Chaudhary

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Dedicated to my late father

JOKHAN THARU (2009-2067 BS)

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ACRONYMS

AD	Anno Domini
ADB	Asian Development Bank
AEPB	Agricultural Enterprise Promotion Board
AGDP	Agricultural Gross Domestic Product
APMDD	Agribusiness Promotion & Marketing Development Directorate
APP	Agriculture Perspective Plan
APROSC	Agriculture Project Services Centre
ASC	Agriculture Service Centre
BIMSTEC	Bay of Bengal Initiative for Multisectoral Technical and Economic Cooperation
BS	Bikram Sambat
DADO	District Agricultural Development Office
df	Degree of Freedom
FM	Frequency Modulation
FY	Fiscal Year
GDP	Gross Domestic Product
GM	Gross Margin
GR	Gross Revenue
Ha	Hectare
HHs	Households
HVCs	High Value Crops
JMA	John Mellor Associates
KFVMDB	Kalimati Fruits and Vegetables Market Development Board

Kg	Kilo gram
Km	Kilo metre
MDD	Marketing Development Directorate/Division
MM	Marketing margin
MOAC	Ministry of Agriculture & Cooperatives
MOF	Ministry of Finance
No.	Number
N/Rs.	Nepalese Rupees
PS	Producer's Share
SAFTA	South Asia Free Trade Agreement
USA	United States of America
VC	Variable Costs
VDCs	Village Development Committees
VDD	Vegetable Development Directorate
VS	Value Share
WTO	World Trade Organization

EQUIVALENTS

AREA

1 Hectare = 19.66 Ropani

WEIGHT

1 ton = 10 quintal = 1000 Kg

MONTH

Nepali Calendar	**Gregorian Calendar**
Baisakh	Mid-April to Mid- May
Jestha	Mid-May to Mid- June
Ashadh	Mid-June to Mid- July
Shrawan	Mid-July to Mid- August
Bhadra	Mid-August to Mid- September
Aashwin	Mid-September to Mid- October
Kartik	Mid-October to Mid- November
Marga	Mid-November to Mid- December
Paush	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)
2064	2007/08
2065	2008/09
2066	2009/10
2067	2010/11

CURRENCY (as of 3 September, 2010)

Euro (€) 1 = NRs. 95.54

US$ 1 = NRs. 74.55

ABSTRACT

Tomato (*Lycopersicon esculentum*, Mill) *is one of the most commonly grown vegetables in Nepal. It has occupied the fourth and fifth position in terms of production and acreage respectively. Despite the fact that tomato growing is a viable option to increase farm income and hence alleviate widespread poverty considerable attention has not been given for its marketing aspects. Therefore, this study was carried out to analyze the marketing system of tomato in Lalitpur district of Nepal during the year 2010. Specifically, this study was intended to identify marketing channels, to estimate gross margin, marketing margin and producer share, to find out the situation of market information and to identify constraints related to production and marketing of vegetables, especially tomato. Accordingly, a representative sample size of 20 tomato growers comprising 10 each from Lamatar and Lubhu village development committees were purposively selected. Similarly, 10 wholesalers from Kalimati fruits and vegetables wholesale market and 10 retailers from Lagankhel vegetable market were purposively selected. The required information was obtained by interviewing with semi-structured questionnaire. This was supplemented with information from focus group discussion with farmer groups and key informants; and observation.*

From the study it was found that the average cost of production per ropani was higher in Lamatar than in Lubhu. Likewise, gross margin was higher in Lubhu than in Lamatar due to lower cost of production and higher yield in former case. In addition, the benefit cost ratio was also found to higher in Lubhu. In the marketing system, the channel of producer-wholesaler-retailer- consumer was most common where about 50 percent tomato passes to consumer through this channel. The marketing margin was estimated to be Rs. 20 per kg and producer share in the study area was 67 percent, which was highest among chain actors. The mode of selling tomato in commission was higher in Lamatar than in Lubhu where farmers sold tomato by bargaining. However, there was not significant difference in mode of selling. In Kalimati wholesale market, two types of tomato were found to selling and the wholesale price of tomato big was found higher than of small one. In the case of total volume of tomato arrival, about 85 percent tomato was from different districts of Nepal and rest from India. Plastic crate was the most common packaging material.

Likewise, telephone, neighbours and friends were the major means of market information for majority of respondents. The study showed that farmers were facing with several constraints related to production and marketing. Among several production constraints, the most common constraints faced by producers in the study area were high cost of agricultural inputs (seed, fertilizers and agro chemicals), timely unavailability of chemical fertilizers, unavailability of pure seed, lack of technical knowhow, disease and insect pest problems etc. Likewise in marketing constraints, the most common constraints faced by farmers were frequent transport obstruction, high transportation cost, lower price, fluctuation in market prices, unorganized retail markets, lack of processing facilities.

The research showed that tomato growing is a profitable and potential agricultural enterprise in the research area. In conclusion, there is an immense need to adopt market oriented policy and programs linking with production in order to enhance production and marketing efficiency in the study area, in particular.

CHAPTER 1 INTRODUCTION

1.1 Background

This section comprises an overview of Nepalese agriculture, status of vegetables in Nepalese economy and status of tomato production. It also describes about statement of problem, objectives of the study, research questions, limitation of the study and organization of the report.

1.1.1 Agriculture in Nepalese economy

In Nepal, agriculture is the main contributing sector of the national economy accounting 36 percent of the gross domestic product (Ministry of Finance, 2009). The growth rate of agricultural gross domestic product (AGDP) has been recorded at around 5 percent in 2007/08 and is estimated to grow only by 2.2 percent in the year 2008/09 (ibid). Moreover, it is a source of livelihood and employment for more than two third of the economically active population (Agribusiness Promotion and Marketing Development Directorate, 2009). Therefore, any programme for poverty alleviation and employment generation should focus on agriculture. Taking this fact into account, the Government of Nepal has implemented the twenty years' long term plan in agricultural sector called Agriculture Perspective Plan (APP) in 1995 to accelerate the growth rate of agriculture (Agricultural Projects Service Centre and John Mellor Associates, 1995). This plan has identified the four priority outputs: livestock, high value crops, agribusiness and forestry. Here the high value crops included are fresh vegetables including off-season vegetables, ginger, cardamom, honey, apple, citrus, silk. This plan seeks to raise AGDP from three percent in 1995 to five percent by the end of 2015 (ibid). Similarly, the plan has targeted the growth rate of horticulture GDP and vegetable GDP to 5.5 percent and 5.42 percent per annum by end of 2015.

1.1.2 Vegetable crops in Nepalese agriculture

Vegetables include a group of specialized crops and are important economically from the health point of view. They are important sources of protein, vitamins, minerals, energy and integral constituents of Nepalese dish. The development of vegetables in Nepal started during early forties (Awasthi, 2007). The diverse topographic features and climatic conditions in Nepal permit the successful production of a large number of vegetables. There are more than 247 cultivated vegetable crops, of which more than 50 are common in Nepal (Awasthi, 2007). The main vegetables grown are cauliflower, cabbage, radish, broadleaf mustard, carrot, peas, beans, chilli, okra, brinjal, onion, cucumber, pumpkin, bitter gourd, bottle gourd. Cauliflower has occupied first position both in area and production, followed by cabbage, radish and tomato (figure 1).

Due to urbanization and changes in food habit the domestic production is no longer fulfilling the increasing demand. Nepal imports 67 percent of vegetable consumption and 85 percent of its fruit consumption (Agriculture Project Services Centre and John Mellor Associates, 1995). Vegetable crops contribute 9.7 percent to AGDP (Ministry of Agriculture & Cooperatives, 2008). In 2008/09 the area and production of vegetables is recorded to be

225,154 hectare and 2754,406 ton with yield of 12.2 ton/hectare respectively (Vegetable Development Directorate, 2009). The trend of vegetable production with area is mentioned in table 1. Both area and production are in increasing order, but there is very little increment in yield. Due to the nutritive value of vegetables and health awareness of the consumers the per capita consumption of vegetables in Nepal has increased from 49 kg/head/year to 60 kg/head/year in last ten years, but still far below the human vegetable nutritional requirement i.e. 104 kg/person/year (Awasthi, 2007).

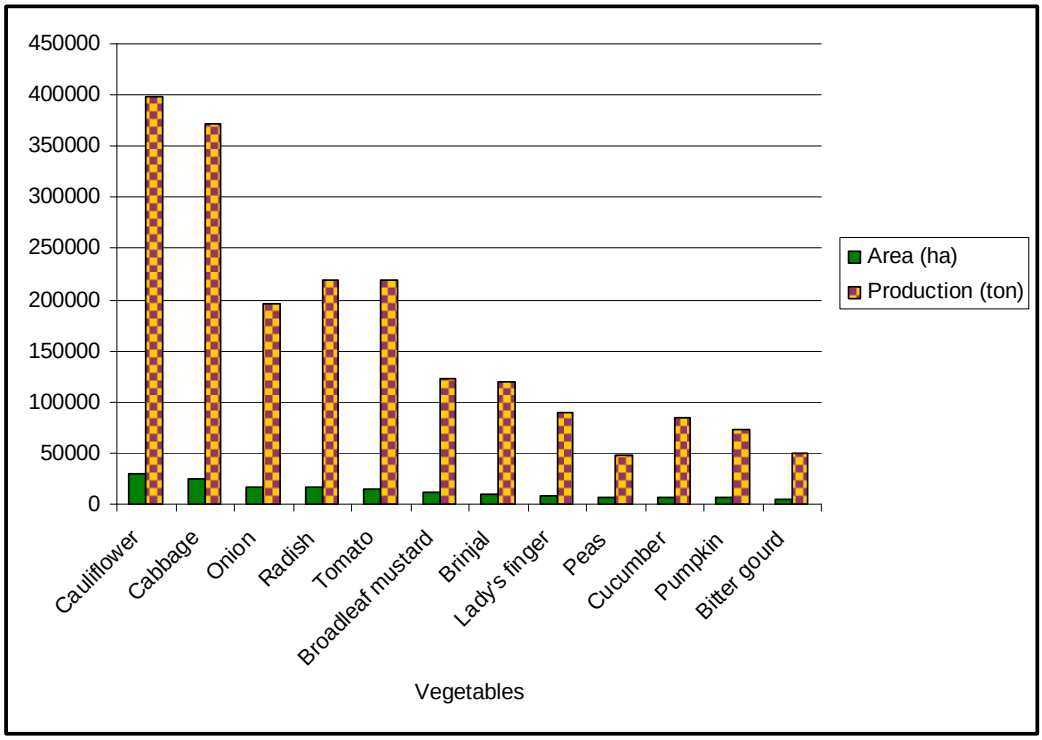

Figure 1: Status of major vegetable crops in terms of area and production
Source: Vegetable Development Directorate (2009)

Table 1: Area, production and yield of vegetable crops in last five years

Year	2004/05	2005/06	2006/07	2007/08	2008/09
Area (ha)	180,823	189,864	191,922	208,108	225,154
Production (ton)	2,065,193	2,190,122	2,298,689	2,538,904	2,754,406
Yield (ton/ha)	11.4	11.5	12	12.2	12.2

Source: Vegetable Development Directorate (2009)

1.1.3 Status of tomato production in Nepal

The cultivated tomato (*Lycopersicon esculentum*, Mill) is the most important and widely grown vegetable in the world. It is widely accepted and commonly used in a variety of dishes as raw, cooked or processed products (Lemma, 2002 cited in Weldeslassie, 2007). It is reported that it is originated in Peru, Ecuador and Andes range of Bolivia (Singh, 2010a). In Nepal, it is cultivated as winter crop in Terai and Inner Terai whereas in the mid hills of Nepal it can be produced successfully in two growing seasons-spring and rainy. Rainy season tomato is quite remunerative enterprise to the hill farmers because the supply from the Terai districts is constrained by high temperature, low fruit set and flowering; and bacterial wilt etc (Pandey, *et al.,* 2006). According to Singh (2010a), the most commonly grown areas of tomato in Nepal are Ishworpur (Sarlahi), Dhalkebar (Dhanusha), Panchakhal (Kavre), Namatar, Bajrabarahi and Handikhola (Makawanpur), Lamatar (Lalitpur), Hirapur (Mahottari), Harre (Surkhet). According to the Vegetable Development Directorate (2009), the area under tomato is estimated to be 15, 572 hectare with a total production of 219,194 ton in the year 2008/09. If we compare tomato crops with total vegetables in terms of area and production we will find that tomato has constituted 7 percent in area and 8 percent in total production of vegetables. Tomato comes in fourth and fifth position in terms of production and acreage (figure 1). The major tomato growing districts with area and production are presented in figure 2 where one can see that Kavre and Sarlahi districts rank first and second both in area and production, respectively.

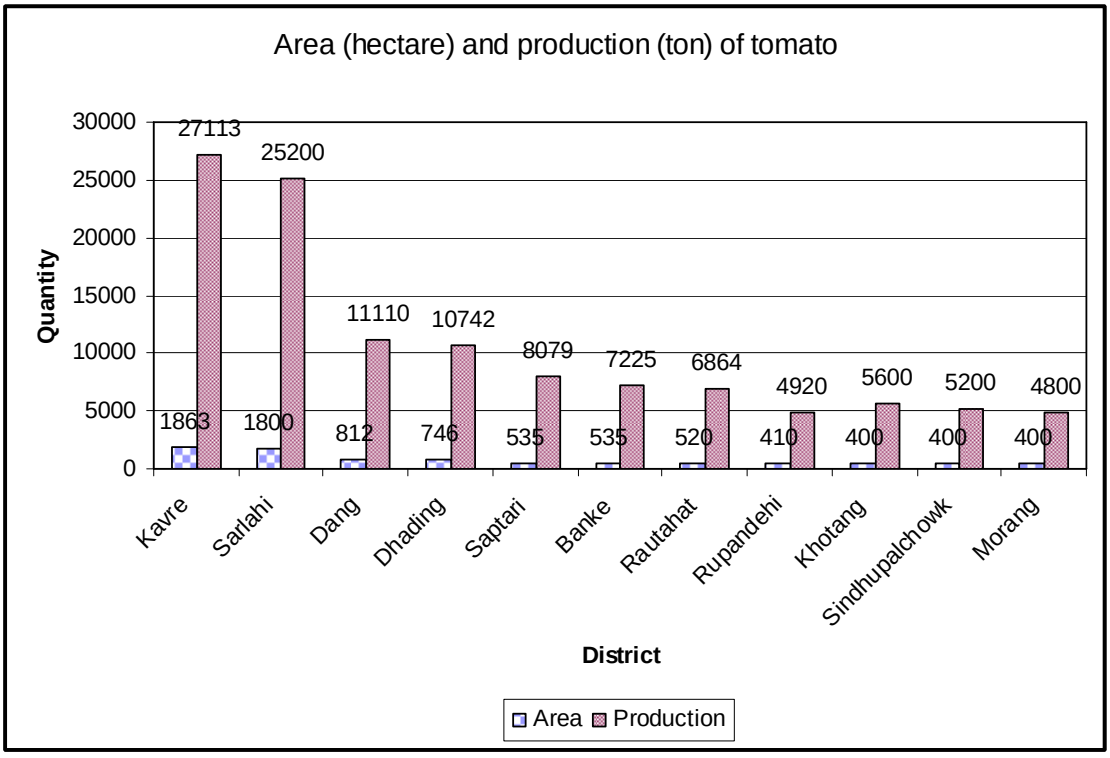

Figure 2: Major tomato growing districts with area and production in 2008/09

Source: Vegetable Development Directorate (2009).

1.2 Problem statement

Unlike cereals, the marketing of horticultural crops, in general; and vegetables and fruits in particular, is more complex and risky because of the special characteristics like highly perishable nature, seasonality, bulkiness etc. and needs special care and immediate disposable (Gandhi and Namboodiri, 2002.). As a result, the supply of vegetables is subjected to various problems including wide fluctuation in prices. The marketing situation of vegetables is still in developing/rudimentary stage characterized by influences of supply and demand and price realization (Shrestha, 2008). The important factor that energizes agriculture development towards commercialization and diversification is the development of proper marketing system. Despite the fact that vegetable production is a viable option to increase farm income and hence alleviate widespread poverty considerable attention has not been given for its marketing aspects. Because of the imbalance in distribution system and lack of organized marketing system there is always a market glut of vegetables in main production season and scarcity of vegetables in the other seasons.

The Government of Nepal has emphasized the commercialization of vegetables in each and every fifth year plan including the three years' interim plan (2008-2010). Despite the great potential of production in the country and continuous efforts from government vegetable farmers are facing marketing problems such as poor marketing infrastructures (marketing information, physical facilities, auction markets, marketing extension services, price uncertainty etc.), frequent transport obstruction called by different political parties and pressure groups, small scale of production. Moreover, producer farmers are not organized. Farmers are obliged to dispose their produce at low price due to the lack of adequate knowledge of marketing system. They are not getting fair prices for their produces. This has affected not only the producer, but also the consumers. Involvement of large number of middlemen has decreased farmers' share. The middlemen are grabbing the economic benefits.

The marketing of vegetable crops, in general, and tomato in particular, has been generally acknowledged. But, little research has been directed towards the economic analysis of marketing of tomato. Therefore, it is interesting to study the economics of marketing of vegetables especially tomato. Furthermore, this research is assumed to understand problems and prospects of marketing; and to contribute a scientific base for viable policies and strategies aiming at the sustainable development of the vegetables in the country.

1.3 Objective of the research

The broad objective of this research is to analyze the marketing system of tomato in Lalitpur district.

1.4 Research question

What is situation of marketing system of tomato?

Sub-research question:

1. What are the existing marketing channels in tomato?
2. What is the gross margin in tomato business?
3. What is the market margin and value share of chain actors (farmers, wholesalers/retailers) in value chain of tomato?
4. What is the situation of market information in Lalitpur district?
5. What are the major problems of production and marketing of tomato?

1.5 Scope and limitation of the study

This research project explored the existing marketing system of tomato enterprise, its challenges and constraints in Lalitpur district. Since the coverage is limited for the research site, the inferences drawn from the research may not be taken as generalization for other areas of the country. Data collected on recall basis may lead to some response errors. The size of the sample taken may not be adequate due to resources and time constraints. It became difficult to contact farmers because of peak season of rice transplanting.
The findings from this study would be useful for all stakeholders involved in tomato enterprise and in formulation of policies related to tomato production and marketing for the study areas and other similar areas.

1.6 Organization of the thesis

Following the introduction, the thesis is divided into altogether five chapters. The chapter 1 describes about the introduction of the study which includes background information, statement of problem, research objective and research questions; and scope and limitation of the study. The chapter 2 discusses on different literatures reviewed for the study. The chapter 3 focuses light on research design and methodology followed in writing report. The chapter 4 describes about the results and discussion. Finally, the chapter 5 describes about the conclusion and recommendation.

CHAPTER 2 REVIEW OF LITERATURES

This study has intended to analyze the marketing system of tomato in Nepal. Therefore, this chapter deals with such concepts as agricultural marketing, horticultural marketing, marketing system, marketing channels used in the study and past works done in the field of marketing system of vegetables in general and tomato, in particular. In addition, this chapter also describes about the government plan and policy in agriculture sector.

2.1 Agricultural marketing: Concepts and definition

It is important to clarify the concepts of market and marketing first before dealing with the agricultural marketing.

Market

Literally, the term 'market' refers to a place where buyers and sellers come in contact for the exchange of goods and services. It may be an open space or closed within a fence or wall, or in a permanent or semi-permanent market building. But different people perceive the meaning of market differently. To the geographer, it usually refers to a physical area where the commercial exchange takes place (Verma, *et al.*, 2002). For the economists, it broadly denotes the meeting of supply and demand. To the retailer in the agricultural sector, for example, marketing is the selling of agricultural inputs to the farmers; and to the farmers it is simply selling what he/she produces on his/her farms (ibid).

"*Market implies the whole area over which buyers and sellers are in such touch with each other, directly or through middlemen, that the price of the commodity in one part influences it in the other part of it"* (Dwett and Verma,1980 cited in Piya, 2001).

According to Marketing Development Division, (1999) the term 'market' covers selling and buying area, product consumption area and state of competition and price.

Marketing

Kohls and Uhl (1980) defined the term 'marketing' as the performance of all business activities involved in the flow of products and services from the point of initial agricultural production until they are in the hands of consumers. It is a process that makes goods and services available to the consumers.

Marketing is a planning of disposal of the products into the markets. It answers four W's and one H:
What to sell?
Where to sell?
When to sell?
How to sell?
Whom to sell?

According to Agrawal, (1999) marketing encompasses all the activities aimed at satisfying the needs of the customers through the exchange relationships to achieve organizational objectives with social responsibility.

The American Marketing Association (2010) has defined the term 'marketing' as the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large.

Agricultural marketing

Agricultural marketing is one of the important branches of marketing that deals with the exchange of agricultural goods. Conventional definition of agricultural marketing states that agricultural marketing starts when the crop is harvested. But the concept has been changed, as it is a process, which starts with the farmer's decision to produce saleable farm commodities involving all aspects of marketing structure or system both financial and institutional with technical and economic considerations including products assembly, preparation for the market, distribution and use by the final consumer, (Kaini & Werner, 1998).

Agricultural marketing comprises of all the activities from production to consumption such as harvesting, grading, packaging, storing, price fixation, selling and buying. In performing these operations, 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 (Marketing Development Division, 1999).

Agricultural marketing deals with all the activities, agencies and policies involved in the procurement of farm inputs by the farmers and movement of agricultural products from the farm to the consumers (Scribd, 2010). The agricultural marketing includes not only buying and selling of agro produces but it is a complex process which includes a series of services and functions concerned in moving an agro produce from the point of production to the point of consumption (Asian Productivity Organization, 2005). In this process, various marketing functions are involved.

The development of the agricultural 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 (Rayamajhi, 2005). Production may be the door to the economic growth but marketing is the key that turns the lock. Marketing is also the most important multiplier of economic development.

Horticultural marketing

Horticultural marketing is one of the most important branches of agricultural marketing and deals with the marketing of horticultural commodities (fruits, vegetables). Marketing of vegetable products begins at the farm when the farmer plans his production to meet specific demands and market prospects (Awasthi, 2007). According to Dixie (2005) horticultural marketing is a series of inter-connected activities which include:

- planning production;
- growing and harvesting;
- grading, packing, transportation, storage, processing, distribution and sale;
- sending information from production area to markets (e.g. products available, volumes) and from market back to production areas (e.g. prices and supply levels, consumer preferences and changes in taste).

Vegetable marketing is an important mechanism to coordinate the production, distribution and consumption of vegetables in the food chain. In this context, marketing includes the

exchange activities associated with the transfer of property rights to commodities, the physical handling of products and the institutional arrangements for facilitating these activities (Kaynak, 1986, p.5 cited in Cadilhon, *et al.*, 2003). Marketing of vegetables entails a careful consideration of how to grow and sell the vegetables to stores or directly to consumers and how to compete against a wide range of sellers. Marketing of vegetables is particularly important as up to 90-98% of the output of most vegetables is sold, except for root and tuber crops for which a significant proportion is saved for seed (Singh and Sikka, 1992 cited in Shrestha, 2008), and vegetables produced in home gardens.

2.2 Marketing system

A system refers to a complex of components or sub-systems which are interrelated and are acting together to attain a defined common goal (Crawford, 1997). Each of these components or sub-systems is independent of one another. However, if any change occurs in any of them it affects other components or sub-systems and the system as a whole.

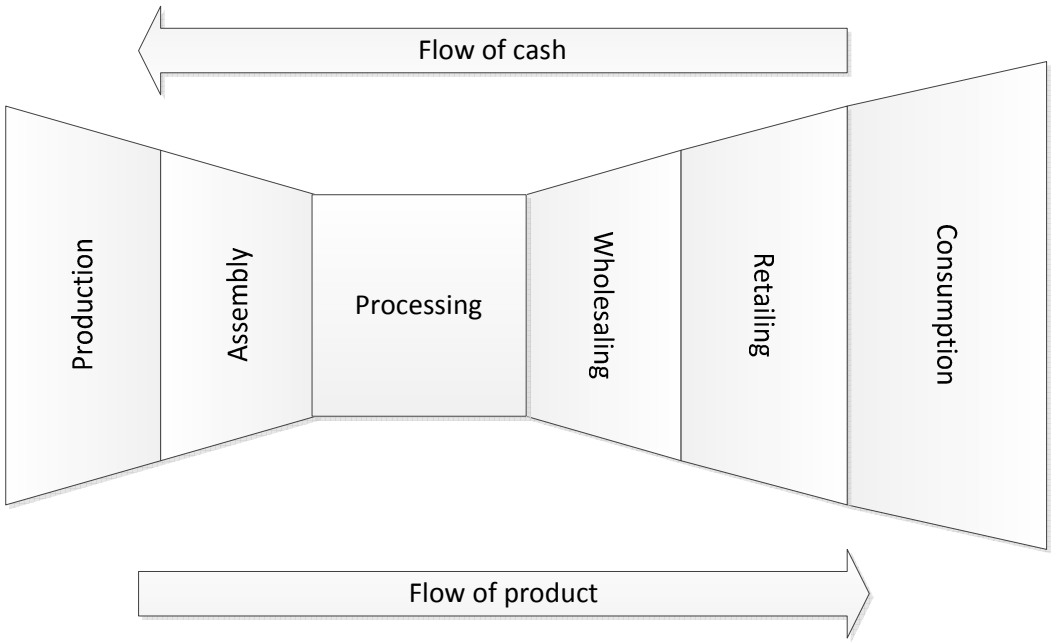

Figure 3: Stages in a typical marketing system
Source: Rhodes and Dauve (1998)

A typical marketing system includes such stages as production, assembling, processing, wholesaling, retailing and consumption in a sequential way (figure 3). According to Rhodes and Dauve (1998), the agricultural commodity is concentrated into larger quantities and fewer firms as it moves to processors and then is broken down into smaller quantities as it moves to many retailers and even more consumers. In this system, the flow of products takes place from production to consumption whereas the flow of cash takes place in reverse direction i.e. from consumption to production. In marketing system, producer farmers, traders, transporters, wholesalers, retailers, consumers are the main actors involved in carrying out marketing activities (Marketing Development Division, 1999).

In agriculture-based developing countries like Nepal, agricultural marketing services play a crucial role in fostering and sustaining agricultural and rural development. The ideal marketing system is one that maximizes the long run welfare of the society and that should

operate with maximum physical and allocative efficiency (Acharya and Agarwal, 1999 cited in Bastakoti, 2001). Marketing plays an important role not only in stimulating production and consumption, but also in accelerating the pace of economic development. So the country like Nepal, whose economy is dependent on agriculture, the marketing system plays a dual role in economic development.

Marketing is the most important function for assembling, processing and distribution of marketable surpluses. An efficient marketing system is essential for timely delivery and reduced marketing costs. The efficiency of market is influenced by a number of external factors, such as policy, regulatory frameworks and infrastructure. A well developed and efficient marketing system fosters and provides leverage to the overall growth and development of an economy by facilitating optimal product mix and planning, and its efficient distribution (Gurung, *et al.*, 1996). An efficient and organized marketing system is necessary to enable producers to realize a just price for their produce and to reduce their exploitation by middlemen, commission agents and traders (Adhikari, 2002).

The agricultural marketing system acts as a bridge between the farm and non-farm sectors. It is conceived as a process which starts from farmers' decision to produce a saleable farm commodity and comprises of all the aspects of market structures or systems, both functional and institutional, based on technical and economic considerations, including the pre- and postharvest operations, assembling, grading, storage, transportation, distribution and use by the final consumer (Singh, 2010b). In other words, agricultural marketing system includes the assessment of demand for farm-inputs and their supply, post-harvest handling of farm products, performance of various activities required in transferring farm products from farm-gate to processing industries and/or ultimate consumers, assessment of demand for farm products and public policies and programmes relating to the pricing, handling, and purchase and sale of farm inputs and agricultural products.

Adhikari (2002) conducted a research on analysis of marketing system of cauliflower and cabbage in Palpa district of Nepal. She found that the net return from cauliflower production was higher in Chidipani and lower in Madanpokhara. The net return from cabbage was higher in Madanpokhara and lower in Chidipani. In the marketing system of cauliflower and cabbage, channel of producer-retailer-consumer was most common. The marketing margin was higher in Madanpokhara as compared to Pokharathok and Chidipani. Similarly, the producer's share was lower (41.80%) in Madanpokhara and higher in Pokharathok (81.24%) and Chidipani (81.54%).

Similarly, Paudel (2006) conducted another study on production and marketing efficiency of cauliflower in Makwanpur district of Nepal. He found that the marketing system of the study area was poorly organized and purely private based system dominated by traders. He further mentioned that the local collectors had major influence on price fixation. Marketing margin was the highest in Chitlang (Rs 11.83/kg) with the lowest producers' share (54.39%), whereas the lowest marketing margin (Rs 11.14/kg) and the highest producers' share (57.05%) were found in Daman. Categorically, the lowest marketing margin (Rs 10.03/kg) and the highest producers' share (61.33%) were found in category 3 i.e. farmers having more than 6 ropani land.

A study on production and marketing of tomato conducted by Marketing Development Directorate (MDD) and Winrock International (2003) shows that the lack of basic infrastructure (market yard, storage, weighing machine) at local assembly markets causes great hardship to farmers as well as traders (wholesalers and retailers).

The prevailing marketing system of tomatoes, consumers in Kathmandu are paying three times more than what farmers are receiving in Sarlahi district (Marketing Development Directorate, 2002a). The difference between the price of farmers receiving and consumers paying is large due to the high transportation cost and post-harvest losses.

Cadilhon, *et al*. (2003) studied marketing system of vegetables in Vietnam and found following type of marketing system in Ho Chi Minh City (figure 4).

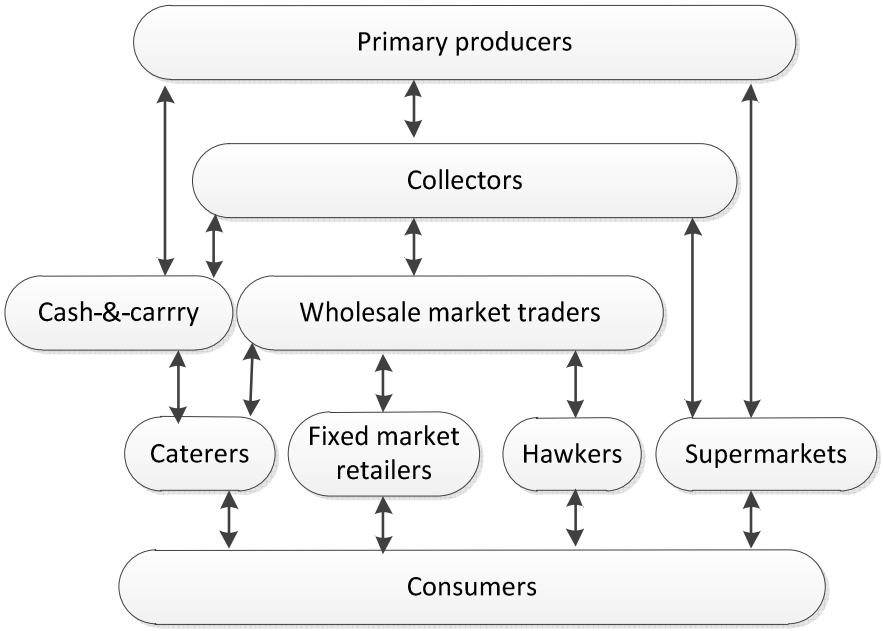

Figure 4: Vegetable marketing system in Ho Chi Minh City, Vietnam

Source: Cadilhon, *et al*. (2003)

Haji (2008) did a study on economic efficiency and marketing performance of vegetable production in the Eastern and Central Parts of Ethiopia. He found that there was the existence of considerable economic inefficiency in production, poor contract enforcement and imperfect competition in the marketing of vegetables, and indicated the need of intervention from the governmental and/or private institutions to improve the production and marketing performances of vegetables by providing the necessary supports to the smallholder farmers.

2.3 Marketing channels

According to Acharya and Agarwal (1999) the marketing channels are the routes through which agricultural products move from the point of production to the final point of consumption. In other words, marketing channels are the way through which products from producers are passed down to the consumers. In this process, the products undergo a change in time, place, form and ownership, which add to their value (Karki, 2002).

The shorter the channel, the lesser the marketing costs and cheaper the commodity to the consumer (Scribid, 2010). When there are more intermediaries in the channel the prices of commodities will be higher and producer's share will be lesser. So we can say that long

marketing channel is one of the main reasons for increased marketing costs and bring inefficiency in marketing. This results in the loss of consumers' welfare and producers' share. Presence of intermediaries makes the marketing system inefficient in the long channels as compared to the shorter ones (Hossain, *et al*., 1996).

According to Thapa and Paudyal (2003), farmers bring their agro produces to the local market and sell either to retailers or directly to the consumer. Such type of marketing channels is found in the Terai and hill regions of Nepal. The type of marketing channels depends upon the scale of production, distance to the market and source of agro produce in Nepal.

For marketing of vegetables, Thapaliya (2006) mentions three main marketing channels followed according to the type of vegetables. The leafy vegetables follow the first channel, i.e. farmer-retailers/consumer; whereas other fresh vegetables follow the second channel, i.e. farmer/farmer group/cooperative-collection centre-intermediary-urban wholesaler-retailer/hawker/Indian wholesaler-consumer/exports to India; and non-perishable vegetables such as potato, onion, garlic follow the third category of channel, i.e. importer-urban wholesale market-retailer-consumer. These vegetables (onions, garlic, potato) mostly come from foreign markets (India, Tibet).

In India, Chauhan and Singh (1998) found mainly three channels of vegetable growers for the disposal of vegetables in their study. The most important channel, which had been adopted by the majority of farmers in the study area, was the channel involving commission agent and retailer. However, in the most predominant channel comprising producers, commission agent, retailer and consumer, the net price received by the producer was in the range of 60 to 63 percent. The leading marketing channels of farm products used by the farmers are local assemblers, followed by financier-middlemen and wholesalers. Due to lack of organization, the farmers can only sell their products in the local market where prices are dependent mainly on the law of supply and demand which is unstable.

Teka (2009) found eight marketing channels for tomato in Ethiopia. The main receivers from the producers were wholesalers, retailers and rural assemblers, and with an estimated share of 44.7, 40.4 and 8.5 percent, respectively. The channel of producer-retailer-consumer was found to carry the largest share followed by producer-wholesaler-retailer-consumer with the volume of 552 quintal and 382 quintal respectively.

Eleven lines of marketing channels of tomato were identified by Weldeslassie (2007) in a study conducted in Amhara national regional state of Ethiopia. The main receivers from the producers were rural assemblers, retailers and wholesalers and with an estimated share of 43.29, 33.36 and 22.25 percent, respectively.

Piya (2001) identified four types of marketing channels for winter vegetables (cauliflower, cabbage, radish and cucumber) in Chitwan district of Nepal. These channels were producers-consumers, producers-retailers-consumers, producers-wholesalers-retailers-consumers and producers-contractors-retailers-consumers.

According to Adhikari (2002) there are three channels for marketing of cauliflower and cabbage in Palpa district of Nepal. These include farmers-consumers, farmers--retailers-consumers, farmers-dokes-consumers.

Small Marketing Infrastructure Development Project (1996) studied marketing system of fresh vegetables in Dhankuta district of Nepal and found seven types of marketing channels:

Channel 1: Producers-consumers

Channel 2: Producers-retailers-consumers

Channel 3: Producers-collectors-retailers-consumers

Channel 4: Producers-wholesalers-retailers-consumers

Channel 5: Producers- wholesalers-processors-consumers

Channel 6: Producers-cooperatives-export (to India)

Channel 7: Producers-cooperatives- wholesalers-retailers-consumers

Adepetu, *et al.* (2005) identified five types of channels in tomato marketing in Nigeria. They have mentioned producer-retailer-consumer, producer-assembler-retailer-consumer, producer-assembler-bulk purchaser-agent-retailer-consumer, producer-commission agents-bulk purchaser-agent-retailer-consumer and producer-commission agents-retailer-consumer.

Huang, *et al.* (2009) found that farmers were disposing vegetables through traditional marketing channels. Further they reported that about 80 percent of vegetable marketing at farm gate was conducted by wholesalers.

2.4 Agricultural plan and policy

Nepal is an agricultural country and will continue to be one into foreseeable future. Realizing this fact the Government of Nepal has been giving top priority in each consecutive five-year plan since 1975 (Chaudhary, 2003). In 1995, with the cooperation of Asian Development Bank (ADB) Nepal has formulated 20 years' long term plan- Agriculture Perspective Plan (APP)-in the agriculture sector. The primary objective of APP is economic growth through commercialization of agriculture. APP has identified vegetables and vegetable seed, apple, citrus, honey as high value crops (HVCs). Production of horticultural crops has increased significantly after the implementation of APP. Among these, vegetables have established as the commodities of major transactions in the organized agricultural market centres of the country followed by fruits (Marketing Development Directorate, 2002b).

In 2008, Nepal has launched three years interim plan. The specific objectives laid down in this plan include to increase agricultural production and productivity, to maintain food sovereignty by ensuring food security, to make agriculture sector competitive by transforming subsistence agriculture into commercial agriculture and to conserve, promote and utilize agricultural biodiversities through the development and dissemination of environment friendly technologies (National Planning Commission, 2008).

Moreover, the government has formulated "National Agricultural Policy" in 2004. The objectives set in this policy are as follows (Agricultural Information and Communication Centre, 2009):

- To increase agricultural production and productivity;
- To develop the bases of commercial and competitive farming system and to make the competitiveness in the regional and world markets;

To attain aforementioned objectives following policies have been adopted in the case of production of agricultural commodities and commercialization of agriculture:

- The priority will be given to the development of pockets of high-value agricultural products in feasible areas adjoining the north-south highways and feeder roads. Production of low weight and high value agricultural commodities will be given priority especially in the remote areas.
- The process of commercialization of agriculture sector will be provided with necessary support by effectively mobilizing the Agricultural Enterprise Promotion Board (AEPB) to analyze and provide outlets to the complaints and suggestions of agricultural entrepreneurs, industrialists, progressive farmers and related organizations, fulfil the comments made to such external export market related organizations as the World Trade Organization (WTO) and South Asia Free Trade Agreement (SAFTA), the Bay of Bengal Initiative for Multisectoral Technical and Economic Cooperation (BIMSTEC) and actively work for import substitution and export promotion
- Commodity and subject specific policies equipped with incentives will be developed in order to attract the cooperatives and private sectors to make investment in the commercial production, processing and marketing of agricultural products
- For the purpose of guaranteeing opportunities for marketing the commercial production of agricultural products the establishment of collection centres near the potential production centres will be encouraged and, for the purpose of guaranteeing organized markets near the large number of potential consumers, the process of developing and expanding well equipped wholesale and seasonal markets under the cost participation and management of the private and cooperative sectors will be encouraged
- Large production pockets will be developed to produce agricultural products in quantities and of qualities that match the demands of the markets. In such pockets, priority will be given to the production of agricultural products which have comparative advantage. Besides, technologies and technical services, as well as such facilities as agricultural roads, rural electrification, irrigation, agricultural credits and marketing arrangements, will be mobilized in an integrated manner in such pockets.
- Commodity and subject specific policies equipped with incentives will be developed in order to attract the cooperatives and private sectors to make investments in the commercial production, processing and marketing of agricultural products.
- The agricultural and livestock quarantine services will be systematized and strengthened in order to ensure the production of high-quality agricultural products and raise their credibility in the domestic and foreign markets.
- Regulatory services relating to agricultural products will be gradually updated as per the provisions of international treaties and agreements and the national requirements.

CHAPTER 3 RESEARCH DESIGN AND METHODOLOGY

This chapter describes the selection of study area, sample size determination, sources of information, method and techniques of data collection and analysis. Each of these sections is described below.

3.1 Selection of the study area

The research was conducted in Lalitpur district, the neighbouring district of Kathmandu-the capital city. This was the potential tomato growing pocket area identified by District Agricultural Development Office (DADO) Lalitpur. Two tomato production pocket areas-Lamatar and Lubhu-were selected purposively based on area coverage, production and access to road. In addition, the selected village development committees (VDCs) have the highest share of tomato both in area and production. In figure 5 and 6 the map of Nepal and Lalitpur district shows the study area.

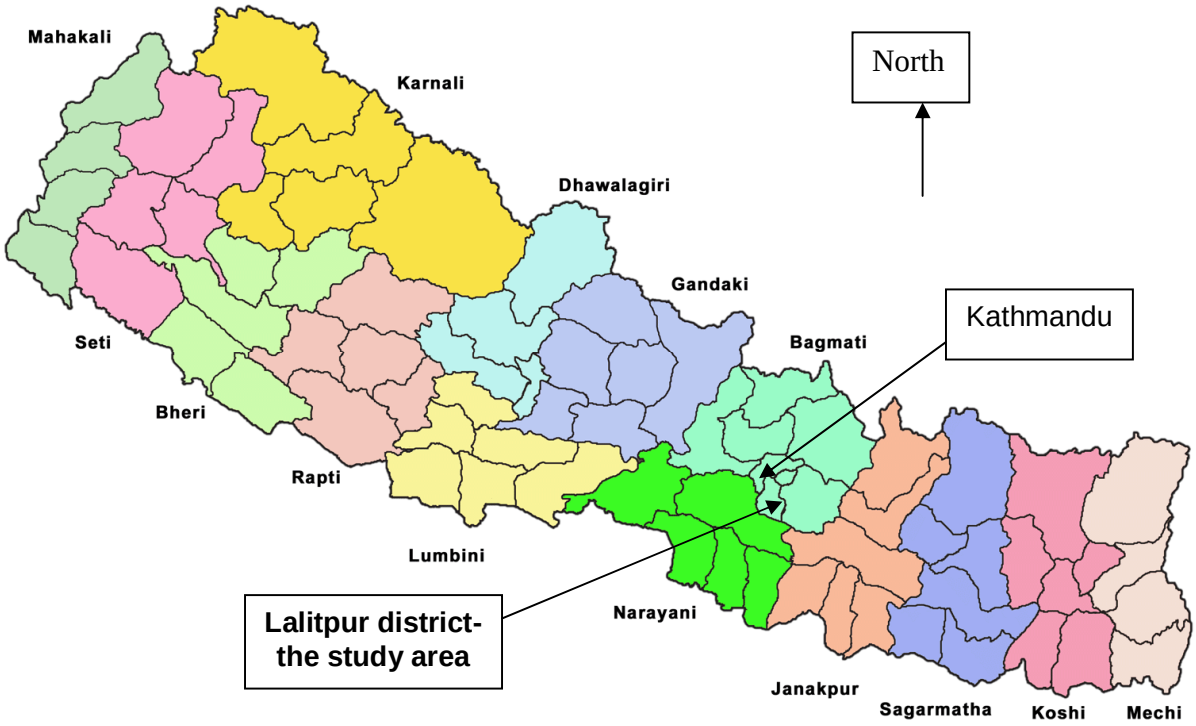

Figure 5: Map of Nepal
Source: Sahara Nepal (2010)

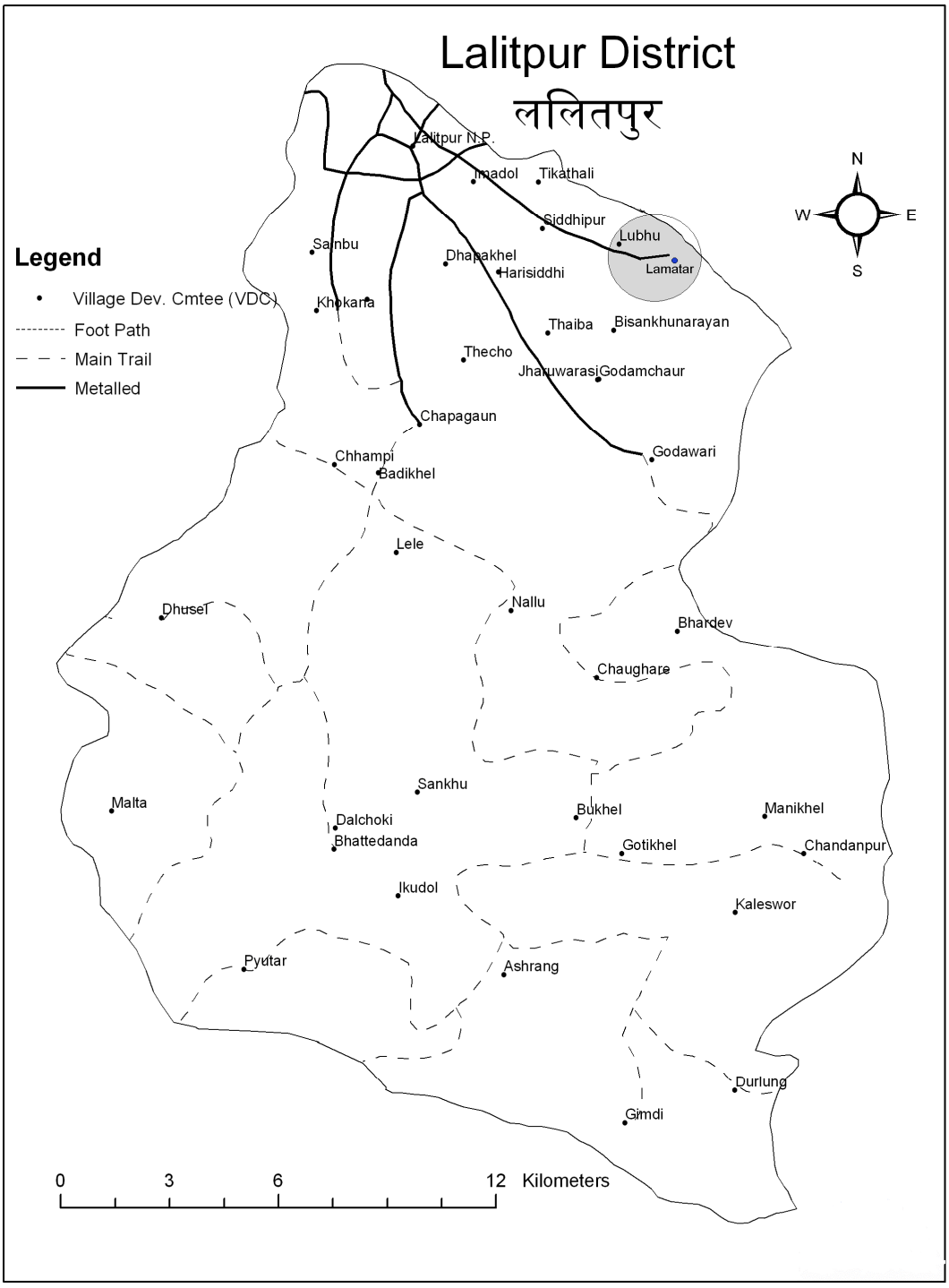

Figure 6: Lalitpur district map showing research areas (highlighted)
Source: Digital Himalaya (2010)

3.2 Selection of tomato growers

The target population for this study was the tomato growers of the selected areas. The farmers who grow tomato and sell were selected as respondents. A list of tomato growers was obtained from the Agriculture Service Centre (ASC) Lubhu, the field level unit of DADO. A total of 20 tomato growers 10 from each of the VDCs were selected purposively for this study. For selecting sample household, sampling frame was entered into excel sheet and sample of predetermined size was selected with the help of computer. Probability of choosing an element as sample was 56 percent and 63 percent in Lamatar and Lubhu, respectively (table 2).

Table 2: Sample size distribution by VDC in the study area

VDC	Total growers (No.)	Sample size (No.)	Percent
Lamatar	18	10	55.56
Lubhu	16	10	62.50
Total	34	20	58.82

3.3 Selection of wholesalers and retailers

A list of vegetable wholesalers was obtained from Kalimati Fruits and Vegetables Market Development Board (KFVMDB) and ten wholesalers were purposively selected for our study. Similarly, ten retailers from Lagankhel vegetable market were also selected for our study (list of wholesalers and retailers is given in appendix M).

3.4 Sources of information

For our purpose, two sources of information were used: primary and secondary. Information like land holding and farm size, farm gate price, cost of production, packaging, transportation and marketing system and marketing constraints, were collected from primary sources. Likewise, secondary data were collected from the publications of government agencies, such as Ministry of Agriculture & Cooperatives, Ministry of Finance, Agribusiness Promotion & Marketing Development Directorate, Vegetable Development Directorate, Kalimati Fruits & Vegetables Market Development Board, and District Agricultural Development Office. Information was also collected from internet search and reports of other individuals and agencies.

3.5 Methods of data collection

This research has qualitative and quantitative approach and is based on empirical data, literature and documents. In order to carry out any field research and draw meaningful conclusions, it is very crucial that the methods and techniques of data collection be precise and accurate. For this purpose, case study (interview, focus group discussion and observation) and desk study were applied.

Desk research was conducted in the beginning of July 2010 while field study was conducted from 3rd week of July to 3rd week of August, 2010. Data analysis and write up was done till 10th September, 2010.

3.5.1 Case study

The case study is a type of research during which the researcher tries to gain a profound insight into one or variety of objects or processes that are restricted in time and space (Verschuren and Doorewaard, 2005). The aim of the case study was to collect the primary information from the field. The methods used under the case study were interview, observation and focus group discussion.

Interview

The primary data were collected with semi-structured interview from grower farmers, wholesalers and retailers. Purposive random sampling was used in collecting data. Case study was applied for the study where 20 farmers, 10 wholesalers and 10 retailers were interviewed with semi-structured questionnaire. Ten farmers were selected from each of Lubhu and Lamatar village development committees of Lalitpur district. Wholesalers were purposively selected from the Kalimati wholesale market, whereas retailers were also selected from Lagankhel vegetable market. The data regarding the scale of production, cost of production, packaging and grading, means of transportation, sources of marketing information and selling of products, problems on production and marketing were collected from the farmers. On the hand, data on prices and quantity bought and sold, pricing system, means of transportation, means of packaging, storage facility, marketing margin, marketing problems were collected from wholesalers and retailers.

Observation

Visits were made to the study sites by the researcher during the harvesting season and direct observations were done on marketing systems and farm activities. Furthermore, market visits were also done to observe different activities.

Focus group discussion

Focus group discussion is one of the important tools used for identifying and prioritizing production and marketing problems. Therefore, information on production and marketing constraints of vegetables, in general, and tomato, in particular, was collected by group discussion with the respondents.

3.5.2 Desk study

The desk study was done through reviewing literature related to agricultural marketing, marketing system, marketing channels, government plan and policy in agricultural sector. Information was extracted from reports, journals, books and internet search.

In addition, as key informants, government officials from Vegetable Development Directorate, District Agriculture Development Office, Agribusiness Promotion and Marketing Development Directorate, Kalimati Fruits and Vegetables Market Development Board and Department of Agriculture were also consulted. They were asked to know the current

government policies and programs towards the production and marketing of vegetable crops in general and tomato in particular. In addition, they were asked to focus on production and marketing problems.

3.6 Methods and techniques of data analysis

Information thus collected was coded, tabulated and analyzed using Microsoft Excel. For the analysis of socioeconomic data such as land holding, farm size, farming experience, simple descriptive statistics such as average, standard deviation and percentage were used. Likewise, the economic analysis was done through gross margin analysis, marketing margin, value share; producer share and index of marketing problem. Results were presented in descriptive, graphical and tabular forms.

3.6.1 Gross margin

The gross margin is a simple and quick method of planning changes in activity(ies) or analyzing a farm enterprise. The gross margin of a particular enterprise is the difference between the gross revenue earned and the variable costs 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). In this analysis, only the gross revenue and the variable costs incurred are taken into consideration. It will be worthwhile to define the terms gross revenue and variable costs. The former term refers to the value of production of main product and by-products at market price, while the latter term includes those costs that vary with the level of production and are not incurred when there is no production. For example, cost of seed, fertilizer, pesticides, wage for temporary labourers, etc. Mathematically,

GM= GR-VC

Where,

GM= Gross margin

GR= Gross revenue

VC= Variable costs

3.6.2 Marketing margin and producer's share

Marketing margin is the difference between the farm gate price and the retailer's price, which can be calculated as follows:

Marketing margin (MM) = Retailer's price (P_r) - Farm gate price (P_f)

Marketing margin indicates the efficiency of marketing system because it refers to the efficiency of intermediaries between the producer and consumer in respect of the services rendered 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 (PS) is the price received by the farmer expressed as percentage of the retail price, that is, the price paid by the consumers. It can be calculated by the following formula:

$PS= (P_f/P_r)_* 100$

Where,

P_f = farm gate price (producer price)

P_r = retailer's price

An increase in the producer's share is the indicator of increase in the efficiency of marketing system in the favor of producer farmers, and vice-verse. A decrease in producer's share indicates that the middlemen are gaining the larger share.

3.6.3 Value share

It is the percentage of the final, retail price that the actor earns and can be calculated by dividing the added value by the final retail price and then multiplying with 100 to express in percentage.

Mathematically,

Value share (VS) = (Added value /final retail price)* 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.

3.6.4 Index of production and marketing problems

Scaling technique provides the direction and attitude of the respondents towards propositions. Farmers' perception towards the production and marketing problems can be presented by five point scale comprising most serious, serious, moderate, a little bit and the least serious. The scale value of 5, 4, 3, 2 and 1 was used to most serious, serious, moderate, a little bit and the least serious respectively (figure 7). Mathematically, the index of importance of problems can be computed by the formula:

$I_{imp} = \sum(S_i f_i/N)$

Where,

I_{imp} = Index of importance

$\sum$ = Summation

S_i = Scale value

f_i = Frequency of respondents

N = Total number of respondents

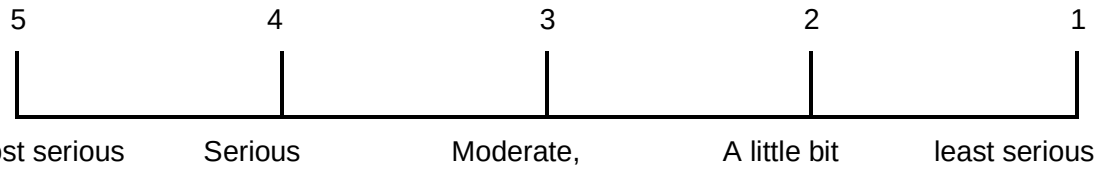

Figure 7: Scale of rating

CHAPTER 4 RESULTS AND DISCUSSION

This chapter describes the findings of the study that were obtained from the analysis of data. These findings include description 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 price behavior, market information, volume of tomato arrivals, analysis of marketing practices, market centres; and problems related to production and marketing. These findings are presented in the following sub-headings.

4.1 Description of study area

Lalitpur district is located in the east south direction of Kathmandu, the capital city. Agriculture is the main source of livelihood for the population. The total population living in the district is estimated to be 337,785 of which 49 percent are female and 51 percent male with population density of 877 per square km (District Agriculture Development Office, DADO, 2009). The total cultivated land is estimated to be 14,000 hectare (ha) out of which 48 percent land is irrigated and rest is rain fed. More than 56 percent population of the district is economically active, whereas it is about 36 percent in agricultural sector (District Development Committee, 2004).

There are 41 village development committees (VDCs) and one sub-metropolitan city in the district. The dominant crops grown in the district include cereals, vegetables and fruits. Bungamati, Khokana, Sainbu, Chhampi, Lamatar, Lubhu, Tikathali, Thaiba, Godamchaur, Imadol, Badikhel, Thecho, Sunakothi, Lele, Bhattedanda, Chandanpur and Gotikhel VDCs are famous for growing vegetables on commercial scale. Currently, the production of vegetables has increased from 57,608 ton in 2008 to 61,504 ton in 2009 (DADO, 2009). Lamatar and Lubhu VDCs were purposively selected for the study. These two VDCs are located at 9 km and 7 km respectively in the east from the district head quarter. These VDCs are very famous for vegetable production in the district. The vegetables extensively grown in these VDCs are potato, cauliflower, cabbage, broad leaf mustard, radish, tomato, cucumber, brinjal, beans.

4.2 Land holding size

The total cultivable land in the district is estimated to be 15,296 hectare, of which 14,000 hectare land is under cultivation. Table 3 shows that more than 40 percent households (HHs) have less than 0.5 ha land and very negligible HHs have more than 10 ha of land.

Table 3: Size of landholding

Size of landholding (ha)	Number of households	Area (ha)
<0.5	8,578 (43.1)	1,271
0.5-1.0	4,695(23.6)	3,482
1.0-2.0	5,291(26.6)	5,669
2.0-5.0	1,161(5.8)	3,629
5.0-10.0	174(0.9)	1,081
>10.0	12(0.1)	164
Total	19,911(100)	15,296

Source: DADO (2009). Note: The figure in parenthesis represents percentage

In study area, it was found that on average 45 percent HHs had less than 0.25 ha land (figure 8). In particular, half of sampled HH in Lubhu had less than 0.25 ha, whereas 50 percent HH had land holding between 0.25 and 0.5 ha in Lamatar. On an average 15 percent HH had more than 0.5 ha land.

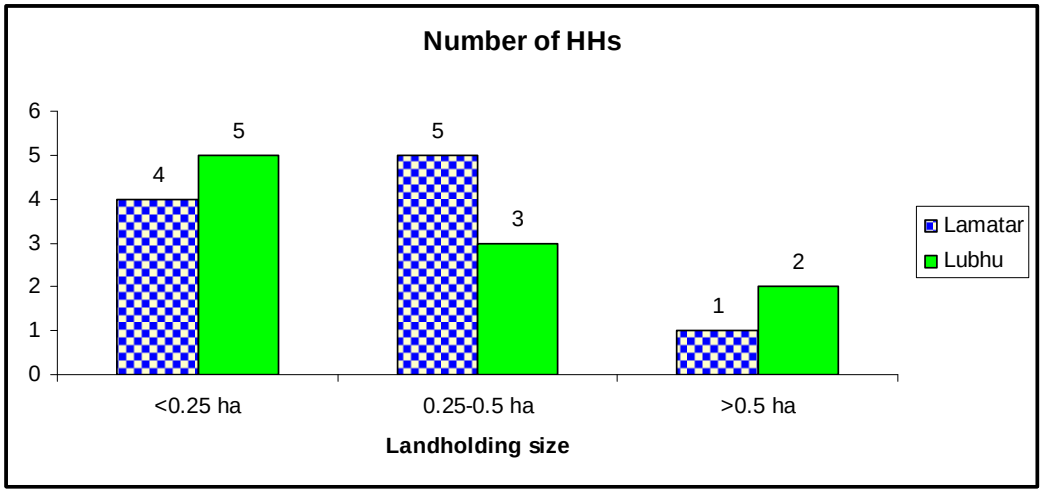

Figure 8: Land holding size of study area
Source: Field study (2010).

4.3 Farming experience

Farming experience is an important variable in determining the quality and quantity of production as well as the adoption of new production technologies. In this study, it was observed that 45 percent of the farmers have been cultivating tomato for last ten years. It is interesting to note that 40 percent farmers in Lubhu had more than 10 years experience in tomato growing (figure 9).

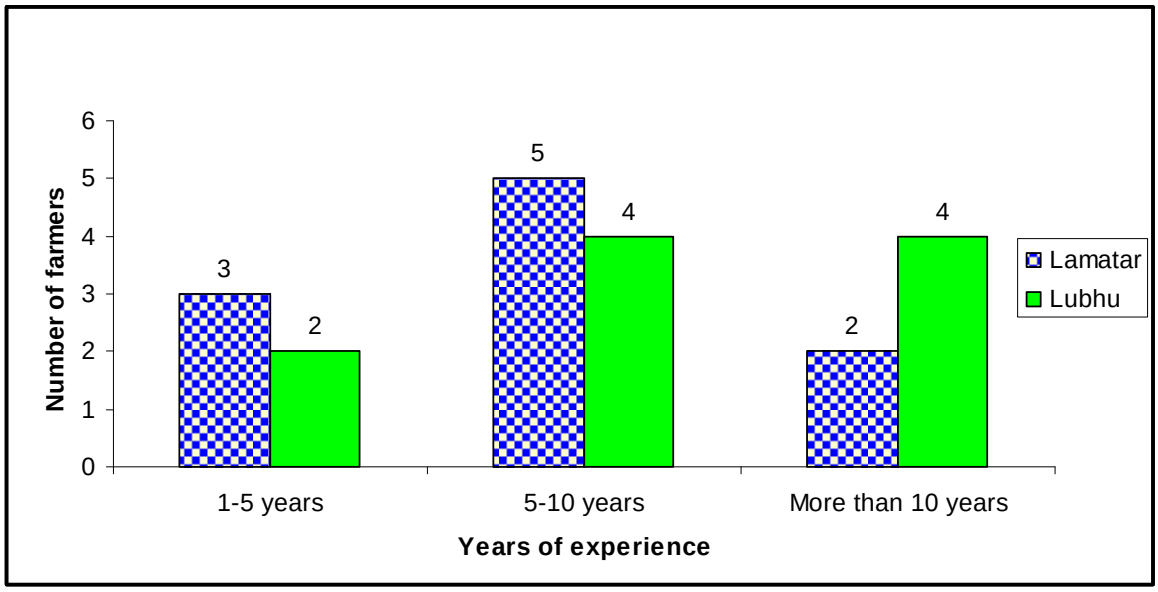

Figure 9: Farmers' experience in tomato growing

Source: Field study (2010)

4.4 Economics of production of tomato

Tomato crops require higher amount of different inputs for successful cultivation and require proper care and management. Plastic tunnel, manure and chemical fertilizer, pesticides, irrigation and labour required for transplanting seedlings, weeding, manuring, harvesting constituted in variable costs. It was found that farmers took land on lease. The result showed that the average cost of cultivation was Rs. 23180 per Ropani (table 4). In particular, the cost of production was higher in Lamatar. This is due to human labour supplied from outside the family. Moreover, the average cost of production per kg is about Rs 8.

Table 4: Economics of production of tomato and gross margin in the study area

Variables	Location		Average
	Lamatar	Lubhu	
Cost of production (Rs/ropani).	25078	21282	23180
Average cost (Rs/Kg)	8.22	6.65	7.44
Yield(Kg/ropani)	3050	3200	3125
Gross revenue (Rs/ropani)	91500	96000	93750
Gross margin (Rs/ropani)	66422	74718	70570
Benefit cost ratio	3.65	4.51	4.08

Source: Field study (2010) Note: 1 ropani = 0.05 ha

Marketing Research and Statistics Management Program (2006) has reported that per kg cost of production of tomato in open system was about Rs 4. In our case the cost of

production was Rs.7.44 per kg because this cost was calculated for tomato grown under the plastic tunnel in off-season. Therefore, the cost per kg of tomato was higher. However, the gross revenue and gross margin was higher in Lubhu because of higher yield. Same is also true in case of benefit cost ratio. According to Pokhrel (2010), the cost of production and net profit of tomato was estimated to around forty thousand rupees and one hundred and seventy thousand rupees per ropani in Hemja of Kaski district of Nepal. So the cost of production and net profit differ from place to place.

"Tomato growing changed my life"

"I am Nishan Rai. I am a smallholder farmer in a village called Lubhu in Lalitpur district. I am married and father of three children. I started vegetable farming in 2003. Mr. Ram Prasad Ghimire, Junior Technician at Agriculture Service Centre, Lubhu and other staffs of District Agriculture Development Office, Lalitpur inspired me for tomato growing. From my 12 ropani of land, I have set aside 4 ropani for vegetables, among which I have planted tomato in 2 ropani under the plastic tunnel. The cost of production under this tunnel is expensive. In first year this cost reaches up to Rs.30,000. Besides, I have grown brinjal, beans, coriander, bottle gourd, bitter gourd. From the income of vegetable farming, I have built this house for my family, opened small shop, and sent my children in boarding school.

Usually I prefer to sell my produce in Lagankhel vegetable market because it is near for us and there is direct bus service. My wife helps me in selling vegetables in open market which starts at 4 o'clock everyday. On an average I sell vegetables of worth Rs. 500 daily and I have to pay rent for open space to Lalitpur municipality. This year the price of tomato has increased to 25 percent as compared to previous year. This is good news for retailers. Tomato growing has changed my life. When asked about problems you encountered in tomato growing, then he replied that "seed, fertilizers and other agricultural inputs are expensive; we don't get these during growing seasons, we don't get pure vegetable seeds. Diseases and insect pests, high transportation cost, frequent strikes (Nepal banda) are other important problems for us. We have needed improved applicable technologies. If the government is really in favour of farmers, agricultural inputs should be made available in the market so that farmers can purchase when they need.

4.5 Marketing channel

According to Acharya and Agarwal (1999), the marketing channels for vegetables vary from commodity to commodity, from producer to producer, lot to lot and time to time. In Nepal, agricultural commodities move from the farmer's field to consumers through several channels. As mentioned in section 2.3, according to Thapaliya (2006), generally there are three types of marketing channels followed in marketing of vegetables.

Survey results also showed that farmers of Lamatar and Lubhu were using three types of marketing channels to dispose tomato in two markets-Kalimati and Lagankhel. First, it involves disposing tomato directly to consumers, disposing to wholesalers to retailers to consumers and finally, disposing to consumers through retailers (figure 10). In second two channels the brokers are involved in selling of tomato in commission basis by matching up producers and buyers and help them to negotiate a price and volume of produce. They don't buy the produce but often earn the commission, so they aren't really traders but service providers. In addition, it was also found that about 60 percent tomato passes to consumers through the second channel.

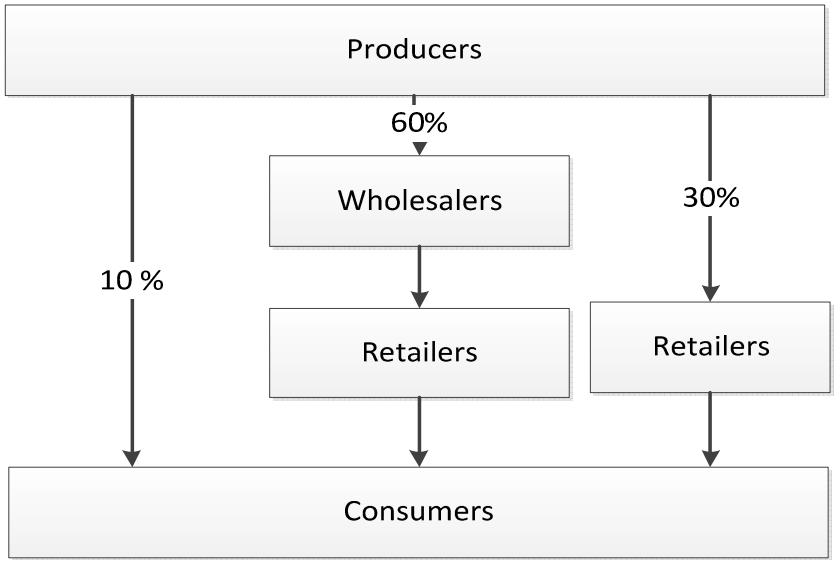

Figure 10: Marketing channels in study area

4.6 Marketing margin and producer share

Marketing margin refers to the difference between the retailer's price and farm gate price. Likewise, producer's share is the percentage share of producer on consumer rupee, i.e. retailer's price. Marketing margin and producer share give an indication of efficiency of existing marketing system. Lower marketing margin and higher producer share on retail price ensures efficiency of marketing system (Bastakoti, 2001). Keeping this concept in mind, marketing margin and producers' share was worked out in our study.

The marketing margin was estimated to be Rs. 20/Kg and producer share in the study area was 67 percent (figure 11 and appendix G). We found that producer share was highest among three actors. Singh (2010b) found 61 percent producer share in tomato marketing chain in India. So the producer share in the study area is higher than in India. KIT and IIRR (2008) reports that value share of farmer, travelling trader, wholesaler and retailer in the tomato value chain in Kenya was 56 percent, 8 percent, 6 percent and 30 percent respectively. Paudel (2006) also found producer share from 57 to 63 percent in marketing system of cauliflower. Chauhan and Singh (1998) indicated that the producer's share

declined drastically with the increase in the number of intermediaries. They have suggested for a need in improving the efficiency of marketing channels.

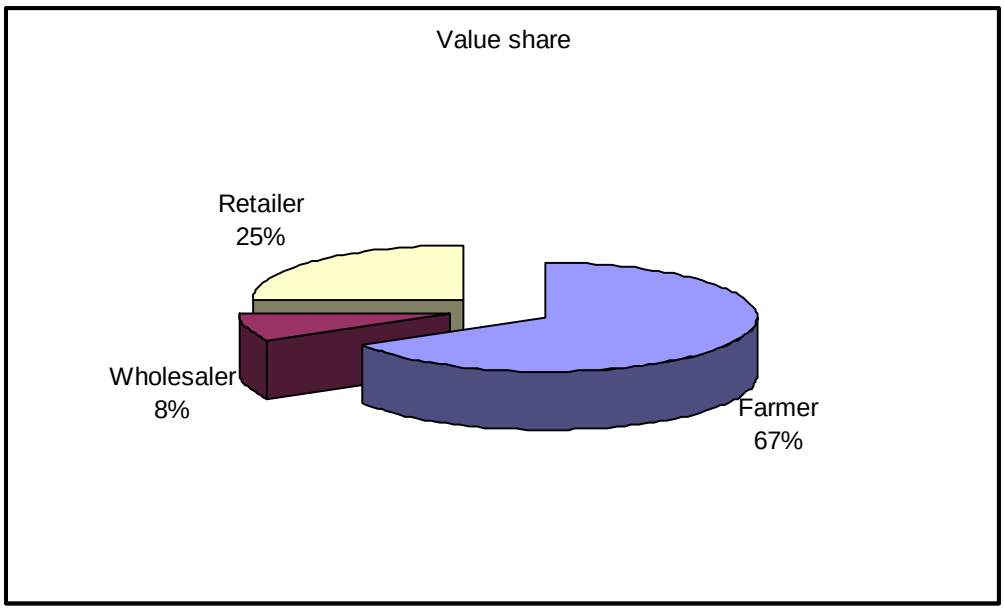

Figure 11: Value share among actors

4.7 Mode of selling

After bringing tomato into the market, the farmers have to decide over the ways of disposing products. There were two ways of disposing tomato in the market. The first way was by bargaining with wholesalers, retailers and consumers. Farmers were found selling either by bargaining with retailers and consumers directly or by lump sum selling of tomato to wholesalers. The price fixation depends upon the demand and supply situation of vegetables in the market at that point of disposal (Piya, 2001). In lump sum dealing, disposing vegetables takes very little time because dealing is done for whole quantity of products. In this mode of disposing vegetables, profit those farmers fetch largely depend upon the ability of farmers to bargain with the buyers. The second mode was disposing vegetables in commission. In this case, generally brokers take the responsibility of selling all the products in the market place and in return farmers have to pay certain percentage in the form of commission. The price received by farmers depends upon the capability of brokers to charge higher prices.

Table 5: Mode of selling tomato by location

Mode of selling	Farmers of		Total	P- value
	Lamatar	Lubhu		
In commission	7(70)	4(40)	11(55)	
By bargaining	3(30)	6(60)	9(45)	0.178
Total	10(100)	10(100)	20(100)	

Source: Field study (2010). Note: The figure in parenthesis represents percentage
At 5% level of significance and 1 degree of freedom (df).

From table 5 it is depicted that on an average 55 percent farmers sell their tomato in commission. By location, the mode of selling tomato in commission is higher in Lamatar than in Lubhu. Opposite is true for selling by bargaining. However, there is not any significant difference between Lamatar and Lubhu in mode of selling, which is confirmed by chi-square test.

4.8 Price behavior

Generally the price of tomato fluctuates markedly not only seasonally, but also daily and hourly due largely to uncertainties in demand and supply (Adepetu, 2010). Table 6 presents the descriptive statistics of monthly wholesale prices of tomato at Kalimati wholesale market in Kathmandu for the period from Bhadra 2066 to Shrawan 2067. Tomato product quality is broadly categorized into two types: small and big. It was found that there was great variation in prices of smaller type of tomato than the big one.

Table 6: Average wholesale price of tomato in Kathmandu

(Unit: Rs/Kg)

Tomato type	Mean	Standard deviation	Maximum	Minimum
Tomato big	30.42	8.83	45	16.91
Tomato small	28.63	12.98	44	11.21

Source: Kalimati Fruits and Vegetable Market Development Board (KFVMDB, 2010) with own calculation

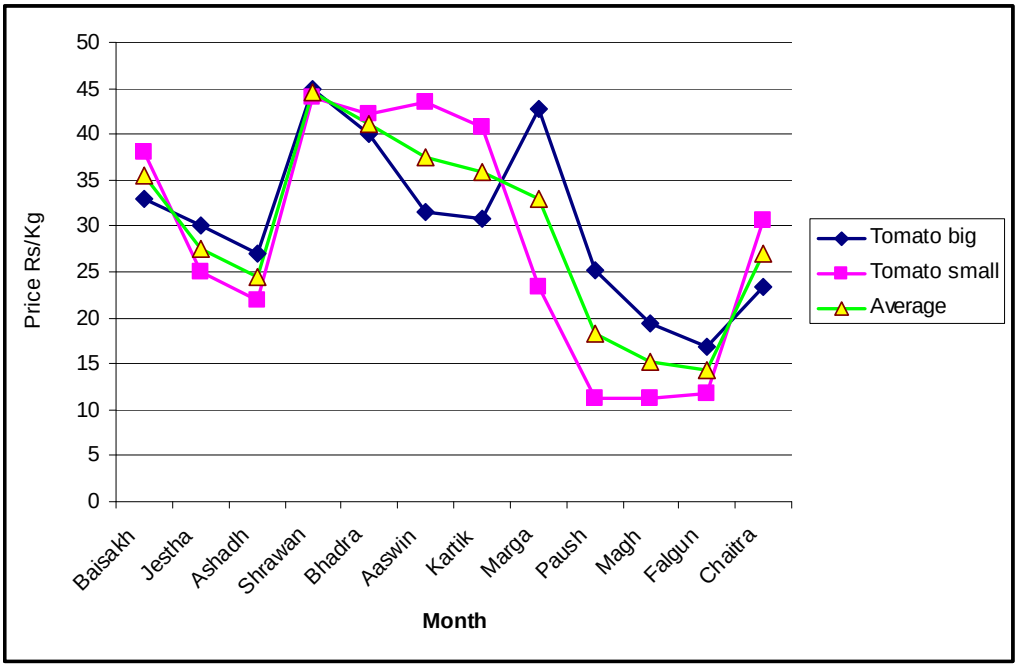

Figure 12: Monthly wholesale prices of tomato in Kalimati market
Source: KFVMDB (2010)

The trend of price fluctuation has been shown in figure 12. It clearly depicted that the wholesale prices of both types of tomato has sharply increased in Shrawan month where the price is recorded as most expensive. Afterwards prices have tended to decrease. However, the price of small tomato is expensive than the big one. After the month of Kartik, the price of big tomato has again increased in Marga month. Then price has started to fall till Falgun and starts again increasing.

A wholesaler's tale

Kumar Shrestha, 47, is a wholesaler at Kalimati fruits and vegetables wholesale market. He is a bread winner of 4 family members-wife, two children. He is a resident from Bhadrabas village development committee of Kathmandu district; and has been engaged in wholesaling of vegetables for more than 20 years. He transacts all kinds of vegetables grown in season and off-season. He brings these vegetables from production pockets of Kathmandu, Lalitpur, Kavre and Bhaktapur districts. During off-season, he mainly sells 'Roma' and 'Manisha' varieties of tomato. The daily transaction of tomato is recorded to 12000 Kg and 3000 Kg tomato in harvesting season and off-season of growing respectively. He usually uses plastic crates for packaging and pick-up van for transportation of tomato. Telephone call is the most frequently used means of market information. When asked "who fixes the wholesale price of tomato?" then he replies that wholesalers are the persons who fix price daily. He also mentions that retailers are benefitting more from vegetable business than farmers and wholesalers.

"I buy tomato at Rs. 38-40 per kilo and resell at Rs. 40-45 per kilo".

Some of the constraints that are most pertinent to mention include frequent strikes called by different pressure groups, high cost of transportation, lack of storage and processing facilities, lack of market sheds, market glut of tomato.

4.9 Market information

Market information includes information on price, product demand and supply, buyers and sellers. It is very important to have up to date knowledge and access to timely market information in order to reduce the risk of losing money on a market transaction (Teka, 2009). The different key actors in tomato marketing rely on different sources for up-to-date information on tomato price. Adepetu (2010) reports that the farmers depend on personal interaction with fellow farmers, transporters, yan-wazi (assemblers) and dillali (commission agent). In addition, these latter groups also rely on interaction among themselves as well as bulk purchasers. From table 7, it appears that 55 percent farmers received market information from neighbors and friends followed by radio and telephone call to market centres. Neither farmers nor traders (wholesalers and retailers) were using newspaper as a source of market information. For wholesalers, telephone call is the most reliable and frequently used source of price information, while retailers use different sources-telephone call, neighbors and friends and radio broadcast-for price information. Nowadays, farmers are using mobile phone to get market information. Milagrosa (2007) reports that 35 percent farmers receive vegetable price information from other farmers (friends) only followed by other farmers and radio (31 percent) in the Philippines.

Table 7: Sources of market information

Sources of market information	Farmers	Wholesalers	Retailers
Radio	2(10)	1(10)	1(10)
Television	1(5)	0(0)	1(10)
Newspaper	0(0)	0(0)	0(0)
Telephone call to market centre	6(30)	7(70)	5(50)
Neighbours and friends	11(55)	2(20)	3(30)
Total	20(100)	10(100)	10(100)

Source: Field study (2010) Note: The figure in parenthesis represents percentage.

There are authentic sources of market information, such as price bulletin broadcast by Radio Nepal. This price bulletin is collected by Kalimati Fruits and Vegetables Market Development Board (KFVMDB), and is sponsored by Agribusiness Promotion & Marketing Development Directorate (APMDD). The Radio Nepal broadcasts the wholesale price bulletin at 6:35 pm every day. This price bulletin is also available at www.kalimatimarket.com, www.agribiz.gov.np and www.agripricenepal.com. Local F.M. radio stations are nowadays broadcasting the price information of agro produce. These radio stations are Damauli F.M. Tanahun, Madapokhara F.M. Palpa, Waling F.M. Syangja, Birtamod F.M. Jhapa, Parasi F.M. Nawalparasi and Annapurna F.M. Pokhara (Capacity Building on Agricultural Marketing and Market Management Project, 2009). The present wholesale price dissemination should be accompanied with other market information like purchasing price, information on demand and supply of vegetables, market arrivals, information on production pocket areas of major vegetables in different parts of the country. The government should focus on market oriented agriculture development programs.

4.10 Tomato arrivals in Kalimati market

The total arrival of tomato in the Kalimati wholesale market, the biggest agricultural market in the country, is found to 21,046 ton from the month of Bhadra 2066 to the month of Shrawan 2067. As mentioned in section 4.8, tomato is sold in two types: big and small. The share of small tomato comprised of about 80 percent of the total volume of arrivals (appendix J). Besides, the highest amount of tomato was recorded in the month of Chaitra and Jestha followed by Falgun, Baisakh and Ashadh (figure 13).

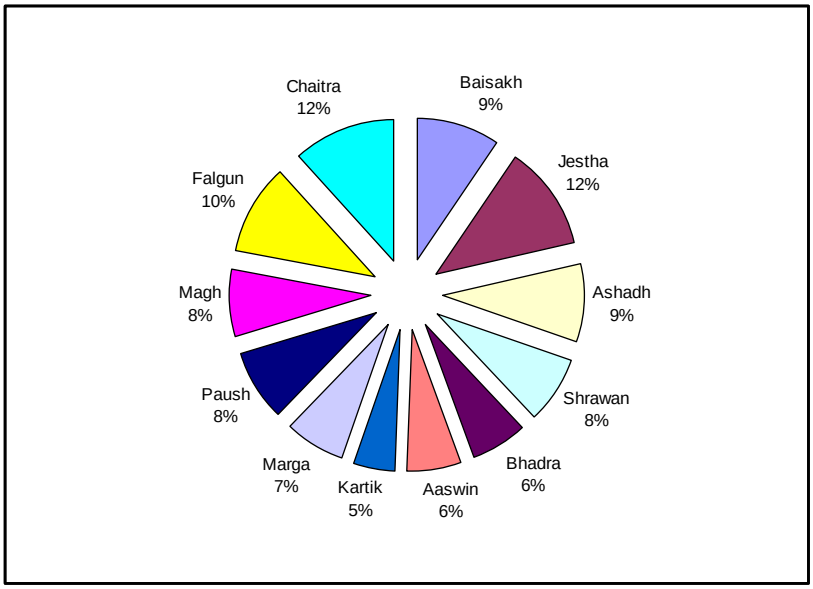

Figure 13: Tomato arrivals in Kalimati wholesale market by month
Source: Kalimati Fruits and Vegetables Market Development Board (KFVMDB, 2010), with own calculation
Note: Tomato arrivals from Bhadra 2066 to Shrawan 2067

It has also been found that tomato in the Kalimati wholesale market comes from different districts-Kavre, Lalitpur, Kathmandu, Bhaktapur, Dhading, Bara, Chitwan, Dhanusha, Jhapa, Makawanpur, Morang, Nuwakot, Nawalparasi, Parsa, Rautahat, Sarlahi, Sunasari, Tanahun of Nepal and India. Dhading, Kavre and Sarlahi districts come to first, second and third position in terms of supply to Kalimati wholesale market of Kathmandu because these are leading producers (figure 2 and 14).

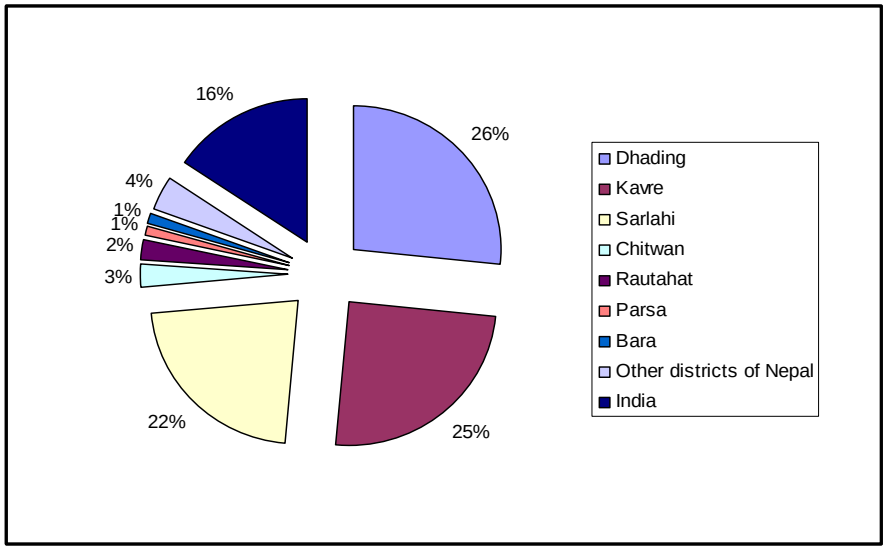

Figure 14: Tomato arrivals based on source of supply

Source: KFVMDB (2010), with own calculation

According to Thapa and Paudyal (2003), tomato comes to Kalimati wholesale market from Sarlahi, Dhanusa, Bara, Chitwan, Morang districts during October to February; from Dhading and Nuwakot districts during March-May; and Kathmandu, Kavre, Bhaktapur, Dhading and Lalitpur districts supply tomato from June to September in the Kalimati wholesale market. It is interesting to mention that the share of tomato from India comprised of about 16 percent.

4.11 Analysis of marketing practices

4.11.1 Standards and grading

From the agronomic perspective, the quality and long shelf life of agro produce start with production. Almost all traders (wholesalers and retailers) mostly like mature ripe tomato of large size with good flesh content. This type of tomato is needed especially for raw use *(salad)* in hotels and restaurants. But housewives and their family members prefer to buy small sized tomato for *chatani.* This is also true because tomato in Kalimati wholesale market is sold in two sizes-big and small. Tomato selling was usually done by sorting size and level of maturity a buyer demand in the markets. Out of 20 farmers interviewed, 75 percent farmers of the study areas were found to do grading because small scale growers were not grading. All wholesalers and 90 percent retailers had used grading before selling (figure 15). They are aware about the grading because they know that graded tomato fetch high prices.

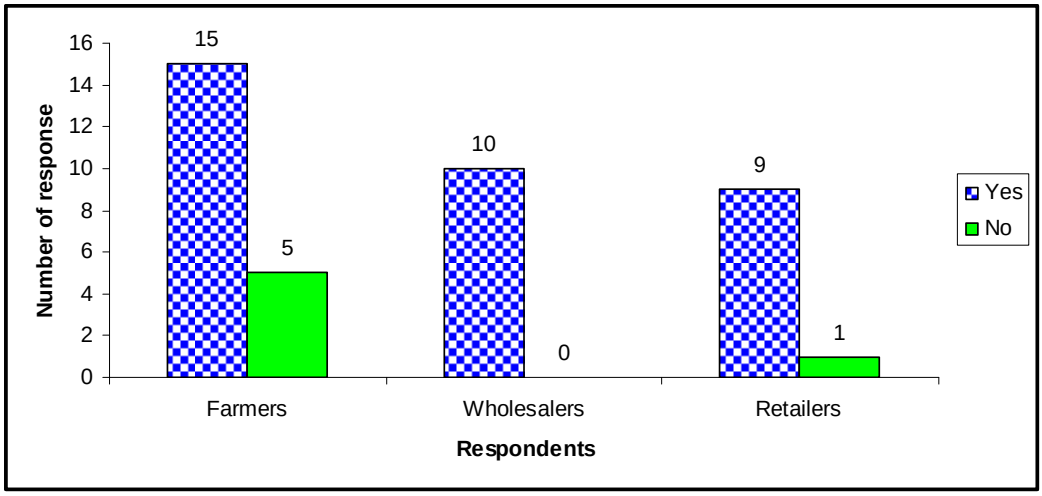

Figure 15: Response towards grading
Source: Field study (2010)

4.11.2 Packaging

Proper packaging of tomato is very important for keeping quality. Almost all respondents were found to use plastic crates for packaging. 80 percent farmers were found to use plastic crates for packaging during transportation. Producers still use traditional packagings such as *doko* (bamboo basket). This doko can be made with bamboo which is easily available in production areas. Although plastic crates are expensive all traders (wholesalers and retailers) were found to use plastic crates for packaging (figure 16). Plastic crate reduces the

losses during handling (loading, unloading and transportation) because Agro Enterprise Centre (2005) has pointed out 5-10 percent spoilage during handling of tomato.

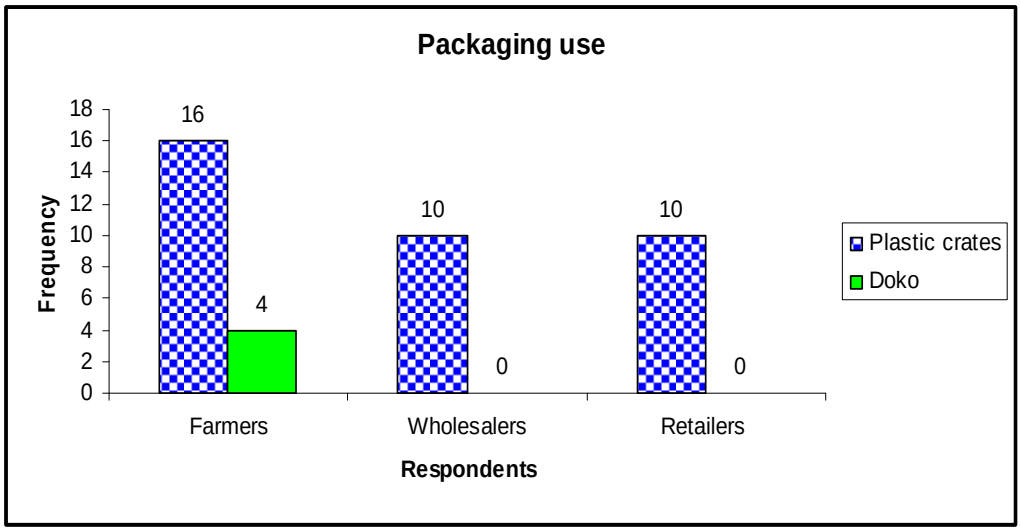

Figure 16: Response towards packaging

Source: Field study (2010)

4.11.3 Transportation

In Nepal vegetables are transported from production areas and collection centres to markets mainly on truck and bus. No specialized vehicles are used for transportation of perishable vegetables. In research area, most of the farmers were selling tomato at farm level because of good road network. Wholesalers were found to go to the farmer's field to buy tomato with their own vehicle. Tomato was transported from farmers' field to the market centres with bus and pick-up van. Retailers were found to transport tomato from wholesale market centres to the retail markets by pick-up van and auto rickshaw (tempo). Retailers were also found using bicycle, motorbike and mobile trading cart "*thela*" for transporting vegetables and tomato in our case.

4.12 Agricultural market centres

Actual buying and selling of horticultural produces in general, and vegetables and fruits, in particular, mainly takes place in different market yards, such as wholesale markets, retail markets, rural periodic markets (*haat bazaars*) and collection centres operated by farmers' cooperatives. In Nepal, there are a total of 1002 market centres in the country (Department of Agriculture, 2008). These markets include wholesale markets, retail markets, collection centres and other rural periodic markets (*haat bazaars*). These are managed mostly by either Agricultural Produce Market Management Committees, local government institutions (municipality, village development committee), farmers cooperative or government departments. Detail of these markets is given in the appendix K. Few markets are not under operation partly due to improper selection of site, politicized market management system and lack of budget for operation of market. Among them, Kalimati wholesale market is the biggest agricultural wholesale market in the country. It is managed by Kalimati Fruits and

Vegetables Market Development Board (KFVMDB) under the Ministry of Agriculture and Cooperatives. Other major agricultural markets in the Kathmandu valley are located in Balkhu, Baneshwor, Tukucha, Lagankhel, Koteshwor, Balaju, Khusibu, Chabahil, Maitidevi, Ranamukteshwor, Bhedasingh, Kalanki, Minbhawan, Bhatbhateni.

In addition, there are some roadside markets used by retailers, street hawkers (cycle vendors, thela and doke) and farmers.

4.13 Constraints in tomato production and marketing

Vegetable growers in the study area have faced several constraints related to production of vegetables in general and tomato in particular. Production constraints faced by vegetable growers are mentioned in table 8. It is clearly depicted that farmers were constrained by high input costs and timely unavailability of agricultural inputs (chemical fertilizers), quality seeds and lack of technical knowhow with first, second, third and fourth rank, respectively.

Table 8: Index of production constraints

Problems	Location		Average	Rank
	Lamatar	Lubhu		
Problem of diseases	4.1	4	4.05	4
Problem of insect and pests	4	4	4	5
High costs of input	4.9	4.8	4.85	1
Lack of irrigation facilities	3.9	3.9	3.9	6
Weak extension support services	4.2	4.3	4.25	3
Timely unavailability of chemical fertilizers	4.9	4.8	4.85	1
Unavailability of pure seeds	4.4	4.4	4.4	2
Unavailability of loan	3	3.2	3.1	7

Note: Respondents were asked to rank the problems ranging from most serious problem to the least serious problem by assigning 5 to 1 scales.

It is worthwhile here to mention that unavailability of loan was the least problematic issue. Most of farmers were found to take loan from neighbours and friends; and wholesalers in advance contract. Farmers also complained that loan from formal financial sources is a tedious job and long process. Adhikari (2002) also mentioned unavailability of pure seeds, disease and insects, timely unavailability of agro inputs as problems in production of cauliflower.

Tomato growers in the research area have faced several constraints related to disposal of tomato in the market. The topmost problem faced was frequent transport obstruction called by political parties and pressure groups, followed by high cost of transports, lower price in the market (table 9). Lack of storage facilities was the least problematic issue mentioned by farmers because they directly sold tomato on same day of harvest. In marketing of vegetables, Karki (2003) has also identified frequent fluctuation of market prices, lack of marketing information, Nepal banda (Nepal shut out), inappropriate transport facilities as

constraints in marketing of vegetables in Kathmandu valley. So the problems faced by vegetable producers are mostly similar.

Table 9: Index of marketing constraints

Problems	Location			
	Lamatar	Lubhu	Average	Rank
Lower price of tomato	4	3.7	3.85	2
Lack of market information	3.8	3.3	3.55	5
Unorganized market	3.9	3.4	3.65	4
Fluctuation in market price	3.8	3.8	3.8	3
High transportation cost	3.9	3.8	3.85	2
Lack of storage facilities	3.6	3.4	3.5	6
Lack of processing facilities	3.7	3.6	3.65	4
Frequent transport obstruction	4	4	4	1

Note: Respondents were asked to rank the problems ranging from most serious problem to the least serious problem by assigning 5 to 1 scales.

The constraints indicated by farmers were also in line with view of government officials and traders (wholesalers and retailers). They also mentioned that frequent strike called by different political parties and pressure groups was the first and foremost constraint in marketing of vegetables including tomato. In addition, they mentioned that there is an urgent need of agricultural marketing act because at present agricultural markets are operated either according to the Development Board Act or Agricultural Produce Market Management and Operation Directive 2053. Agricultural marketing act provides guidelines to regulate market, specifies the duties and authorities, taxes and charges and their exemption. Furthermore, this act supports investors in decision making process regarding the investment in the field of agricultural marketing.

4.14 Government's set up in vegetable production and marketing

There are different government institutions involved in promotion of vegetable production and development of marketing infrastructure. These are described here.

4.14.1 Agribusiness Promotion and Marketing Development Directorate

Agribusiness Promotion and Marketing Development Directorate is the central level government institution responsible for carrying out different activities related to agribusiness promotion and marketing development of agricultural products. The broad objective is to help in poverty alleviation and food security through assured and efficient agriculture marketing system. The major functions can be grouped into:

- Marketing infrastructure development (wholesale/retail markets, collection centre, periodic weekly markets, etc.)
- Collection and dissemination of marketing information

- Agricultural marketing research and extension
- Agricultural market management including preparation of rules and regulations for operation of markets
- Agricultural marketing program formulation, implementation and monitoring
- Advocating price policy formulation for agricultural commodities
- Technical backstopping to district agricultural development offices

4.14.2 Vegetable Development Directorate

This directorate has been established with the objective of contributing to increasing farmer' income by increasing productivity of fresh vegetables, vegetable seed, potato, spices, root crops. The major functions are as follows:

- Vegetable seed production
- Seedling production
- Germplasm collection and conservation
- Management of buffer stock of breeder and foundation seed
- Providing suggestion in formulating policy for vegetable production

4.14.3 Kalimati Fruits and Vegetables Market Development Board

Kalimati wholesale market is biggest agriculture wholesale market in the country. This market was established by then Department of Food and Agricultural Marketing Services under the Ministry of Agriculture in 1986. At present, this market is operated under the Development Board Act 1957. This market is the pioneer organized wholesale market where retailers, wholesalers, consumers, farmers procure their supplies of agricultural commodities. The market area is spread over 2.25 hectares of land. There are multipurpose sheds for wholesaling of fruits and vegetables; market sheds for retailers and farmers. This market has following major objectives:

- To increase production and productivity of fruits and vegetables through creating market facilities
- To develop satellite markets outside Kalimati market and collection centres
- To develop backward and forward linkages for sustainable development of agricultural marketing
- To make adequate arrangements for market intelligence

There are more than 400 registered wholesalers, 80 retailers and 26 cooperatives and farmer groups. The market arrival of agro commodities is estimated to be 500-600 tons daily and transaction usually takes place early in the morning. Vegetables rank first in transaction followed by fruits, spices, fishes and other agricultural commodities.

4.14.4 District Agriculture Development Office, Lalitpur

This institution is the district level unit under the Ministry of Agriculture and Cooperatives. This office is responsible for implementation of agricultural development programs at district level. There are different subject specific sections-horticulture development, agronomy, plant protection, agriculture extension, fisheries development, program planning, monitoring and

market development. These sections are led by subject matter specialists with other support staffs. There are six field based units called Agriculture Service Centres (ASCs) which are located in Taukhel, Chapagaon, Lubhu, Chaughare, Bhattedanda, Gotikhel. Agriculture development programs (both production and market oriented programs) are implemented through these ASCs. However, one ASC have to provide extension services for 4 to 6 VDCs, which is difficult task for hilly country like Nepal. So the government extension delivery system is not so effective. Also field staffs don't get opportunity to upgrade their knowledge. In addition, government does not allocate sufficient budget to district agricultural marketing programs. So far as vegetable and market development program is concerned, this district office conducts vegetable demonstration program, distribution of improved vegetable seed/seedlings, trainings, visits and workshops for farmers, traders; construction of agriculture markets (wholesale and retail markets), collection centres, collection and dissemination of market prices; providing extension services free of costs to all concerned.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

This chapter deals with the conclusions based on findings. In addition, this chapter also describes some recommendations made for policy implications.

5.1 Conclusions

Vegetable growing is an important agribusiness in Nepal. Due to increasing consciousness towards the nutritional value of vegetables, the vegetable production in Nepal is in increasing trend. In agricultural sector, Nepal has adopted twenty years' Agriculture Perspective Plan since 1995 and has given focus on production of vegetables in general and tomato in particular. So it is one of the high value crops for Nepalese farmers. Continuous efforts have been made for the development of vegetable crops, but it is still facing several constraints related to production and marketing. Taking these issues into account, this research was conducted to analyze the marketing system of tomato in Lalitpur district.

In the study area marketing system was purely based on private undertakings. Producers and traders (wholesalers and retailers) were the main actors of the marketing system. Producers were found to be involved in selling activity at the farm, and traders were involved in buying, assembling, transporting, selling activities. It was found that producers were selling tomato in two ways-in commission and by bargaining. But most of producers were selling tomato in commission (involvement of brokers) in wholesale market especially to save time and avoid all possible drudgery in the markets. Three types of marketing channels were identified. About 50 percent tomato was found to reach consumers through wholesalers and retailers. Plastic crates were extensively used by almost all actors except few farmers in the marketing system. Bus and pick-up van were used for transportation of tomato from field to wholesale market and to retail markets. But in some cases producers directly retail their produce by vendor on bicycle, *thela* (cart), *doko* (bamboo basket).

Gross margin analysis showed that tomato growing is an important option for smallholder farmers in contributing family income. The producer's share is highest among all actors in the value chain.

Almost all respondents were getting market information from neighbours and friends, and telephone calls as first source of market information. So most of them were found using informal sources to receive marketing information. The study showed that farmers were facing with several constraints related to production and marketing.

From this study, we can conclude that tomato growing is a profitable and potential agricultural enterprise in the research area. For achieving higher return through high efficiency from tomato growing farmers should give emphasis on growing tomato in off-season and mode of selling. Moreover, in spite of selling tomato by bargaining, farmers should focus more on selling in commission. There is an immense need to adopt market oriented policy and programs linking with production in order to enhance production and marketing efficiency in the study area, in particular.

5.2 Recommendations

Based on the findings of the study following recommendations were made, which are useful to policy makers and other agencies who are directly or indirectly involved in development of vegetable crops and agricultural marketing.

- Need to establish vegetable production and marketing cooperatives and sell their produce through group marketing practices
- Agricultural marketing information system should be improved. The present wholesale price dissemination should be accompanied with other information like information on demand and supply of vegetables, market arrivals, information on other markets.
- Government should focus on market oriented agricultural development programs by emphasizing more on marketing extension.
- There should not be any barriers for transportation of perishable agro produces like vegetables.
- Agricultural marketing infrastructure (retail market, collection centres etc.) should be developed in production pocket and rural areas.
- Government should provide agricultural inputs in right time and in required quantity.
- Transportation and storage facilities should be developed.
- Need of agricultural marketing act.
- There should be provision of pure seed of vegetables.
- Field level extension staffs should be upgraded with latest technical knowhow.

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APPENDIX

Appendix A: Major vegetables with area and production in 2008/09

Vegetables	Area (ha)	Production (ton)	Yield (ton/ha)
Cauliflower	29836	399012	13.37
Cabbage	25690	372578	14.50
Onion	16900	196413	11.62
Radish	16570	219230	13.23
Tomato	15572	219194	14.08
Broadleaf mustard	10865	123386	11.36
Brinjal	9265	119104	12.86
Lady's finger	7618	90080	11.82
Peas	7073	47837	6.76
Cucumber	6106	84963	13.91
Pumpkin	5819	73772	12.68
Bitter gourd	4510	49599	11.00

Source: Vegetable Development Directorate (2009)

Appendix B: Share of tomato in total vegetable crops

Vegetables	Area (ha)	Production (ton)	Yield (ton/ha)
Tomato	15,572	219,194	14
Total vegetables	225,154	2,754,406	12
Tomato share %	7	8	

Source: Vegetable Development Directorate (2009)

Appendix C: Farming experience in tomato cultivation by VDC

Location	1-5 years	5-10 years	>10 years	Total
Lamatar	3(30)	5(50)	2(20)	10
Lubhu	2(20)	4(40)	4(40)	10
Total	5(25)	9(45)	6(30)	20

Source: Field study (2010). Note: The figure in parenthesis represents percentage

Appendix D: Farm gate price in 2067

Unit: Rs/Kg

	Month			
	Baisakh	Jestha	Ashadh	Shrawan
Price	30	32	36	40

Source: Field study (2010)

Appendix E: Average cost of production per ropani in Lubhu

Particulars	Unit	Quantity	Rate	Total
Plastic house (tunnel)	No.	3	4500	13,500.00
Compost manure	Kg	650	2	1,300.00
Chemical fertilizers				0.00
• Urea	Kg	3	30	90.00
• DAP	Kg	1.5	24	36.00
Pesticides	Rs	1	1250	1,250.00
Bamboo stakings and other materials	No.	40	100	4,000.00
Seed (variety- Srijana)	Gram	5	200	1,000.00
Sub total				21,176.00
Interest on variable cost	Rs			105.88
Total variable costs				21,281.88
Gross revenue	Rs			96000
Production	Kg	3200	30	96000
Gross margin	Rs			74,718.12
Cost per Kg	Rs			6.65
Benefit cost ratio				4.51

Source: Field study (2010) with own calculation

Appendix F: Average cost of production per ropani in Lamatar

Particulars	Unit	Quantity	Rate	Total Rs
Plastic house (tunnel)	No.	3	4500	13,500.00
Human labour	Man days	15	250	3,750.00
Compost manure	Kg	600	2	1,200.00
Chemical fertilizers				0.00
• Urea	Kg	3.5	30	105.00
• DAP	Kg	2	24	48.00
Pesticides	Rs	1	1500	1,500.00
Bamboo stakings and other materials	No.	35	110	3,850.00
Seed (variety- Srijana)	Gram	5	200	1,000.00
Sub total	Rs			24,953.00
Interest on variable cost	Rs			124.77
Total variable costs	Rs			25,077.77
Gross revenue	Rs			91500
Production	Kg	3050	30	91500
Gross margin	Rs			66,422.24
Cost per Kg	Rs			8.22
Benefit cost ratio				3.65

Source: Field study (2010) with own calculation

Appendix G: Marketing margin and value share

Actor	Selling price (Rs/Kg)	Marketing margin (Rs/Kg)	Percentage share
Farmer	40	20	67%
Wholesaler	45	15	8%
Retailer	60	-	25%

Source: Field study (2010) with own calculation

Appendix H: Wholesale price of tomato

Unit: Rs/Kg

Month	Tomato big	Tomato small	Average
Chaitra	23	31	27
Baisakh	33	38	36
Jestha	30	25	28
Ashadh	27	22	25
Shrawan	45	44	45
Bhadra	40	42	41
Aaswin	32	44	38
Kartik	31	41	36
Marga	43	23	33
Paush	25	11	18
Magh	19	11	15
Falgun	17	12	14

Source: KFVMDB (2010). Note: Prices from Bhadra 2066 to Shrawan 2067

Appendix I: Grading response

Respondents	Yes	No	Total
Farmers	15(75)	5(25)	20
Wholesalers	10(100)	0	10
Retailers	9(90)	1(10)	10
Total	34(85)	6(15)	40

Source: Field study (2010), Note: The figure in parenthesis represents percentage

Appendix J: Tomato arrivals in Kalimati wholesale market

(Unit: ton)

Month	Tomato big	Tomato small	Total
Baisakh	516	1466	1982
Jestha	272	2259	2531
Ashadh	234	1648	1882
Shrawan	280	1357	1637
Bhadra	412	911	1323
Aaswin	778	485	1263
Kartik	563	437	1000
Marga	289	1193	1482
Paush	153	1543	1696
Magh	87	1563	1650
Falgun	251	1908	2159
Chaitra	883	1558	2441
Annual	4718	16328	21046
% share	22	78	100

Source: KFVMDB (2010)

Appendix K: List of agricultural markets in Nepal

S.N.	Name & place of market	Type of market	Management according to
1	Birtamod, Jhapa	Wholesale market	HMG Directives 1996
2	Dharan, Sunsari	,,	
3	Janakpur, Dhanusa	,,	,, ,,
4	Kalaiya, Bara	,,	
5	Narayangarh, Chitwan	,,	,, ,,
6	Kalimati, Kathmandu	,,	Development Board Act 1956
7	Pokhara, Kaski	,,	HMG Directives 1996
8	Lamahi, Dang	,,	,, ,,
9	Kohalpur, Banke	,,	,, ,,
10	Kuleshwor, Kathmandu	,,	
11	Ghorahi, Dang	,,	
12	Attaria, Kailali	,,	
13	Chaulikababa, Banke	,,	
14	Budhabare, Jhapa	Collection centre	,, ,,
15	Katari, Udayapur	,,	,, ,,
16	Dhalkebar, Dhanusa	,,	,, ,,
17	Bardibas, Mahottari	Bi-weekly haat & collection centre	,, ,,
18	Bhandara, Chitwan	Collection centre	,, ,,
19	Nawalpur, Sarlahi	,,	,, ,,
20	Lalbandi, Sarlahi	,,	,, ,,
21	Saruatta, Rautahat	,,	,, ,,
22	Handikhola, Makwanpur	,,	,, ,,
23	Simaraungarh, Bara	,,	,, ,,
24	Kavresthali, Kathmandu	,,	,, ,,
25	Jagatpur, Chitwan	,,	,, ,,
26	Pokhariya, Parsa	Bi-weekly haat & collection centre	,, ,,
27	Tamaghat, Kavre	Collection centre	,, ,,
28	Tinpiple, Kavre	,,	,, ,,
29	Dharke, Dhading	,,	,, ,,
30	Dhusa, Dhading	,,	HMG Directives 1996
31	Gaushala, Mahottari	Collection centre	,, ,,
32	Kapurkot, Salyan	,,	,, ,,
33	Balaju, Kathmandu	,,	,, ,,
34	Chhaimale, Kathmandu	,,	,, ,,
35	Hansapur, Dhanusa	,,	,, ,,
36	Patharaiya, Parsa	,,	,, ,,
37	Kaptangunj, Sunsari	,,	,, ,,

38	Babiachaur, Surkhet	,,	,, ,,
39	Rangeli, Morang	,,	
40	Tikapur, Kailali	Haat bazaar & collection centre	
41	Jiri, Dolakha	,,	
42	Sindhulimadi, Sindhuli	,,	
43	Gadariya, Sarlahi	,,	
44	Haripur, Sarlahi	,,	
45	Mahammadpur, Rautahat	,,	
46	Basatpur, Bara	,,	
47	Kolabi, Bara	,,	
48	Jomsom, Mustang	,,	
49	Kawasoti, Nawalparasi	,,	
50	Wangsing, Syangja	,,	
51	Bodhaban, Bara	Krishak Chautari	
52	Bastipur, Makawanpur	Collection centre	
53	Basantpur, Terahthum	,,	
54	Surunga, Jhapa	Tomato processing & collection centre	
55	Jawalakhel, Lalitpur	Retail market	Lalitpur Sub-Metropolitan City
56	Damauli, Tanahu	,,	Byas Municipality
57	Pokhara, Kaski	,,	Pokhara Sub-Metropolitan City
58	Katahari, Morang	Retail market	
59	Charikot, Dolakha	Weekly haat & retail market	

Source: Agribusiness Promotion & Marketing Development Directorate (2009)

Appendix L: Questionnaire for interview

A) Semi-structured questionnaire for farmers

1. Personal details:

Name: Age: Qualification: Sex: Male/female

Address:

2. Total land (in ropani)

Type of land	Own	Land in lease	Total
Irrigated			
Non-irrigated			

3. From when have you been growing vegetables?
4. What types of vegetables have you planted (with area and production)?
5. What is the cost of production of tomato (labour cost, seed, fertilizer, pesticides etc.)?
6. How much vegetables do you sell (with quantity and price)?
7. Where do you sell tomato?
   ( ) Own farm ( ) Collection centre ( ) Wholesalers
   ( ) Middlemen ( ) Retailers ( ) Self selling in retail markets
8. Do you do contractual agreement with retailers/wholesalers/middlemen?
   ( ) Yes ( ) No
8. Do you do grading in tomato before selling? ( ) Yes No ( )
9. What kind of packaging materials do use for tomato?
   ( ) Plastic crates ( ) Doko ( ) Plastic bag
   ( ) Wooden box ( ) Other
10. What means of transport do use for transportation to market?
    ( ) Bus/truck ( ) Delivery van/ jeep ( ) Porter
    ( ) Self head load ( ) Other
11. Where are the possible markets for your tomato?
12. When do you sell tomato?
    ( ) Same day of harvesting ( ) Next day of harvesting
13. How much do you pay for transporting tomato from farm to market?
14. What are the means of market information?
    ( ) Radio ( ) Television ( ) Newspaper
    ( ) Telephone call ( ) Neighbors ( ) Other
15. In opinion, who is getting profit most from the tomato business?
    ( ) Farmer ( ) Cooperatives ( ) Retailers
    ( ) Wholesalers ( ) Middlemen ( ) Other
16. Which agency should play important role in production and marketing of tomato?
    ( ) Government agency-District Agriculture Development Office
    ( ) Non-governmental organization
    ( ) Farmers' cooperatives
    ( ) Private sector
    ( ) Other
17. What do you think that the government agency should conduct programs for more profit to farmers?
18. How do you sell your tomato?
    ( ) By commission ( ) by bargaining

19. How do you rate the problems on production of tomato?

S.N.	Problems	Scale of rating				
		5	4	3	2	1
1	Timely unavailability of chemical fertilizers					
2	Problem of insect and pests					
3	Pest and diseases					
4	Unavailability of loan					
5	Lack of irrigation facilities					
6	Weak extension support services					
7	High input costs					
8	Unavailability of pure seeds					

Note: 5- most serious, 4- serious, 3- moderate, 2- a little bit and 1- the least serious

Marketing problems:

S.N.	Marketing problems	Scale of rating				
		5	4	3	2	1
1	Lower price					
2	Unorganized market					
3	Frequent price fluctuation					
4	High transport cost					
5	Lack of storage facilities					
6	Lack of processing facilities					
7	Frequent transport obstruction					
8	Lack of market information					

Note: 5- most serious, 4- serious, 3- moderate, 2- a little bit and 1- the least serious

20. What suggestions do you think to solve those problems?
21. Are you satisfied with this business? ( ) Yes ( ) No

B) Questionnaire for wholesalers and retailers

1. Personal details:

Name: Age: Qualification: Sex: Male/female
Address:

2. From when did you start this business?
3. What kinds of vegetables do you sell?
4. From where do you buy tomato and at what price?
5. How much tomato do you sell daily?
   In main season……
   In off-season…….
6. What is the selling price of tomato?
7. Which varieties of tomato do you sell?
8. To whom do you sell tomato?

( ) Individual consumers ( ) Retailers ( ) Wholesalers
( ) Institutional consumers (hotels, schools, army/police barrack)

9. Do you do grading in tomato before selling? ( ) Yes No ( )
10. Do you do contractual agreement with retailers/wholesalers/middlemen?
( ) Yes ( ) No
11. What kind of packaging materials do use for tomato?
( ) Plastic crates ( ) Doko ( ) Plastic bag
( ) Wooden box ( ) Other
12. What means of transport do use for transportation to market?
( ) Bus/truck ( ) Delivery van/ jeep ( ) Porter
( ) Self head load ( ) Other
13 How much do you pay for transporting tomato from wholesale market to retail market and from farmers' field to wholesale market?
14 Do you have storage facility for storing tomato? ( ) Yes ( ) No
15 In opinion, who is getting profit most from the tomato business?
( ) Farmer ( ) Cooperatives ( ) Retailers
( ) Wholesalers ( ) Middlemen ( ) Other
16 Which agency should play important role in production and marketing of tomato?
( ) Government agency-District Agriculture Development Office
( ) Non-governmental organization
( ) Farmers' cooperatives
( ) Private sector
( ) Other
17 What problems do you face in marketing of tomato?
18 What suggestions do you think to solve those problems?
19 Are you satisfied with this business? ( ) Yes ( ) No

C) Questionnaire for government officials

Name: Designation:
Office: Location:

1. How do you support to farmers and traders?
2. What types of programs do you provide related to tomato marketing?
3. What is government policy towards production and marketing of vegetables, in general, and tomato, in particular?
4. What challenges do farmers face in the production and marketing of vegetables?
5. What is situation of market prices and market arrivals of tomato?

Appendix M: Name of the respondents

A) Name of the farmers

S.N.	Name	Address	Age	S.N.	Name	Address	Age
1	Nishan Rai	Lubhu	40	11	Yagyanidhi Paudel	Lamatar	36
2	Maiya Subba	Lubhu	38	12	Ganesh B. Khadka	Lamatar	39
3	Harka Tamang	Lubhu	44	13	Devi Ghimire	Lamatar	45
4	Shyam Pathak	Lamatar	42	14	Hari Prasad Bagale	Lamatar	36
5	Chandra Shrestha	Lamatar	47	15	Mohan Shrestha	Lubhu	48
6	Resham Shrestha	Lubhu	45	16	Sharada Shrestha	Lubhu	41
7	Tek Nath Ghimre	Lamatar	48	17	Ram Bd. Tamang	Lubhu	38
8	Basudev Ghimre	Lamatar	45	18	Lal Bd. Tamang	Lubhu	46
9	Krishna Khadka	Lamatar	41	19	Kanchha Rai	Lubhu	40
10	Narayan Khadka	Lamatar	38	20	Balabir Rai	Lubhu	39

B) Name of wholesalers at Kalimati market

S.N.	Name	Address	Age (year)
1	Laxman Thapa	Thakre-4, Dhading	52
2	Ram Bd. Tamang	Naubise-3, Dhading	41
3	Uttam Bd. Adhikari	Jeewanpur-8, Dhading	42
4	Rameshwor Khakural	Chhatredeurali-2, Dhading	36
5	Ram Bd. Khadka	Aalakot-1, Kathmandu	51
6	Badri Lal Shrestha	Jeewanpur-8, Dhading	38
7	Sanuman Prajapati	Kathmandu Metropolitancity-13	41
8	Sanubabu Pantha	Duipipal-9, Nuwakot	38
9	Kiran Shrestha	Padmapokhari-5, Makawanpur	36
10	Kumar Shrestha	Bhadrabas-6, Kathmandu	47

B) Name of retailers

S.N.	Name	Address	Age (year)
1	Nishan Rai	Lubhu	36
2	Harka Bd. Rai	Lubhu	41
3	Radha Rana	Satdobato	35
4	Kabita Khadaka	Lagankhel	45
5	Laxmi Budhathoki	Lamatar	41
6	Ganga Thapa	Tikathali	48
7	Ram Krishna K.C.	Imadol	40
8	Shiva Pujan Sah	Imadol	47
9	Ram Pukar Yadav	Lagankhel	43
10	Dil Prasad Ghimre	Lamatar	46

C) Name of government officials

S.N.	Name and designation	Organization
1	Gopal Prasad Shrestha (Director)	Vegetable Development Directorate, Lalitpur
2	Ramesh Dangol (Planning Officer)	Kalimati Fruits and Vegetables Market Development Board, Kathmandu
3	Uma Shrestha (Senior Planning Officer)	District Agriculture Development Office, Lalitpur
4	Ram Prasad Ghimire (Technical Assistant)	District Agriculture Development Office, Lalitpur
5	Rajesh K.C. (Horticulture Development Officer)	Department of Agriculture, Lalitpur

Appendix N: Photographs

Photo 1: Interview with wholesaler in Kalimati vegetable market

Photo 2: Group discussion with women farmers

Photo 3: Consumers buying tomato

Photo 4: Wholesaling tomato in Kalimati market

Photo 5: Vegetable market in the street

Photo 6: Tomato in farmer's field

Photo 7: Off-season tomato production under the plastic tunnel

Photo 8: Tomato selling in open market

Photo 9: Tomato loading on bus for market

Photo 10: Tomato packaging in plastic crates

Photo 11: Researcher (Left) with extension worker (in the middle) and farmer (right)

Photo 12: Wholesalers packing tomato for Kalimati market, Kathmandu