



RESEARCH ARTICLE

VALUE CHAIN ANALYSIS OF TOMATO SUB-SECTOR IN BHAKTAPUR DISTRICT, NEPAL

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ARTICLE DETAILS

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ABSTRACT

The value chain status of tomatoes in Bhaktapur, Nepal, was investigated in 2022. 60 households were randomly selected and interviewed using a pre-designed semi-structured interview schedule. Tomato farmers, traders, and extension personnel were the primary sources of primary data. Descriptive statistics were employed in SPSS and Microsoft Excel for analysis. 60 farmers were selected through the purposive selection process, which involved participants from two rural municipalities and one municipality. The marketing aspect was researched by ten traders (wholesalers and retailers). The household survey of primary data was conducted using a semi-structured interview schedule, with secondary data obtained through peer-reviewed journals, articles, websites, organizational publications, AKC, and PMAMP profiles.

The variable cost of tomato cultivation was found to be NRs. 75,920, and tunnel construction was the major cost among the total costs of tomato cultivation. The gross return of tomatoes was found to be NRs 1,48,000, with a profit of NRs. 72,080 /ropani. The tomato enterprise was highly profitable with a BC ratio of 1.94. market margin was NRs.35/kg, and producer's share was 53.33% in the mostly used market channel. The average farmer's gate price of tomatoes was NRs 40/kg and the consumer's price was NRs.75/kg.

There were three distinct marketing channels. Tomato prices are heavily influenced by middlemen. Even though they were involved in packaging and grading, most farmers were unaware of how tomatoes are valued. The number of tomato farmers on their own land is around 30%. Srijana was the most cultivated variety. The major marketing challenges faced by producers were low market prices, market availability, price fluctuations, perishable nature, and transportation shortcomings. Farmers were enthusiastic about tomato production despite the low productivity and market difficulties. According to the study, tomato cultivation in Bhaktapur could be highly profitable if the government provides special assistance.

KEYWORDS

Productivity, Vegetable Production, Profit, Marketing, B;C ratio

1. INTRODUCTION

1.1 Background Information

Nepalese economy mainly depends on agriculture, creating employment opportunities up to 60.4% (MOF, 2020/21). Out of total GDP, as much as 1/4th (25.8%) is contributed through Agriculture and Forestry sectors, with annual growth rate of 5.05% (MOF, 2020/21). 22.96% of total GDP was singly contributes by agriculture sector in the Fiscal Year 2019/20. More precisely, vegetables comprise 9.71% of total AGDP, being third most important contributor. More than 247 types of vegetables are cultivated globally, and more than 50 species are commonly cultivated in Nepal (Awasthi, 2007). The agro-climatic variation of Nepal is favorable to grow almost all species of vegetables (Awasthi, 2007); over the five-year period (2015/16–2019/20), the average area of cultivation was 284,678.2 ha with a production of 3,974,143.8 mt and yield of 13.954mt/ha (MOALD, 2019/20). However, in F/Y 2019/20, the total area of vegetable cultivation decreased slightly, to 281,132 ha with production of 3,962,383 mt, yielding 14.09mt/ha (MOALD, 2019/20). Similarly, in the same Fiscal year 2019/20, Cauliflower, cabbage and tomato were mainly cultivated with production of 534141mt, 485199 mt, 400,674 mt respectively (MOALD, 2019/20). 37.7% of total GDP is fulfilled by Bagmati Province (MOF, 2020/21). According to MOALD (2019/20), in the Bagmati province, vegetable cultivation occupied 49,692 ha, with a total production of

717,089 mt and a productivity of 14.90 mt/ha. Similarly, the MOF (2019/20) reported 27.5 a trade deficit, comprising 28 billion and 0.5 billion equivalent imports and exports.

Tomatoes are a well-liked vegetable in Nepal. After cauliflower and cabbage, tomatoes are the third most popular food in this location. According to the F/Y 2018/19, an area of 22,566 ha is used for cultivating tomatoes; this yields 18 tons per ha (MoALD, 2020). Off-season tomato cultivation is generally done all year under a plastic house (Entrepreneur India, 2016). Depending on the conditions, tomatoes are typically grown two to three times. During the winter, spring, and rainy seasons, tomatoes are grown in the terai and inner part of Nepal (Neupane, Poudel and Parajuli, 2018). The major factor for the sustainable growth of agriculture is the value chain development framework, as envisioned by the ADS (ABPMDD, 2016). Previously, tomatoes were only grown on hills during the rainy season, but now with the introduction and development of better varieties, they are extensively cultivated in springs (Ghimire, Subedi, & Green, 2000). Srijana, Samjhana, NBL-1, all-rounder, and Pusa-Ruby are the most popular varieties in the Bagmati province of the country (MOAD, 2015/16).

1.2 Statement of Problem

The marketing of vegetables is highly risky and difficult compared with

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that of cereals. Fresh vegetables are highly perishable, seasonal, and bulky. Therefore, vegetables require special management and immediate disposal methods (Gandhi and Namboodini, 2002). Vegetable marketing is still in the growing stage and is influenced by supply, demand, and price realization (Shrestha, 2008). The supply of vegetables is also challenging because of the low prices and high variation in prices.

Each interim plan of the government has prioritized agriculture for commercialization but cannot be implemented effectively (Chaudary, 2010). High market margin, price fluctuation, post-harvest loss, lack of extension service, lack of update in price, etc. are problems faced by tomato farmers. Lack of cleaning, sorting, grading, processing, packaging, etc., reduces the value of vegetables leading to low income and unsatisfactory profitability (Sharma, 2019). Farmers sell tomatoes to local traders at very low prices, but middlemen exchange the same tomatoes at a high price and earn higher profits than farmers. Due to the lack of market information regarding the time of cultivation and harvest, farmers cannot earn high profits (MRSMP, 2015/16). Thus, the market price trend is essential for the profit from farm products (Hugar & Hiremoth, 1984). Middlemen benefit greatly from their limited understanding of market information systems and ineffective coordination among market actors. Commercial arrangements are not present among farmers. A commercial vegetable farmer has been arranged in some way through the newly introduced vegetable zone under PMAMP. Due to non-tariff barriers, a limited number of vegetables are exported to India through unofficial channels (HVAP, 2011). Thus, this study seeks to explore the challenges faced by farmers and market actors in the value chain of tomatoes in Bhaktapur.

1.3 Rational of The Study

All the studies conducted in the valley did not adequately address the needs and concerns of farmers and institutions to improve tomato production, including its profitability. Value addition is the outcome of various activities, including sorting, cleaning, processing, packaging, transporting and grading.

The aim is to evaluate the performance of various efficiency measures and use it as a reference to determine appropriate resource allocation during production, while also alerting farmers to after-harvest operations that can boost profitability and reduce post-harvest to some extent. As a result, the outcomes of this research help to bridge the knowledge gap between farmers and other market participants regarding post-harvest

management and marketing strategies.

1.4 Objectives

The general objective of this study was to investigate the tomato value chain in the Bhaktapur district.

Specific objectives were as follows:

- To estimate the cost and returns in the production of tomato
- To identify the major stakeholders (core actors and enablers) and their roles in the promotion of the tomato value chain in the Bhaktapur district and
- To analyze the strengths, weaknesses, opportunities, and threats (SWOT) of the tomato value chain in the Bhaktapur district

1.5 Scope And Limitation of The Study

The study covers the major tomato producing municipality of Bhaktapur district i.e. Suryabinayak municipality and Madhyapur Thimi municipality. There are many problems in tomato farming as well as marketing but it covers the major production and marketing constraints of tomato farming and marketing. Owing to the unavailability of technicians, farmers do not have detailed knowledge related to tomato farming. Most farmers practiced conventional farming methods.

2. RESEARCH METHODOLOGY

2.1 Site Selection

Among the seventy-seven districts of Nepal, the Bhaktapur district is situated in eastern Kathmandu valley and is the smallest. It is situated in the Bagmati Province. The district, which has Bhaktapur as its headquarters, covers an area of 119 sq. Kb (46 sq. m.) Mi. The district is segmented into four districts: Bhaktapur, Changuarayan, Madhyapur Thimi, and Suryabinayak.

This research was conducted in Suryabinayak and Madhyapur Thimi Municipality of Bhaktapur District. This area was selected because it is the command area of the PMAMP with production potential in the district. The study site lies at 27°40'20"N latitude and 85°25'40"E longitude.

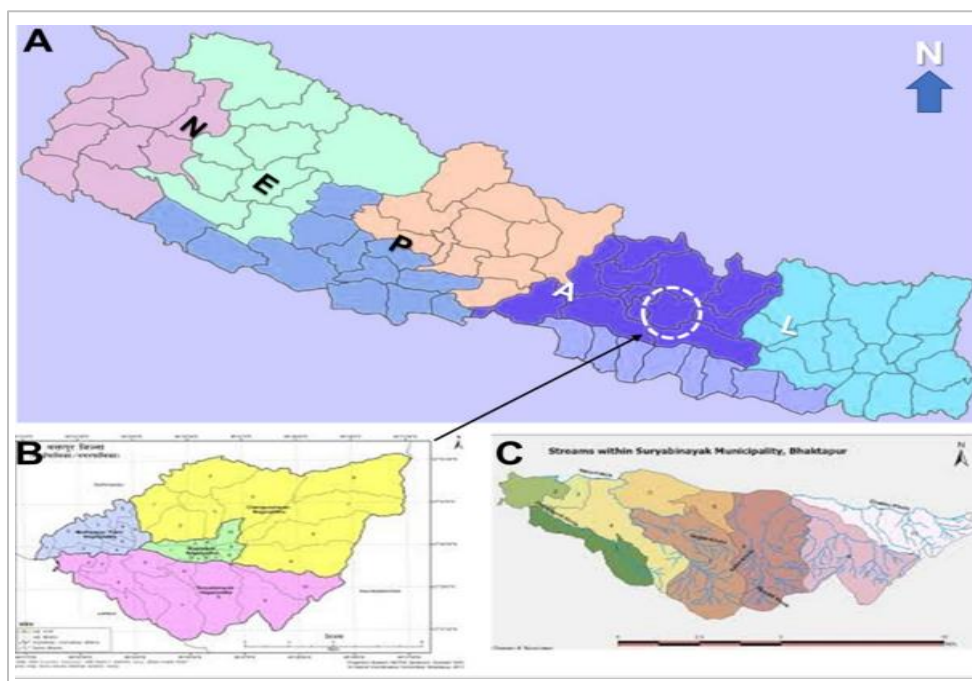


Figure 1: Map of Nepal showing study site (<https://www.preprints.org/manuscript/202008.0242/v1/download>, August 10,2020)

2.2 Preliminary Field Visit

It is a prerequisite to visit the field in order to identify the demographic, socio-cultural, economic, geographical accessibility, ongoing cultivation practices, and major problems faced by tomato-growing farmers. Not only does this enable us to explore the particular topic to be focused on, but it is also helpful in designing the appropriate questionnaire, budget

estimation, time scheduling, providing the opportunity for interaction and relation to build up for the ease in upcoming time of data collection, and estimation of samples from the sampling frame.

2.3 Sample and Sampling Technique

The SRS method was used to sample 75 cases. The research focused on

tomato producers, traders, retailers, and consumers. The sampling frame includes the leading farmers and tomato growers. 60 samples out of 75 were randomly selected from the producers of Suryabinayak and Madhyapur Thimi. The other 15 were from intermediaries, 10 from retailers and 5 from consumers. In the major tomato producing areas, a survey was carried out by households. The PMAMP vegetable implementation unit provided a list of farmers. In the timeframe, a household survey was conducted, along with interviews with key informants and group discussions with small farmers, leading farmers on the panel, subject matter experts, and other related stakeholders.

2.4 Research Instruments/ Design

This survey focused on determining the value chain of tomatoes, profitability between each actor and value-added activities under technical inputs, and the variables needed for tomato production. The following methodologies were employed for data collection.

2.5 Preparatory Phase

During the preparatory phase, a desk review of documents was performed. Questionnaires and checklists relating to the value chain, profitability, and value-added activities under the consideration of the technical use of inputs were completed. The sampling criteria and methodology process were finalized.

2.6 Household Survey

A survey held at a household is designed to gather feedback from multiple participants by visiting their home. Various questions were included in the written and oral questionnaires to gather information on various households, including demographics/socioeconomics, education, value-added activities, cultivation practices, and information about production. The first data collection involved the interviews of 60 tomato growers from the study area.

2.7 Focus Group Discussion (FGD)

Focus group discussions are conducted with a uniform number of individuals, usually comprising 6-12 people for 1-3 hours, to discuss varying topics and share their experiences without any personal biases. Several members, including commercial growers, agro-vet personnel, local traders, leaders, and official PIU members were involved in providing information about tomato value chain analysis. A list of questions was used to lead the discussion, and valid conclusions were drawn.

2.8 Key Informant Interview (KII)

KII is a technique of interviewing individuals who have specialized knowledge about the program being evaluated. To determine the impact of technical input factors on vegetable production output variables, local progressive farmers and agro-vet personnel, traders, leaders, and official members of the PIU were interviewed.

2.9 Secondary Data

The data was augmented with secondary sources, both published and unpublished, to supplement the primary sources. We gathered the required data from various organizations, cooperatives, agriculture-based reports, and programs of several non-governmental organizations.

3. DATA ANALYSIS TECHNIQUE

3.1 Analysis of Socio-Economic Data from Survey

Various variables, including family size and educational level, as well as the size of land holding, were examined using descriptive statistical tools like frequency, percentages, and means for the descriptive analysis of the study area, population grouping and tomato production system.

3.2 Economic Analysis

3.2.1 Cost of Production

The expenditure incurred on various activities such as land rental, inputs like fertilizers and pesticides, labor for planting, pruning, manure application incineration, and other production-related expenses. Only variable cost items were analyzed for the cost of production.

3.2.2 Analysis of Benefit Cost Ratio

Benefit-cost analysis was performed after calculating the total cost and gross returns of the tomato. The total cost is calculated by adding all

variable and fixed costs. To calculate gross returns, income from sales was accounted for. The benefit-cost ratio was calculated using the following formula:

$$\text{Benefit cost ratio} = \text{Gross Return} / \text{Total Variable Cost}$$

$$\text{Gross return} = \text{Total quantity of tomato marketed (kg)} * \text{price per unit of tomato}$$

$$\text{Total Variable Cost} = \text{Cost of FYM} + \text{Human Labor Cost} + \text{Power Cost}$$

Source: (Kalauni and Joshi, 2020)

3.2.3 Marketing Margin

The marketing margin is the difference between the farm gate price received by the farmers and the price paid by the consumer; that is, the retailer's price.

$$\text{Marketing margin} = \text{Retailer's Price (Pr)} - \text{Farm gate price (Pf)}$$

For calculating Marketing Efficiency, modified method as suggested by Acharya and Agarwal

$$\text{ME} = \text{FP} / (\text{MC} + \text{MM})$$

Where, ME = Marketing efficiency

FP = Net price received by the farmer

MC = Total Marketing cost

MM = Total marketing margin

Source: (Acharya and Agarwal, 2004)

3.2.4 Analysis of Value-Added Activities

The survey's data was coded, tabulated, and analyzed using descriptive statistical tools like frequency, percentage, or mean, which were used to analyze value-added activity data such as washing, selection, sorting, etc.

3.2.5 Value Chain Analysis

Value chain analysis outlines the complete range of activities necessary to bring a product or service from idea to final consumer and beyond. The study area's various value chains were identified and subsequently evaluated. The cost of production and the price paid to the interested parties were established, and each actor's margin in the value chain was computed. The study area's producers share and marketing margin were calculated for each chain in a similar manner. The price distribution at every level of the value chain is also examined.

3.2.6 SWOT Analysis

Strengths, weaknesses, opportunities, and threats are powerful tools for value chain analysis of agricultural products. A scan of the external and internal environments is an important part of the strategic planning and intervention process. SWOT analysis was sufficient to reveal useful changes (Kalauni & Joshi, 2019). SWOT related to vegetable production was analyzed.

4. RESULTS AND DISCUSSION

4.1 Household and Farm Characteristics

The household and farm characteristics included gender of respondent, family size, economically active population, educational level of respondent, landholding, and experience of farmers. These characteristics are briefly described below.

4.2 Age of Respondents

Table 1 shows that out of total respondents selected for interview, respondents of age group 30-40 had highest in frequency (31.7 %) and respondents of age group 0-30 had lowest frequency (18.3 %).

4.3 Gender of the Respondents

Table 2 shows that total 60 households (Table 3) from Suryabinayak Municipality and Madhyapur Thimi Municipality were taken for data collection in which the number of male respondents was 42(70 %), and females were 18 (30 %).

Table 1 : Age of Respondents

Age group	Frequency (n=60)	Percentage
<30	11	18.3
30-40	19	31.7
40-50	17	28.3
>50	13	21.7
Total	60	100.0

Note, Data was collected from (survey, 2022)

Table 2 : Population Distribution of Respondent by Gender

Parameters	Frequency	Percent
Male	42	70
Female	18	30
Total	60	100

Note, Data was collected from (survey, 2022)

4.4 Education Level of Respondents

The respondents were categorized into five levels of education: illiterate, primary, secondary, higher secondary and bachelor's degree. Those without formal education but with a primary level of literacy attend classes up to grade five. Education up to class eight is referred to as secondary level, while higher secondary refers to the 12th grade, and the bachelor's level denotes the undergraduate level.

Table 3 shows that out of the total respondents, 8 percent were illiterate, 28 percent had primary, 24 percent had secondary education, 22 percent

had a higher secondary level, 12 percent had a bachelor's degree, and 6 percent had masters and above.

4.5 Ethnicity

Family ethnicity provides information regarding the type of farming system adopted by farmers. Four major ethnic groups were considered: Brahmin, Chhetri, Janajati, and Dalits.

Table 4 shows that majority of the respondents were Brahmin (40%), followed by Chhetri (33%), Janajati (20 %), and Dalit(7%).

Table 3: Education Level of Respondents

Education Level	Frequency	Percent
Illiterate	6	8
Primary education	16	28
Secondary education	14	24
Higher secondary	13	22
Bachelor	7	12
Master and above	4	6
Total	60	100.0

Note, Data was collected from (survey, 2022)

Table 4: Distribution of Population According to Ethnicity

Ethnic group	Frequency	Percent
Brahmin	24	40.0
Chetri	20	33.0
Janajati	12	20.0
Dalit	4	7.0

Note, Data was collected from (survey, 2022)

4.6 Type of Family of Respondents

A nuclear family was the most common type of family among the respondents, with 58 % identified in Table 5. A ratio of 3:41. The joint family was represented by 41.7% of the respondents.

4.7 Yearly Income From Tomato

The incomes from tomatoes were distributed as below 1 lakh, between 1-2 lakh, between 2-3 lakh and above 3 lakh.

Table 6 shows that out of the total respondents, 21.7 percent earned less than one lakh and 78.3 percent were earn between 1-2 lakh.

4.8 Tomato Cultivated Land

At my study site, farmers are cultivated on a piece of land due to high rent costs. shows that out of the total land, only 36% of the area had cultivated land.

4.9 Area pf Tomato Cultivation

The areas under tomato cultivation were categorized into two, 3ropani, and four ropani. shows that out of the total area, 28.3 percent was cultivated under 2 ropani, 31.7 percent was cultivated under 3 ropani, and 40.7 percent was cultivated under 4 ropani.

Table 5: Family Type of Respondent

Type of family of respondent	Frequency (n=60)	Percentage
Nucleus	35	58.3
Joint	25	41.7
Total	60	100.0

Note, Data collected from (survey, 2022)

Table 6 : Yearly Income from Tomato		
Parameters	Frequency	Percent
Below 3 lakh	7	11.7
Between 3-5 lakh	35	58.3
Above 5 lakh	18	30.0

Note, Data was collected from (survey, 2022)

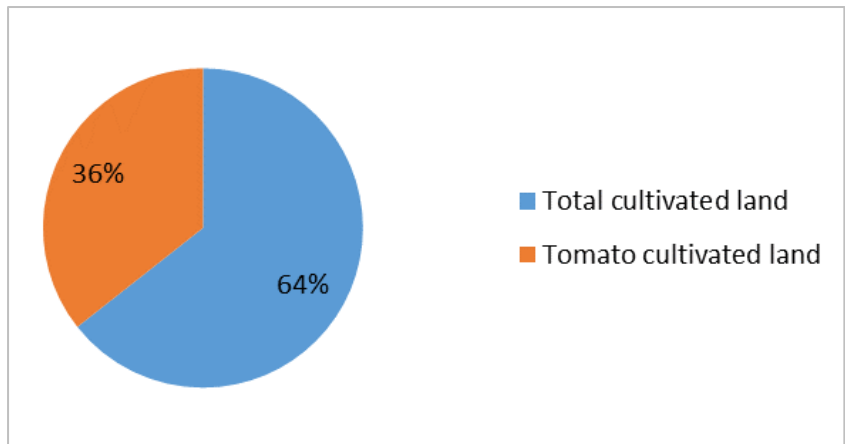


Figure 1 : Area of tomato cultivation

Note, The image was created with the data from (survey, 2022)

Table 7: Area Under Tomato Cultivation		
Area (in ropani)	Frequency	Percent
3.00	17	28.3
4.00	19	31.7
5.00	24	40.0
Total	60	100

Note, (survey, 2022)

4.10 Value Addition Practices

Figure 3 showed that the majority of the respondents were involved in packaging(25 farmers),hen grading (15 farmers); 10 farmers had not heard about value addition practices, and 10 farmers did not practice value addition practices.

4.11 Varieties that Are Grown Widely Among the Respondents

Figure 4 shows the Srijana variety of tomatoes is the most widely grown among the farmers of the vegetable zone, Bhaktapur. Similarly, Samjhana, Improved Srijana, and other varieties accounted for a small percentage.

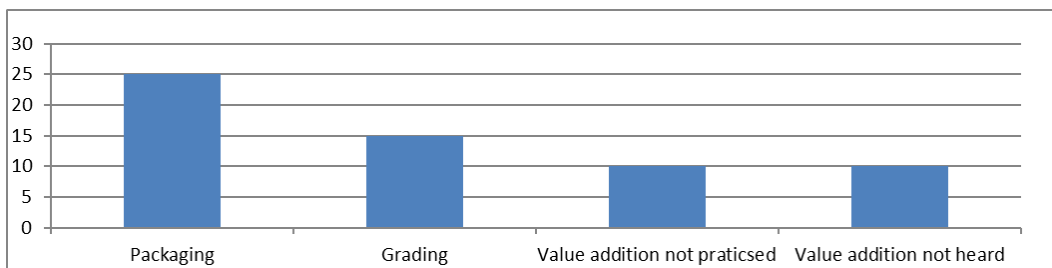


Figure 2 : Value addition practices (survey, 2022)

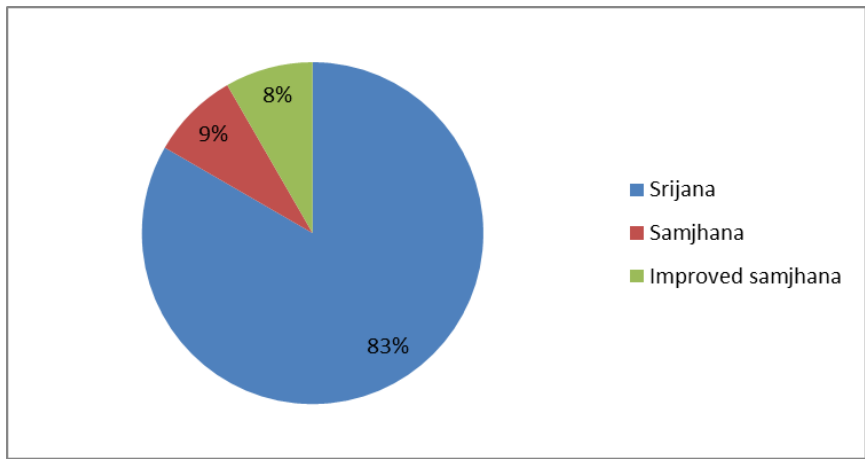


Figure 3 : Tomato Varieties (survey, 2022)

4.12 Value Chain Analysis of Tomato

Tomatoes are a major vegetable that affects farming communities. This section deals with value chain mapping, backward and forward linkage, cost and return, analysis of the B/C ratio, gross margin, market margin, and producer's share.

4.13 Value Chain Mapping

Value chain analysis encompasses all the activities and services necessary

to move a product and service from production to consumption. Input suppliers, producers, traders (wholesalers and retailers), and consumers are the key players in the value chain. A map of the tomato value chain illustrates the movement of tomatoes from grower to consumer, e.g. The vertical alignment of the value chain is depicted as a series of linkages. The value chain map displays the major chain functions in blocks on the left. Among the functions are input supply, production, collection, trading and wholesaling as well as retail. The mapping process involves listing the actors involved in this field and their respective functions. Institutions that facilitate this sector are included in the list.

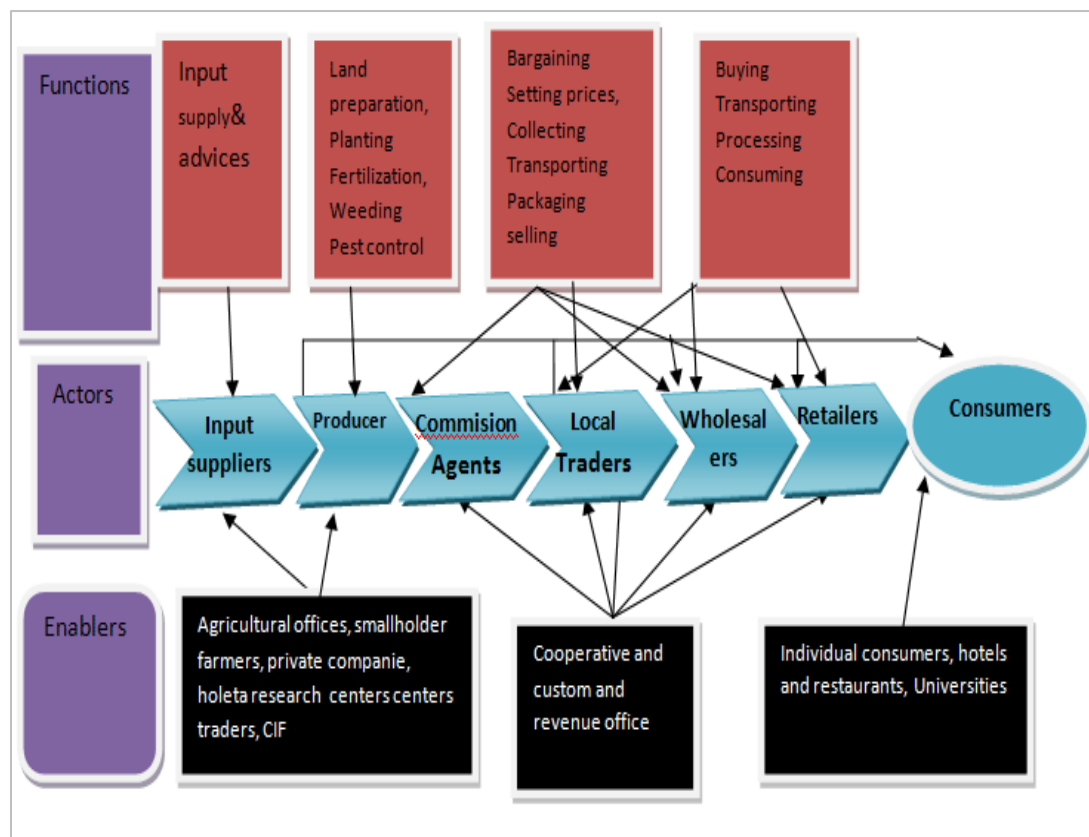


Figure 4: Value Chain Mapping Of Tomato In Bhaktapur District

Note, The image was collected from Tadesse, B., & Bakala, F. (2018). Value Chain Analysis of Potato: The Case of Sheka Zone, Southwest Ethiopia. (Tadesse)

5. FUNCTIONS AND ACTORS

5.1 Input Suppliers

Agricultural inputs such as seeds, fertilizers, and agrochemicals hold immense potential to assist diligent farmers. Agro-vets were the primary source of agricultural inputs and information for farmers in the Kathmandu Valley. Among the inputs/information provided to farmers are the AKC, NGOs, farmer groups, and cooperatives.

5.2 Producers

Production areas are home to two main types of producers: subsistence and commercial producers. Local haat bazaars were the primary location where agro-inputs needed for subsistence farming were bought, organized, and sold, while commercial farmers typically dealt with local collectors. Since tomatoes are perishable, they must be sold immediately after being harvested. Farmers pointed out that there were no arrangements to make tomato marketing through contracts. There is no modern technology for farmers to create price increases over time. Nearly all registered farmers at the LEE site grew a vegetable commercially.

5.3 Collectors And Traders

The tomato value chain is primarily influenced by collectors and traders who trade tomatoes from production sites to wholesale markets. Trading activities, including buying and assembling, occasionally selling to middlemen, transporting goods, and selling them to wholesale markets. All costs, including taxes and transport damages, are deducted by wholesalers from the above activities.

5.4 Wholesalers

The wholesalers obtained tomatoes from vendors and then sold them to retailers. Additionally, they store products for a maximum of 48 hours. Market hubs with infrastructure like office buildings, open stores, transaction sheds, and shop shed occupy these areas. The local market management committee manages these market hubs, which are typically established with government backing.

5.5 Retailers

Wholesalers and consumers were closely linked with retailers, which were actors. They are part of the chain, buying tomatoes, bringing them to their retail stores, sorting, selling, and selling them.

5.6 Local Collector

The Bhaktapur district relies heavily on local collectors for value addition, particularly the tomatoes. They gather tomatoes from a group of vegetables at varying locations and then ship them to the wholesale market. Some local collectors and wholesalers run transport facilities. Wholesalers can be local collectors at times.

5.7 Consumers

Consumers in this study were individual households and hotels that buy and consume tomatoes. They purchased tomatoes at regular intervals.

5.8 Enablers and Facilitators

An enabler in a value chain can offer regular support services or advocate for the collective interests of value chains actors. They operate at the enabler level and include public research and technology development,

professional standard agreements, promotional services, joint marketing or advocacy, and other support service providers. Agriculture Knowledge Center and PMAMP Vegetable Zone Bhaktapur are within the local body that is working to develop and spread various technologies for offseason tomato cultivation. Smaller cooperatives that offer loans during plantation periods are also helpful for farmers.

5.9 Cost Of Production And Return

The price of production is the cost of obtaining inputs and labor for use. Tomato farming necessitated diverse costs and inputs such as labor, manure, fertilizer, seedling, irrigation, pesticides, and more. In the area covered by the study, inputs to tomato production were mainly tractor work and human labour (calculated in hours and man days) converted to monetary value determined against the prevailing wage rate. The nursery needs human assistance for various tasks such as planting, transferring, trimming, harvesting, and spraying pesticides. Tomato cultivation in the study area is known for its challenging nature. Other micronutrients, including DAP, potash, and FYM are also utilized in the field, along with compost. Also, tomato production involved a fixed expenditure on land rent.

The results showed that the cost of production per ropani was NRs. 75,920/ropani. Similarly, the average total returns are NRs. 1,48,000/ropani. The benefit-cost ratio was 1.94, which indicates that one rupee invested in tomato cultivation gives 1.94 rupee. Thus, tomato cultivation was found to be profitable in the study area.

The labor costs and tractors incurred in tomato production accounted for NRs. 3000/ropani, and NRs.2000, respectively. The seed cost accounted for the NRs. 2150/ropani organic manure NRs. 3000/ropani and chemical fertilizers was NRs. 2650/ ropani, and fixed costs contributed to the NRs. 22,000 per ropani for the total cost of the study area.

The study revealed that the total cost of tomato production is NRs. 75,920/ropani. The total variable cost and total fixed cost incurred were NRs.53,920/ropani and NRs 22,000/ropani, respectively. Details of the cost of tomato production in the study area are presented in Table 10 and 11.

Particulars	Cost per Ropani (In NRs.)
Variable cost	
Human Labour	3000
Land preparation	2000
Seed	2150
Fertilizers	2650
Tunnel	38500
Pesticides	1200
Organic Manure	3000
HCP (Harvesting, Cleaning, Grading)	1420
Total variable cost	53,920
Fixed cost	
Land rent	22000
Total fixed cost	22000
TOTAL	75,920

Note: Cost distribution data was collected from (survey, 2022)

Particulars	Amount
Total cost	75,920
Average Price (NRs/kg)	40
Gross Revenue (NRs/ha)	1,48,000
Net Profit	72,080
B:C Ratio	1.94

Source: (survey, 2022)

5.10 Marketing Channels

A marketing channel refers to the route taken by goods from their producers to consumers (Stanton, 1975). Through a combination of agencies, sellers can market their product to the final consumer, regardless of whether they are manufacturing it or not (Howard, 1975). Three main marketing channels are used by farmers in the study area.

1. Producers -----> Local collectors----->Wholesalers----->Retailers----->Consumers
2. Producers-----> Local collectors-----> Retailers----->Consumers
3. Producers-----> Wholesalers-----> Retailers----->Consumers

Channel 1 was the primary marketing channel in the Bhaktapur district. The village and Suryabinayak area had collectors, which meant that the channel was primarily used as a means of communication. Local collectors were constantly in touch with wholesalers to collect tomatoes from their own vehicles. As each actor earned a good income, they were all involved in this marketing channel, which was the most successful and popular option. Channels 2 and 3 were also found in some areas of the study area.

5.11 Market Margin And Producer's Share

The gap between the cost to consumers and the price paid by farmers is known as the market margin. The producer's share is the percentage of payments received by consumers from producers. A lower marketing margin and a higher producer share ensure that the current marketing system is efficient, which can be used to measure its efficiency. According to the study, tomatoes had a marketing margin of NRs. 120 /kg.

Marketing margin (MM) = consumer price (Pc) – price received by farmers (Pf)

= 75-40

= NRs. 35/kg

Producer's share = (Pf/Pc) *100%

= (40/75) *100%

= 53.33%

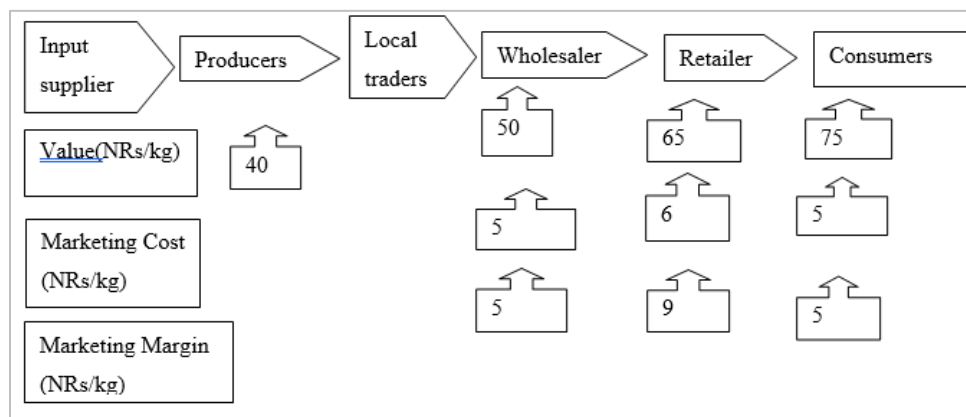


Figure 5 : Marketing Margin Of Value Chain Actors In Mostly Used Market Channel

Note: Data collected from (survey, 2022)

5.13 Price Spread

Price spread is the quotient of the actual price received by producers, the price paid by consumers, costs incurred, and margins earned by various market intermediaries during marketing.

Price Spread is given by,

$$\text{Price Spread} = \text{Price paid by consumer} - \text{Price received by producer}$$

$$= 75 - 40$$

$$= \text{NRs.}35/\text{kg}$$

The price spread for tomato was found to be NRs.35 per kg.

5.1 Problems in Tomato Production and Marketing

Farmers face numerous challenges in the production and distribution of

tomatoes. Indexing/scaling methods were utilized in this analysis. This segment focuses on the various issues faced while growing and selling tomatoes in the Bhaktapur area.

5.15 Production Problems

A six-point scale (1, 0.835, 0.668, 0.501, 0.334, 0.167) was used to determine the seriousness of production problems. The values obtained from the rank scale showed that diseases and pests were the most significant problems (Table 12).

Index was calculated by using the formula, i.e., Weightage / frequency

$$I \text{ prob} = \sum(Si*fi/N)$$

After calculating indexing, we analyze the data and rank them according to the descending order of the weightage value of tomato production problems.

Table 10 : Ranking of The Production Problems Of Tomato Faced By Farmers

Problems	1	0.83	0.67	0.51	0.35	0.17	Total	Weight	Index	Ranking
Disease and Pest	28	26	6	0	0	0	60	53.6	0.89	I
Irrigation facilities	12	24	11	6	0	7	60	43.68	0.72	II
High cost of inputs	7	3	15	14	10	11	60	32.27	0.53	III
Input supply inappropriate time	7	7	9	11	12	14	60	31.31	0.52	IV
Limited Technical Knowledge	0	0	14	18	19	9	60	26.92	0.44	V
Limited credit facilities	6	0	5	8	19	22	60	24.26	0.40	VI

Note: Data collected from (survey, 2022)

Index was calculated by using the formula, i.e., Weightage / frequency

$$I \text{ prob} = \sum(Si*fi/N)$$

After calculating indexing, we analyze the data and rank them according to the descending order of the weightage value of tomato production problems.

5.16 Marketing problems

Marketing problems are also faced by farmers in the marketing sector. Different problems during marketing are ranked by six-point scaling techniques (1, 0.835, 0.668, 0.501, 0.334, and 0.167). According to the rank scale's value, a low farm gate price is the main problem, and the least significant issue is insufficient payment on time. (Table 11).

Table 11: Ranking of The Marketing Problems of Tomato

Problems	1	0.83	0.67	0.51	0.35	0.17	Total	Weight	Index	Ranking
Low Farm-gate price	21	19	5	6	5	4	60	45.891	0.76	I
High price fluctuation	8	19	12	8	4	9	60	39.07	0.65	II
Insufficient storage facilities	9	4	14	13	8	12	60	32.953	0.55	III
Insufficient market information	4	7	14	14	14	7	60	32.182	0.54	IV
Insufficient processing facilities	7	8	9	12	10	14	60	31.526	0.53	V
No timely payment	11	3	6	7	19	14	60	29.758	0.5	VI

Note, Data collected from (survey, 2022)

Index was calculated by using the formula, i.e., Weightage / frequency

$$I \text{ prob} = \sum(Si*fi/N)$$

After calculating indexing, we analyze the data and rank according to the descending order of the weightage value of marketing problems of

tomatoes.

5.17 SWOT Analysis

The SWOT analysis is presented in Table 14.

Table 12 : SWOT Analysis of Tomato During Production

Strengths	Weaknesses
<ul style="list-style-type: none"> Availability of suitable climatic conditions and fertile land suitable for production of tomato. Comparative advantages over other vegetables. Less Investment and time consuming Srijana variety has good production as compared to other varieties. 	<ul style="list-style-type: none"> Lack of improved knowledge and training in production techniques and post-harvest handling, grading, packaging, among farmers. High price of inputs. Limited Irrigation facility. Small volume of production. Limited labour and rise wage demand
Opportunities	Threats
<ul style="list-style-type: none"> Support from Vegetable Zone, PMAMP, AKC, Bhaktapur Inputs are backed by favorable agriculture policies. Availability of large farms with good production capacity that has potentials to expand further. 	<ul style="list-style-type: none"> Incidence of disease and pest high Expensive cost of quality inputs. Highly loss by Hailstones, Heavy Wind and Heavy Rain Decreasing production due to high flux of Pests and diseases

Note: From direct observation and analysis during (survey, 2022)

5.17 SWOT Analysis of Tomato during Marketing

Table 13 : SWOT Analysis During Marketing

Strengths	Weaknesses
<ul style="list-style-type: none"> • High returns lead to high earnings. • Availability of High Yielding Varieties • The demand for vegetables is high in Kathmandu. • Nearness to Market (15-30 km) 	<ul style="list-style-type: none"> • Inadequate market information and poor market management. • Low collection centre • Expensive Input Materials • Weak Bargaining Capacity among farmers
Opportunities	Threats
<ul style="list-style-type: none"> • Enhancing the affordability and awareness of vegetables for locals to consume. • Good Source of Income to Farmers • Relatively high price 	<ul style="list-style-type: none"> • Inconsistency between internal and external demand. • Monopoly of traders on pricing of products • Frequent Fluctuation in Prices • Inflow of low-priced tomato from Terai

Note: From direct observation and analysis during (survey, 2022)

6. SUMMARY AND CONCLUSION

This section includes a summary of the research and the conclusions derived from the findings are presented below.

6.1 Summary

Among the major tomato growing regions, Bhaktapur District stands out. In Nepal, tomato is one of the most economically important vegetables grown. The agricultural community in Bhaktapur heavily depends on vegetables as a major source of income. In the Bhaktapur district, there was an area of 160 ha where tomato production occurred, with a productivity of 34.41mt/ha (MoAD, 2020-21). The increase in production has been attributed to the correlation between increased market access and favorable climate conditions. The main goal of this research is to examine the current status of tomato production and marketing.

The study examined the area's coverage, tomato production, the number of tomato cultivators, and the availability of inputs in Suryabinayak Municipality and Madhyatiapur Thimi Municipalities. The primary sources of data included field and market surveys of farmers and traders, focus group discussions, and key informant surveys. The field surveys were conducted using proportionate random sampling methods. The secondary data was derived from other sources. The typical family consisted of 4.32 members. A primary education-holding farmer group made up 40 percent of the respondents. Most farmers use leased land to grow commercial tomatoes, which reduces the cost of the business. Approximately 55 percent of them were engaged in farming, and 28 percent had been involved in agriculture for 1-2 years. The typical tomato-growing area was four ropani. Training and extension services were exclusively available to the simple majority.

The total production cost was determined to be NRs. 75,920 per ha. The gross revenue and net profit per hectare were NRs. 148,000 and NRs. 72,080. The benefit-cost ratio was 1.94. Three types of marketing channels were found in the study area, but the channel with fewer actors was profitable for farmers. Gross margin analysis showed that tomato growth is an important option for smallholder farmers to contribute family income (Chaudhary K. R., 2019) Market margin of NRs 35/kg and producer's share of 53.33% for the mostly used channel. Several production and marketing issues have also been recognized. In terms of production, the problems were ranked by disease and pest, with the lack of transportation cost for growers being the least significant marketing concern. By enhancing production technology, managing marketing systems and expanding the linkages between service receivers and producers, these issues can be tackled.

7. CONCLUSION

The aim of this research is to determine the overall findings. The PMAMP Vegetable Zone in the Bhaktapur district was the site of research based on this study. This study satisfies all tomato value chain practices in the district of Bhaktapur. In addition, it is designed to identify the significant limitations of tomatoes and to implement a proposal on how to study margin in the Nepalese vegetable industry. This helps to reduce the existing rift between tomato growers and consumers, as well their efficient value chain practices.

Due to their climatic and edaphic conditions, the Suryabinayak Municipality and Madhyavati Municipalities are suitable for tomato cultivation. Gross margin per kg was found NRs.35. The study area's tomato cultivation yields a profitable crop for both farmers and traders,

with a 1.94 B/C ratio. Despite the development of this marketing system, it was not well-developed a few years ago. The improvement of transport facilities, market price information, packaging, storage capacity, and grading could be prioritized over improving commodity prices. Technological progress has facilitated the production of tomatoes within the study area. Both bari and khet are utilized by farmers for growing tomatoes. The usual method of packaging was in the crate, with some degree of grading. The food-processing industry was not aware of the importance of product diversification, and therefore, high-value chain activities such as ketchups and pickles were not pursued. The consumer price share of producers was determined to be 53.33 %. Wholesalers were the most profitable traders as they had a significant impact on tomato prices. There were no post-harvest activities, including cold storage.

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