MARKETING AND SUPPLY CHAIN ANALYSIS OF ONION SUB-SECTOR IN SIRAHA DISTRICT

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By

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LETTER OF RECOMMENDATION

This thesis entitled “MARKETING AND SUPPLY CHAIN ANALYSIS OF ONION SUB- SECTOR IN SIRAHA DISTRICT” has been prepared by Ms. ANJALI SAH under my guidance and supervision. I, hereby, recommend it in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS for final examination.

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LETTER OF APPROVAL

We certify that this thesis entitled "MARKETING AND SUPPLY CHAIN ANALYSIS OF ONION SUB- SECTOR IN SIRAHA DISTRICT" submitted by ANJALI SAH to the Department of Economics, Faculty of Humanities and Social Sciences, Patan Multiple Campus, Tribhuvan University, in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS has been found satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said degree.

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DECLARATION

I hereby declare that this thesis entitled "MARKETING AND SUPPLY CHAIN ANALYSIS OF ONION SUB- SECTOR IN SIRAHA DISTRICT" which I have submitted to the Department of Economics, Patan Multiple Campus, in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS, is entirely my original work prepared under the guidance of my supervisor. I have made due acknowledgements to all ideas and information borrowed from different sources in the course of writing this thesis. The results of this thesis have not been presented or submitted anywhere else for the award of any degree. I shall be solely responsible for any evidence found against my declaration.

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ANJALI SAH

ABSTRACT

A large number of people in this district are engaged in vegetable production. Onion is one of the major vegetable productions in this district. Raw onions are very low in calories. This research is conducted in Siraha to identify the status of Onion production and marketing along with its constraints. Its residents have embraced the production and marketing of onions as their main source of income generation.

Despite the economic potentiality of vegetables in the area, farmers have been unsuccessful in garnering maximum benefits. Hence, the objective of this study is to carry out an in-depth market assessment to analyze the supply chain structure of onion and suggest a value chain development plan for its sub-sector development. For this research, 50 households are being surveyed by filling questionnaires. Qualitative and quantitative, open and close types of questions have been asked to respondents. Primary data collected from questionnaire survey, key informant's interview and focus group discussion. Secondary data collected from DADO Report, journals, articles and newspapers. Necessary information has been collected through field and market survey via farmers, key actors' interviews, key informants' interviews, case study and consultation with farmer's groups, institutions, and individuals through phenomenological study. Simple random sampling was used to select the value chain actors in the chain link. The collected data from the survey have been analyzed using statistical software like MS Excel and SPSS (Statistical Package for Social Sciences). The average yield of onion was found to be 15.134 Mt/ha with average cost of production Rs. 1,17,975. Weed infestation was observed as the major problem in production of onion followed by the storage issues. The major constraint of marketing of onion was seen as the lack of proper storage facility followed by the fluctuating market price of onion. Lack of storage facility was causing the great post-harvest loss. The value of Benefit-cost ratio was observed as 2.535 and thus profitable enterprise. Around 58 percent of price was spread in the supply chain which is about Rs. 30 per kg because traders, wholesalers and retailers incurred marketing cost and therefore comparatively the producer's share in consumer's rupee was reduced to 42.3 percent. The study revealed that the retailers have a higher marketing margin which is Rs. 5.10 among the actors of the supply chain. The marketing efficiency in the supply chain was found to be 0.50.

ACRONYMS AND ABBREVIATIONS

ADS	Agriculture Development Strategy
AEC	Agro-Enterprise Center (AEC)
AFU	Agriculture and Forestry University
AGDP	Agriculture Gross Domestic Product
ANSAB	Asia Network for Sustainable Agriculture and Bioresources
BCR	Benefit Cost Ratio
CBS	Central bureau of statistics
DADO	District Agriculture Development Office
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GM	Gross margin
GR	Gross revenue
HA	Hectare
HVAP	High Value Agriculture Project
Iimp	Index of importance
INGO	International Non-Governmental Organization
KII	Key Informants Interview
MDD	Marketing Development Directorate
MIS	Market information systems
MM	Marketing margin
MoALD	Ministry of Agriculture and Livestock Development
MT	Metric Ton
NARC	Nepal Agriculture Research Council
NGO	Non-Governmental Organization

PS	Producer's share
RMA	Rapid Market Appraisal
SPSS	Statistical Package for Social Sciences
SRS	Simple Random Sampling
USA	United States of America
USAID	United States Agency for International Development
VC	Variable costs
VCA	Value/Supply chain analysis
VDC	Village Development Committee
VDD	Vegetable Development Directorate
VS	Value Share

MARKETING AND SUPPLY CHAIN ANALYSIS OF ONION SUB-SECTOR IN SIRAHA DISTRICT

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CHAPTER I
INTRODUCTION

1.1 Background of the Study

Nepal, where on average 60.4 percent of the population is dependent on agriculture, is no exception. Together with the involvement of more than half of the total population in agriculture and its huge share of the country's national GDP by 27 percent (MOALD,2019/20), the agricultural sector has become an indispensable sector of the nation, thus considered as the backbone of the national economy. Among the diverse agricultural commodities, horticultural commodities constitute an important fraction in the agricultural industry of Nepal. Vegetables make up only 9.71 percent of all horticulture commodities, which account for 14 percent of the overall AGDP. (MOALD, 2014).

Nepal is richly endowed with numerous agricultural crops and plants. The variation in temporal, altitudinal, topographical aspects has made agricultural biodiversity possible (Shrestha, 2007). Siraha, a terai district also exhibits numerous agricultural potentialities. The district has 1,22,757 ha of land, of which 73514 (60.15) is presently fertile and cultivable; however, the total of 72300 ha (58.87 percent) land now cultivated helps to sustain food deficiency in the terai region of Nepal (DADO,2018). The present production scenario of onion crops in Siraha district is 82080 mt under the production area of 5660 ha with productivity of 14.50 mt/hectare (MOALD, 2019/20). In terms of production and sales, onion is an important vegetable crop of Siraha and is extensively grown on a wide scale by many farmers, farmer's groups and farmer's cooperatives.

After cauliflower and cabbage, onions are considered to be the third-most significant vegetable in terms of area and production in the Nepalese agricultural sector. It is cultivated in aggregate 20,000 hectares (ha) in Nepal and around 0.3 million mt of onion is produced annually in the country (MOALD, 2014). Onion is best suited to terai, low and mid hills; and it is also becoming an attractive sub-sector for source of income generation. Budhathoki (2001) claims that as opposed to cereal and other annual crops, onions produce a higher income, hence onion producing regions and farmer populations

have been growing. Different actors, stakeholders and institutions are involved in production and supply of onion and their value adding activities. As significant value chain activities, the function in this instance involves input supply, production, and collecting, trading, wholesaling, and retailing.

Our agricultural economy is undergoing structural changes. Through commercialization, the recently established Agriculture Development Strategy (ADS) also seeks to increase food self-sufficiency and lessen poverty. Yet poor infrastructure, underdeveloped institutions, and insufficient technical assistance for commercialization and value chain development (DADO) continue to impede the expansion of our nation's agriculture. The value chain of agricultural commodities should be studied in order to make the appropriate interventions for reducing such agricultural restrictions. The performance of all business operations involved in the flow of goods and services from the place of production to the hands of consumers is how Kohl and Uhl (1980) defined the term "marketing." It is a procedure that makes products and services accessible to customers. Four W’s and one H question are addressed.

What to sell?

Where to sell?

When to sell?

Whom to sell?

How to sell?

1.2 Statement of the Problem

The agriculture production system's delayed rate of transition was brought on by inadequate marketing infrastructure and facilities. Due to a lack of necessary infrastructure, such as transportation, locally produced goods are inaccessible to the domestic market, making entry to the market expensive. Farming's main issue is said to be storage. Because of this, even if there is a high level of output, onions are only readily available in marketplaces for a limited time—barely four months. The farmers faced various types of problems including technical and economical in the field of onion marketing.

Despite having the potentialities farmers are not able to fully utilize the available resources that is fertile land also remain uncultivated, along with this farmers have been confronting with frequent price change and low producer's share in consumer rupee, Even though the area, production, and productivity of onion production increased, farmers did not fetch the actual price of onion due to improper marketing channels and inadequate market infrastructure and knowledge related to marketing channels. Due to insufficient storage houses and processing units and bad weather conditions farmers confronted with frequent environmental difficulties such as winds and hail storms caused great damage to producer. Besides these, even after the production of onion by the farmers, due to the limited knowledge of the proper marketing system leads to lower profits to farmers. They are also concerned with inadequate facilities to transport products. The reason why onion prices fluctuate is due to a lack of cooperation amongst supply chain participants. Analyzing the existing supply chain in Siraha district is very important to suggest production and market-oriented solutions which will be helpful to onion growers, traders, government agencies, and other non-government organizations. Many farmers engaged in onion production in the Siraha district, most of their products are benefited by the middleman (vendor). Price fluctuations have a direct impact on market prices and result in significant losses for farmers.

Inadequate post-harvest management, improper knowledge about market information, perishability, lack of farmers' cooperative, poor technology, low price of onion, and low level of extension service provision are some of the major problems in marketing of onion (Takele Honja, 2016). Despite the efforts and initiatives of concerned parties, vegetable growers are bound to face a variety of issues, including the inability to obtain high-quality seeds and fertilizers in a timely manner, scientific cultivation practices, irrigation facilities, diseases and pests, lackluster marketing infrastructures (such as marketing data, physical assets, auction markets, disorganized market hubs, marketing extension services, price ambiguity, etc.), and the lack of storage space (USAID, 2011). Transportation costs and marketing margins of both retailers and wholesalers were identified as the major reasons for high marketing costs of vegetables, adversely affecting the profitability of such crops (Kumar and Arora,1999).

The research questions that this study aims to address are as follows:

- How do onion production and marketing support services work?

- What obstacles must farmers overcome in order to supply the market with onions?
- Who benefits the most from the onion supply chain, and how does it look?

1.3 Objectives of the Study

1.3.1 General Objective

To study about onion marketing system and supply chain analysis in Siraha

1.3.2 Specific Objective

- To analyze the current status and limitations on onion production and marketing, as well as to identify the main marketing channels for onions.
- To determine the onion producer's share, the benefit-cost ratio, the marketing expense, the price spread, and the margin marketing effectiveness.

1.4 Significance of the Study

Onion being perishable and its marketing issue is of great concern to the government, farmers, and consumers. The major markets for the production and consumption of onions in Nepal include Siraha. The findings of this study would be useful in developing strategies that would stabilize the market price of onions. It would help to lower the number of uncertainties by utilizing marketing research and intelligence. There is a simultaneous need for increasingly specialized marketing services including physical distribution, storage, grading, market intelligence collection, and so forth as urban populations grow and want a diversified diet (away from agriculture food). This research would help to highlight the production and marketing constraints in onion. It helps to understand the perception of consumers that helps to formulate the farming strategy to the farmers and marketing system to the traders. Finding of the survey research helps in providing baseline information about the existing scenario of onion marketing and its supply chain.

The study understood the perception of the consumers on different species and sources of onion which is helpful to formulate the farming strategy to the farmer and also the marketing system to the traders. Additionally, it encourages individual individuals, interested I/NGOs, and policymakers to make investments in this field. a. It could

improve the quality of life of the farmers by knowing the actual price and improve the economic foundation. So, the proper marketing management with well-equipped facilities and infrastructures like transportation, packaging, storage would fetch the higher price to the farmers

1.5 Scope and Limitations of the Study

1.5.1 Scope

Onion marketing is a unanimous part of the production-distribution system. One of Nepal's major markets for both the production and consumption of onions is Siraha. In Siraha, there is no systematic database or analysis of the onion marketing system. The results of this study will be useful in developing strategies that stabilize onion market prices. It helps to lower the number of uncertainties by utilizing marketing research and information. The results will be helpful in identifying the onion market structure throughout the supply chain in other areas of the Madhesh province as well as supporting the program for distributing subsidies.

1.5.2 Limitation of the Study

The study was unable to cover the entire Siraha district which focuses on some major production areas and market areas. The study only represents the marketing practices, marketing channels, consumer behavior, production technology of only the Siraha district, not the whole country. Labor category only includes the human power from outside the family, family members does not comprise the labor group. The products (onion) in the supply chain not only comes from within the district but also the traders from other neighboring districts put onion in the market in Siraha. Producers only represents the commercial growers not the farmers with subsistence farm doing. The study will be carried out in the area of municipality Golbazar. In addition to those times and budgetary constraints were always present there, so I may not be able to cover large areas due to which I may have limiting factors in area coverage and sample size.

1.6 Outline of the Study

This study comprises of five chapters and each chapter is further divided into different sections and sub-sections.

- Chapter I: Introduction

  The first chapter, which is the introductory portion, gives the general introduction of the whole study comprising research objectives and questions, significance and limitation of the study.
- Chapter II: Review of Literature

  Chapter two is related to the review of literature relating to both national and international contexts. It includes a discussion on the theoretical framework as well as the review of the major empirical works.
- Chapter III: Research Methodology

  Chapter three is concerned to the research methodology used in this study. This chapter comprises of research design, nature and sources of data method of analysis and definitions of key terms. The relevant statistical tools, bar and pie charts have been used as per nature of data.
- Chapter IV: Data Presentation and Analysis

  This chapter is related to presentation of the survey result based on analysis of data.
- Chapter V: Summary and Conclusion

  This chapter contains a summary of the study's findings, its conclusions, and recommendations that could be useful in developing policies. References and appendices follow this chapter.

CHAPTER II
REVIEW OF LITERATURE

2.1 Introduction

This chapter consists of critical review of literatures from both international and national journals, publications, annual reports which provides the basic guideline for conducting research ahead. The supply chain of onion involving various actors along with the marketing channel and economics of production are discussed below.

2.2 Literature Review

2.2.1 International Context

Xaba et al. (2013) studied and analyzed the perspective of the Vegetables Supply Chain in Swaziland which was directed to investigate the existing means of channels and market margin in the vegetable supply chain. The performance of the vegetable supply chain was investigated using a descriptive quantitative design with a two-stage sampling technique that involved stratified random sampling and purposeful sampling. Data were gathered via a questionnaire, and descriptive statistics and multinomial logistic regression were used to evaluate the results. The highest producer's share was obtained through a channel that sells direct to consumers. This was due to the fact that they sold at a higher price compared to the wholesalers. The study did not cover the production aspect.

The goal of Maity's (2013) study, Supply Chain Management of Onion in India: Status, Issues and Scope, was to investigate solutions to use technology and experience to address the market's current challenges while also identifying new prospects for onion. Based to the study's findings, appropriate production planning, post-harvest management, and marketing may enable growers to obtain higher prices for high-quality products and may also motivate them to sustain production levels and domestic market supplies with little price fluctuation. To create a more sustainable onion supply chain, close cooperation was required between the many players, including growers, researchers, entrepreneurs, financial institutions, and all middlemen.

Sulumbe (2015) observed and analyzed the marketing of onions in Monguno local body region of Borno state, Nigeria. The study's objectives were to assess the associated

expenses and financial results as well as to determine the limitations and marketing effectiveness of onions. From the Monguno market, a representative sample of onion vendors was chosen using simple random sampling. From the list of onion marketers that served as the sampling frame for the study, 45 respondents were chosen. The study relied on primary data that was gathered through the use of a questionnaire. Descriptive statistics, the gross marketing margin, and market effectiveness were used in the market analysis. According to the report, onion marketing was successful, with gross margins for wholesalers and retailers of N 2,888.00 and N 3,130.00, respectively. The marketing margin was seen at 32 percent to the wholesalers and 33.3 percent to the retailers with the marketing efficiency being 42 percent and 44.8 percent accordingly. Inadequate storage facilities, inadequate transportation infrastructure, and a lack of cash were obstacles to onion marketing in the research area, all of which had an impact on the profits made by the marketers. Benefit-Cost ratio was left out during the study.

Shah (2018) conducted an analysis of supply chain describing annual price fluctuations, which are often cyclical in nature, having an impact on export performance. It investigates the disparity between farm harvest prices, wholesale prices, retail pricing, and export prices, as well as horizontal and vertical supply chain integration for several onion types. The study revealed the very profitable nature of onion crop farming, as well as the fact that the producer's portion of consumer rupee for onion varied from 49% to 52% in the domestic market for various kinds, and this share in the export channel varied from 30% to 35%. The increased cumulative marketing margins were a major role in the producer's reduced proportion of retail and export onion pricing. Investment activities by the public and commercial sectors to provide suitable post-harvest infrastructure will undoubtedly enhance horticultural crop production and selling in both domestic and export markets. One of the study's main recommendations is to announce an MSP for rabi onion, which has a longer shelf life.

S Premi and BR Premi (2018) had conducted a study of constraints and way forwards in supply chain of onion. Onion prices have a direct impact on the average person's consumption basket. As a result, the government is always focused on this commodity. Though there is always a surplus output, fluctuating local and export demand frequently causes a demand-supply mismatch, resulting in a spiral effect on onion prices. Prices might sometimes fall below the cost of production, making farming unprofitable. Onion sprouting during storage in high humidity and low light circumstances is a serious

limitation, resulting in huge losses for farmers/traders, as well as poor post-harvest management at the farm level. Irradiation, a cold preservation technology, is very successful in suppressing onion sprouting. The Government of India employs the Minimum Export Price (MEP) as a measure to secure regulated exports and an adequate supply of onion in the domestic market. Effective crop planning and the development of post-harvest management infrastructure for onions will go a long way toward resolving onion supply chain concerns.

Abrha et al. (2020) conducted the study will look into the variables affecting farm households' access to the onion market in the study area. Both primary and secondary data were incorporated into the study. 121 farm households were randomly selected, and a semi-structured questionnaire was utilized to collect primary data from them. Twelve wholesalers and thirty-one retailers who deal in onions were questioned in order to look into the onion marketing channel in the study area. The findings of the multiple regression model demonstrated that the quantity of onions produced, accessibility to extension services, and market knowledge all positively and significantly predicted the quantity of onions delivered to the market. As a result, the government, non-governmental organizations, and other stockholders must play an important role in overcoming onion production limits. Extension agents must assist onion farmers in increasing onion output through better farm management and conservation, improved varieties, and integrated water, nutrient, and pest management. The relationship between onion producers and other participants in the district's value chain and beyond is improved by an integrated agricultural marketing information system.

Throughout the fiscal year 2018-19, Basu (2020) conducted a study to evaluate the economics of onion production, price variation, distribution methods, and marketing effectiveness in the Indian West Bengal region of Bankura. 100 onion growers were chosen at random from a pool of 20 villages divided into four blocks. The land holding size of the selected cultivators was roughly one acre. Primary data were gathered through personal interviews using the survey method and a pre-tested questionnaire schedule. A study of the profitability and resource productivity of onion cultivation has been attempted. It is clear that the percentage share of total variable cost is Rupees 33,000 (76.75 percentage) and the fixed cost of production is Rs.10,000 (23.25 percentage) of total cost of produce. The cost-benefit ratio is approximately 2.51. A large portion of profit is distributed to the wholesale and retail markets, with only a

small portion remaining at the producer level. The government should take the required steps to reduce pricing disparities in various marketing channels for the benefit of both farmers and consumers.

In Ethiopia, Mossie et al. (2020) had conducted a study focusing econometrics analysis of onion. Significant obstacles affecting onion production in Ethiopia include improving onion growers' capacity to access markets and actively participate in markets. As a result, the study aimed to look into the variables that affect the supply of onions on the market. The study's specific goal was to explore factors influencing onion production and market distribution in rural residents. A multistage sampling process and a probability proportional to sample size were used to select 275 homes in total. According to the findings, 79.27% of onion-producing households in the study region were headed by men, while the remaining 20.73% were headed by women. On the other hand, model results show that the amount of onion supplied to the market was positively and significantly impacted by gender, age, household size, farm size, power pump, promotional contract, post-harvest adding value, and market intelligence. The results imply that policymakers should take into account encouraging market contract, propagating improved onion varieties and production inputs, accelerating land use, increasing post-harvest value addition activities, and broadening the availability of irrigation machinery.

Priantika et al. (2021) had conducted a study of Onion in Yogyakarta Special Region. The onion production region is situated in the Bantul regency's districts of Saden and Imogiri. The purpose of this study is to comprehend the onion marketing chain in Bantul Regency and, using the Acharya technique, to pinpoint the most effective marketing path. A total of 60 onion farmers in Bantul District were chosen at random as respondents. The snowball method is used to identify two wholesalers, three merchant collectors, and three retailers by following the flow of onion sales from growers to consumers. Three marketing channels make up the Bantul district's onion marketing chain, according to the data. The most typical onion chain marketing compositions in Bantul District are farmers-wholesalers-collectors-retailers-consumers, farmers-wholesalers-collectors, and farmers-collectors-retailers. The third marketing channel, farmers-collectors-retailers, is the most effective for marketing onions in Bantul Regency. The marketing agency of the middleman in the second marketing chain has

the greatest profit-to-cost ratio value of 6.44. Information regarding the onion marketing chain in Bantul regency is anticipated to be provided by this study.

Tripathi et al. (2021) conducted a study that investigates the impact of the Covid-19-induced lockdown on selected vegetables in order to determine whether the vegetable supply chain was impacted during that time period. His research used a variety of methodologies. The market arrival of vegetables and a daily data collection of wholesale price observations were first looked at. The Kalmogorov-Smirnov test and descriptive statistics were used to gauge the extent of the lockdown's effects on India's vegetable supply chain. In areas where FPOs/FPCs already exist, institutional support for direct marketing has been observed to be more extensively investigated. Because this is an exploratory study with a small sample size, the universality of the research findings may be constrained.

Mila (2022) evaluated the onion supply chain restrictions empirically in Bangladesh: A pre-covid to covid situation. The set objectives of the study were to illustrate the existing supply chain of onion along with market actors' margin and profitability from pre-covid to covid situation. Sample size was determined by;

$$n= N/ (1+N* e^2)$$

The determined sample size was 302 for the total population, N = 1240 with a 5percent level of precision. As a result, 300 responses were randomly chosen.

Equation vi was used to create a constraint facing index (CFI) to identify the most important constraint.

CFI= (Ch*3 + Cm*2+ Cl*1+ Cn*0)/ N

where, Ch = number of high hurdle response, Cm = number of medium hurdle response, Cl = number of low hurdle response, Cn = number of not-at-all hurdle response, N = total response, CFI= Constraint Facing Index.

The study brought out the conclusion as follows: Although the survey indicated that onion farmers made about 71% of what consumers pay for a kilogram of onions, the production took a great deal of expense and work. The strain on onion producers and traders was increased by the worldwide pandemic. Furthermore, at the time, it was

believed that assisting disadvantaged farmers required the issuing of little or no collateralized loans.

2.2.2 National Context

Since the majority of people in Nepal make their living as farmers, the agricultural sector leads the country's economy. As a result, farmers who rely on agricultural output make up the majority of the poor populations who live below the poverty line. (MoALD,2018).

In the Palpa area of Nepal, Adhikari (2002) did study on the analysis of the marketing system for cauliflower and cabbage. She discovered that Madanpokhara had a worse net return on cauliflower production than Chidipani did. In Madanpokhara the net gain from cabbage was higher whereas it was lower in Chidipani. Cauliflower and cabbage were marketed primarily through the producer-retailer-consumer chain. Compared to Pokharathok and Chidipani, Madanpokhara had a bigger marketing margin. The producer's share was further lower in Madanpokhara (41.80%) and greater in Pokharathok (81.24%) and Chidipani (81.54%). The constraints of production and marketing were not covered rather the net returns was more highlighted.

According to a 2003 study on the production and marketing of onions by the Marketing Development Directorate (MDD) and Winrock International, farmers and traders (wholesalers and retailers) suffer greatly from the absence of basic infrastructure (market lawn, preservation, and evaluating machine) at local assembly markets. The study recommends that the adequate marketing infrastructure including linkage to roads, electricity and proper market facility would ensure product availability and minimization of losses.

In the Makwanpur district of Nepal, Paudel (2006) conducted a second study on the effectiveness of cauliflower production and marketing. He discovered that the study area's advertising framework was poorly run and entirely private, with traders as its dominant force. He added that a key factor in price fixation was the local collectors. Chitlang had the largest marketing margin (Rs 11.83/kg) and the lowest producers' share (54.39%), whereas Daman had the lowest marketing margin (Rs 11.14/kg) and the highest producers' percentage (57.05%). Category 3, which includes farmers with more than 6 ropani land, had the lowest marketing margin (Rs 10.03/kg) and the greatest producers' share (61.33%). The issue of post-harvest loss was not addressed by the

study.

Mishra and Kumar (2013) studied that by making changes to the value chains, the various problems mentioned can be improved. These changes include raising comprehension among participants, enhancing the capabilities of the value chain participants, bolstering their institutions, encouraging farmers to engage in market-led production, giving farmers better access to market information, and replacing outdated technologies with more advanced ones. The best alternative for value chain participants is provided by value chain improvement, which fosters process synergy. In particular, draw attention to the necessity of market information systems (MIS), infrastructure development facilities for institutional advancement, and the promotion of long-term sustainability. Instead, then analyzing the problems' current state, the study concentrated on making the necessary improvements.

According to Poudel (2013), "the post-harvest loss of vegetables is the fundamental cause attributing toward elevated marketing costs along with pushing down farmer's prices". The study suggests that lowering postharvest loss is a good method to lower marketing margin. Additionally, he suggests that the value chain be improved by choosing appropriate varieties for production based on the local environment, applying improved production technologies, adjusting suitable varieties based on the production calendar, and improving harvesting techniques, eliminating inaccessible materials, grading, and efficient handling of products during harvest. Accordingly, earlier research shows that value chain participants' behaviors have been influenced by a variety of circumstances, which may result in low product prices, relationship imbalances, or fair mutual benefit.

According to Thapa (2013), more than sixty-five percent of Nepal's population works in agriculture, and higher production outcomes are achieved when people collaborate in teams, institutions, and networks. There are more people involved in the buying and selling of vegetables at many levels, including the input supply chain, production, wholesale, and retailing. The value chain has been developed as a result of these various levels, and its participants cooperate, help one another, and compete with one another in order to optimize rewards and reduce risks. According to the study's findings, women's participation in producers' organizations can be boosted and market-oriented production can be encouraged.

Timsina et al. (2016) proposed the study with the goal of this article to assess the present situation of the Nepalese onion seed sector through the perspective of chosen functional supply chain tactics. The actor-oriented technique known as the integrated approach is used to track product flows, was adopted, as well as a more thorough methodology. For the onion seeds supply chain, multiple actors are often involved. The findings revealed that supply chain market participants are reaping large benefits from value addition as a result of increased investment in value creation. It is suggested that supply chain operations work along with different functional techniques, such as efficient seed drying and storing and the production of desired varieties. The study had covered only single crop.

Arain (2018) analyzed agricultural entrepreneurship: opportunities for Nepali youth which clearly went for the goal to provide a holistic view of agricultural entrepreneurship in Nepal, which particularly focused on the problems facing returning migrants, and commodities through which one could find the greatest success. Two quantitative measures, a benefit-cost ratio (BCR) in representative districts and average revealed comparative advantage (RCA) were used for analysis. A collection of government reports was utilized on production costs and marketing margin of agricultural products. BCR is a ratio of the price a farmer receives (farmgate price) to the input costs which includes material, labor, capital, land lease, depreciation, and repairs. RCA is a commodity's share in total national exports divided by its share in total world exports. Onion production in Nepal depicted the average BCR of 3.57 whereas the RCA was observed near to 0. The low value of RCA depicts the strong criticism in trade of onions in the worldwide market. Primary source of data was not evident in the study causing it not to be widely discussed.

Bhandari (2020) was seen working on a novel strategy to agricultural planning and development in Nepal: the use of a sub-sector analytical technique in the selection of vegetable value chains. The study was conducted with the objectives of examination of the value chain's actors' economies in terms of cost of production, gross margin, value addition, and value addition. On-site study of VDCs of Gorkha, Dhading, Kavrepalanchowk and Sindhupalchowk along with district-level consultative workshops and FGDs were deployed to conduct SSA. Using descriptive and empirical approaches, the data was tallied, encoded and evaluated. To determine the best practical sub-sector, the study's outcome was an extensive merger of comparative and

competitive advantages. The study did not address the vegetable's market effectiveness along the value chain.

Bhandari et al. (2021) studied and this survey investigation created an interview schedule with 80 randomly chosen homes in the Kathmandu valley towns of Kirtipur, Chandragiri, Changunarayan, and Godawori using a semi structured questionnaire to estimate supply-side efficiency in the tomato sub-sector. The study found that growing tomatoes in a tunnel produced a net profit that was roughly 44% more than growing them outdoors. For the tomato industry, five different types of marketing channels were used. The marketing profit per kilogram of tomato was the highest (NRs. 39.2) and the producer's share the lowest (39.88 percent) in the channel that included wholesalers, retailers, and local traders. In order to create the most coordinated and effective supply chain and ensure that tomato growers received a sizable share, the study recommended the most dominant, low marketing margin, and highly effective supply route for tomatoes. For the selling of fresh tomatoes, community marketing or cooperation are suggested as an alternative to a private one. The study had not covered the constraints of the marketing.

Modi (2022) studied the economics of growing seeds of onion in western Rukum, Nepal. The study's predetermined goals included an analysis of onion seed production's costs, returns, and profitability as well as the identification of factors that influence productivity and marketing of onion seeds and the industry's current marketing structure. For the purpose of gathering primary data utilizing pre-tested semi-structured questionnaires, field surveys, and focus group discussions, about sixty households were randomly chosen using cluster sampling. Journals, academic books, and DADO reports were some of the sources used to collect secondary data. The SPSS application was used to analyze the data using multiple linear regression and indexing approaches. Onion seed production costs per kg were determined to be on average NRs 622.83, with a profit of NRs 400. For the production of onion seeds, the benefit-cost ratio was 0.64, demonstrating the loss brought on by recent, extreme price swings that were brought on by biotic stress, the consequences of Indian seeds, and an unfavorable chain of seed pricing and marketing. With onion seed productivity, the cost of labor and plant protection was determined to be statistically significant. Although the onion seed growing topic is technical, the study does not go array with onion production and supply chain in the market.

The primary participants involved in carrying out various tasks in the marketing system include producers, traders, transporters, wholesalers, retailers, and consumers (MDD, 1999). In Nepal, there are primarily seven different categories of marketing outlets. Marketing Infrastructure Development Project, 1996. The channels are as follows;

Channel 1: Producers to Consumers
Channel 2: Producers to Retailers to Consumers
Channel 3: Producers to Collectors to Retailers to Consumers
Channel 4: Producers to Wholesalers to Retailers to Consumers
Channel 5: Producers to Wholesalers to Processors to Consumers
Channel 6: Producers to Cooperatives to Export (to India)
Channel 7: Producers to Cooperatives to Wholesalers to Retailers to Consumers

2.2.3 Policies for Agriculture in Nepal

Among various sectors in the country, Nepal has emphasized more in agricultural development and its mechanization for the reduction of the poverty level in rural areas. Different plans and policies have been prioritizing the advancement in the agriculture sector of Nepal. Since past years several plans have been made and implemented. The agriculture sector is also seen by the government of Nepal as the main driver of the nation's economic development, and it is via this sector that the country's poverty rate is intended to be lowered to 14%. The APP (1995) was designed to increase agricultural growth whereby per capita AGDP will grow from its 1995 level of 0.5percent to 4percent per year. Its main objective was to accelerate the growth rate in agriculture through increased factor productivity and technology-based green revolution in agriculture. Similarly, Agriculture Development Strategy (ADS, 2015-2035) is a 20 years' project which aims to reduce poverty from 25 percent to 5percent by 2035 A.D. through increased investment in agriculture leading to a faster agricultural growth rate. It mainly focuses on agribusiness development strategy. ADS strives to accelerate the expansion of the agricultural sector through four factors, namely, governance, productivity, competitiveness, and lucrative commercialization, in order to realize its vision. In a similar vein, the Prime Minister Agriculture Modernization Project (2073-2082) is aiming to revamp agriculture in order to help farmers become self-sufficient through commercialization. This project's vision is to increase the production and productivity of the agricultural sector through mechanization, the availability of necessary technology and production materials, and the development of essential

infrastructure for processing and marketing of agricultural products. The Agri Business Promotion Policy places a strong emphasis on the commercialization, advancement, and variety of the agriculture sector as well as the involvement of the private sector in commercial farming. It emphasizes that unless agriculture shifts from subsistence to business farming, the farmer's standard of life won't rise. By encouraging the production of desirable and competitive agro-products, the policy aims to reduce poverty. It acknowledges the necessity of promoting both domestic and international markets. This policy was developed in accordance with the objectives of National Agriculture Policy 2061, which places a strong emphasis on the development of business service centers for top-notch agricultural products and services. The significance of government and private sector cooperation in the export of high-quality goods has been emphasized. The policy includes particular agricultural entrepreneurship programs for the poor, women, and Dalits.

National Agriculture policy 2061 was enacted to enhance living standards through sustainable agricultural development by converting the subsistence-oriented agriculture system into a commercial and competitive sector. The strategy specifies explicitly that large-scale production regions will be established in sufficient quantity and quality to meet market demand, and that organic manure and farming would be supported. The goal to involve stakeholders at all levels, from the national to the village, in policy implementation and monitoring has also prompted the foundation of the federation.

2.3 Research Gap

There has been a variety of researches about the status of supply chain of onion in the districts of Nepal, mainly the districts other than districts in Madhesh. But, most studies have focused either on the context of value chain of onions in hills or on the topic of geo-political hurdles prevailing in these areas. Despite the fact that Madhesh region does not bear harsh geo-political instabilities, comparatively lesser studies were conducted and the fertile region of terai were unrecognized. The context of production and supply chain of onion seeds rather onion market was highlighted by the researchers which is causing greater extent of infertility and barren land in result. In response, my study is encompassing the gap of supply chain analysis of onion and undefined efficiency of market channel along with the constraints of both onion production and marketing. The two key holes I am attempting to fill in my research are the producer's share of consumer spending and marketing effectiveness.

CHAPTER III
RESEARCH METHODOLOGY

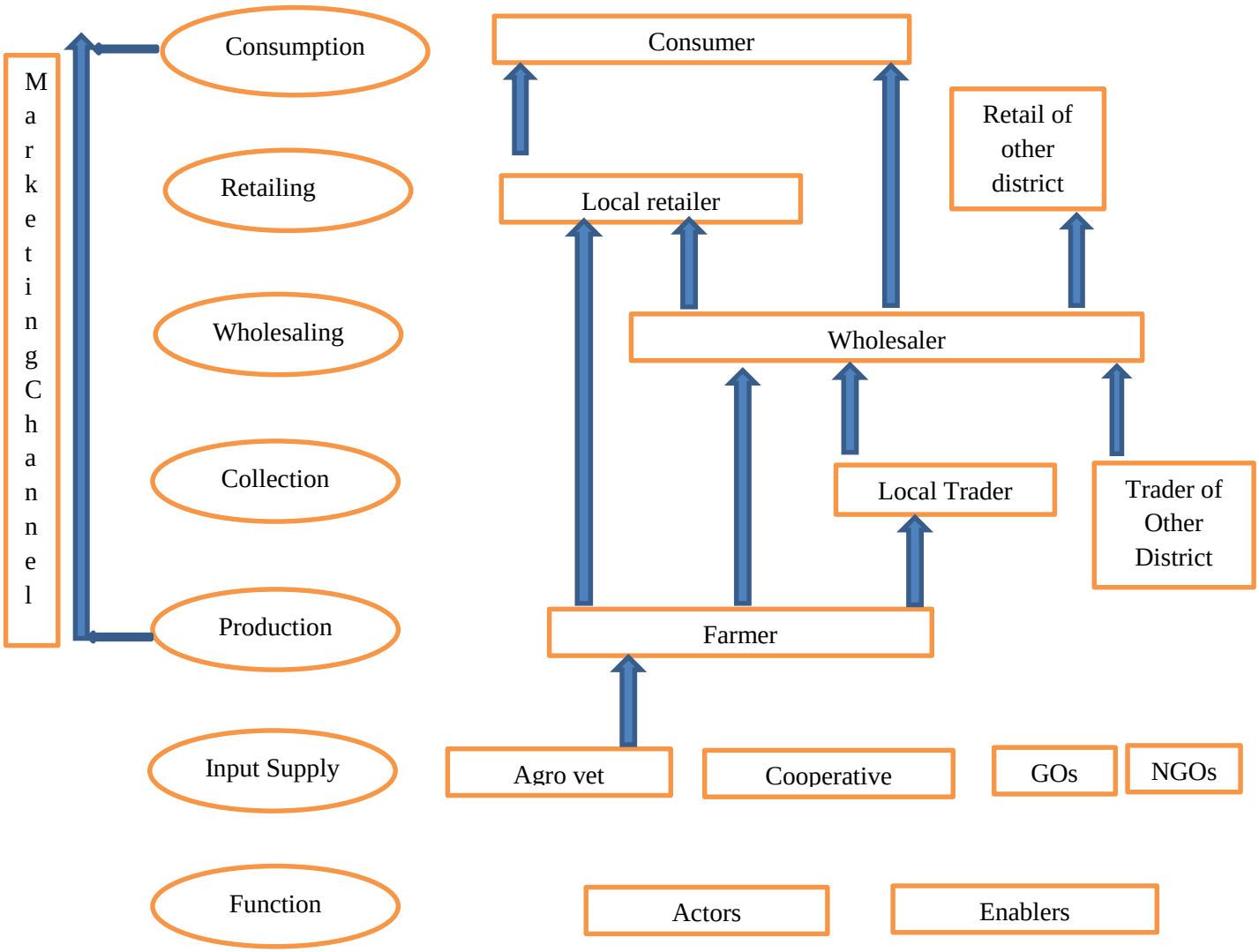
3.1 Introduction

This chapter includes conceptual framework, research design, sampling design, description of the selection of study area as well as nature of data along with method of collection. It also deals with the tools and techniques of analysis along with definition of variables

3.2 Conceptual Framework

The study has proposed to know the marketing channel and supply chain of onion between the various functions through the set of questionnaires and FGD.

Figure 3.1: Conceptual Framework



Source: Adhikari,2002

Figure 3.1 shows different functions involved in onion supply chain namely input supply, production, collection, wholesaling retailing and consumption on the left side and actors involved in each function on the right to the functions.

3.3 Research Design

Descriptive research design was used for this study. Information was collected separately from household respondents, wholesaler, retailer, producer at a single point of time through survey method. Babbie (1998) suggested such design is suitable for descriptive and is also economical in terms of time and financial resources.

3.4 Nature and Sources of Data

3.4.1 Primary Data

A field and market survey were conducted to obtain data related to onion production and marketing. The formal survey was undertaken through formal interviews with randomly selected farmers, wholesalers, retailers, and consumers using a questionnaire for each group.

3.4.2 Secondary Data

To supplement the data for primary sources, various secondary sources of data, i.e., articles, reports, books published by different institutes and organizations like Nepal Agriculture Research Council (NARC), Central Bureau of Statistics (CBS), Agro - Enterprise Center (AEC), District Agriculture Development Office (DADO), proceeding of various NGOs and INGOs and technical documents relevant to onion production, and trade was reviewed. The data from secondary information sources such as production, productivity, price scenario, export and import figures, demand, and supply of onion was critically reviewed to establish the information gap. Similarly, national-level policy and programs associated with fruit production were also reviewed.

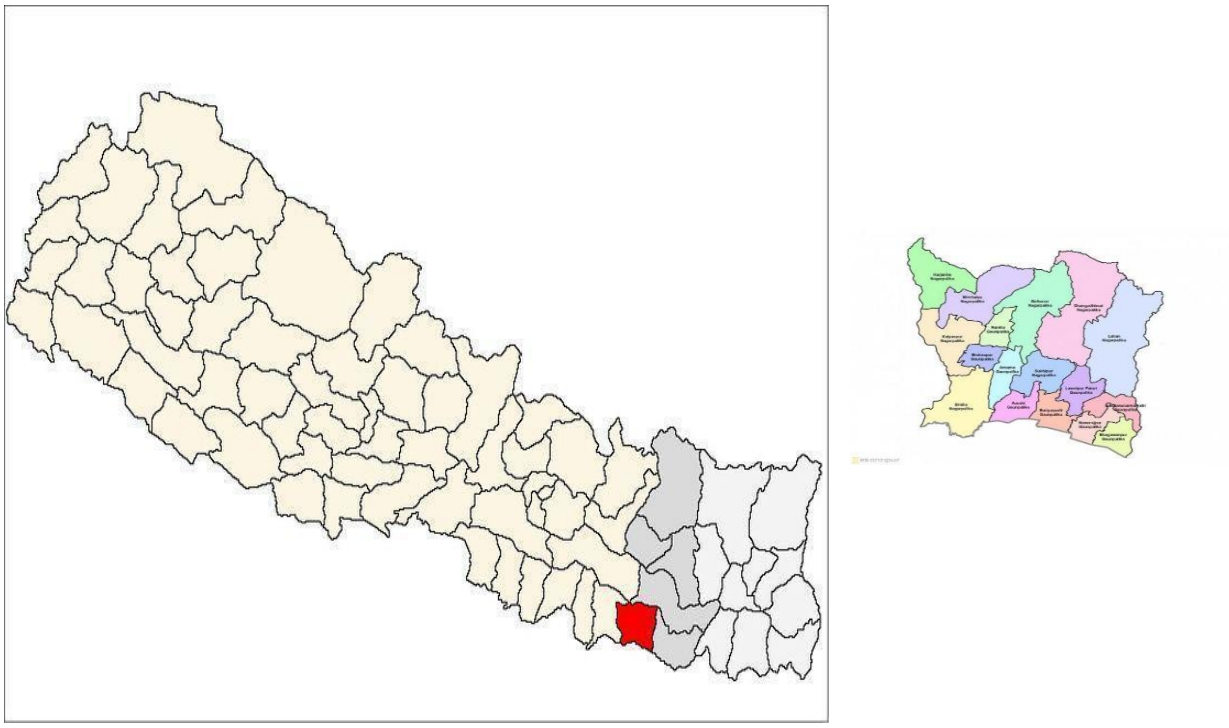
3.5 Data Collection Method

3.5.1 Selection of Study Area

Siraha district, a part of Madhesh province, in Terai plain located in the south-eastern part of Nepal. The region experiences hot summers and cool winters due to its tropical

environment. It is located between 73 meters and 885 meters above sea level. Since the majority of the villagers in this area made onion farming their primary source of income, Golbazar Municipality in Siraha was chosen as the study's location. Hence, the study conducted in this area of Siraha is an effort to analyze the existing scenario of onion's supply chain and recommend market-oriented solutions for further intervention.

Figure 3.2: Map showing Study Area



Source: AKC, Siraha

3.5.2 Sampling Design

Gathering data from the entire population becomes nearly impossible. As a result, (Neuman, 2006) argued that effective sampling aids the researcher in studying a smaller sample while generating correct generalizations about the larger population. Multistage sampling has been used to select municipality in district. Simple Random sampling has been used for the producer's selection as well as for other traders in the supply chain (local traders, wholesalers, retailers and consumers).

3.5.2.1 Population Size

Cooper & Schindler (2008) stated that a population is the total collection of elements about which the researcher wishes to make some inferences. The population under this

study includes following intermediaries; farmers, local collectors, middlemen, wholesalers, retailers, processors and consumers of onion from Golbazar municipality of Siraha. Farmer's group does not include those doing subsistence farming rather majority of the commercial growers were considered. The analysis of commercial producers shows majority of them being registered in the Agriculture Knowledge Centre, Siraha. The top ten retailers with the maximum supply from wholesalers were considered in the population size. Farmers providing the majority of their produces to local traders and wholesalers was considered in estimating the population size of local traders and wholesalers along with the registered data in AKC. 36 households/consumers were comprising all sort of family size; small, medium and large. Total of 76(23 farmers, 10 retailers, 3 local traders, 4 wholesalers and 36 households/consumers) population size was considered for sampling procedure (पुस्तिका | Prime Minister Agriculture Modernization Project (PMAMP,2077-78)).

3.5.2.2 Sample Size

A total of 64 people were taken as respondents in the survey (22 farmers, 3 local traders, 4 wholesalers, 10 retailers, and 25 consumers). According to Poate and Daplyn (1993), a sample size of 60 is the minimum required for a bigger population that will produce a reasonable level of certainty for decision-making and fulfills the study's requirements for meaningful analysis. The overall number of onion farmers in this block was between 20 and 25. These farmers were dispersed among a wide number of communities, with no more than 3-4 farmers in one hamlet. For the sample size n, it employs the following formula: $n = N*X / (X + N - 1)$, where $X = Z_{(\alpha/2)}^2 * p*(1-p) / MOE^2$, and $Z_{(\alpha/2)}$ is the critical value of the Normal distribution at $\alpha/2$ (e.g., for a confidence level of 95%, is 0.05 and the critical value is 1.96), MOE is the margin of error, p is the sample proportion, and N is the population size (Daniel,1999).

3.5.2.3 Selection of the Respondents

Selection of farmers and other supply chain actors was done as follows:

a. Selection of the Farmers

The study's primary focus was on the commercial onion growers in the chosen areas. With the support of the agriculture department of local government staff and local key informants, an informal list of onion growers around the study site was compiled. Using

a simple random sampling technique, a sample of 22 onion cultivating farmers was randomly selected from all of the commercial onion growers (23) in this region.

b. Selection of Other Supply Chain Actors

Other supply-chain actors include the local trader, wholesaler and retailers who acquire vegetables directly from producers and cooperatives, package it and sell it to the other markets. The study included 3 local traders and 4 wholesalers, 10 retailers, and 25 consumers of the study area.

3.5.2.4 Sampling Technique

Onion being a highly demanded commodity and a major element of the farming system of Siraha district, the population involved in this sub-sector is very large. Agrovets, farmers, collectors, wholesalers, retailers and consumers are main supply chain players of Siraha district. A definite number of respondents of each link are selected which are representative of the whole population. The selected respondents constitute the sample and the sample selection process is known as sampling technique. The commercial onion growers and the cooperatives in Siraha associated with onion production, agrovets, collectors, wholesaler, retailer and consumers associated with onion marketing in Siraha district comprise the sampling frame. Among these, purposive, multistage and stratified simple random sampling will be conducted to select the supply chain actors in the chain link. 22 commercial growers (farmers) and at least 25 consumers of Siraha area are surveyed for collecting the information. Similarly, the associated agrovets, collectors, wholesalers, retailers with the sample (random) population of 3-10 respondents, selected from a random selection, each are interviewed to study supply chain of onion in Siraha district. This mode of selection accounts with the study of Daniel (1999).

3.5.3 Methods of Primary Data Collection

a. Questionnaire/Field Survey:

The traders, i.e., onion producers, wholesalers, retailers, consumers were asked a series of open and close-ended questions that helped to gather some relevant information on the locality's social dynamics, economic situation, level of production, marketing mix,

and price. As not every individual of the target group can be included in the survey, a simple random method of sampling without replacement was used to draw out the sample population.

b. Focus Group Discussion (FGD):

FGD was conducted before and after the final survey to build up idea for interview schedule preparation and to verify the data collected through household survey, respectively. The onion producers associated with onion marketing were brought together in a discussion to draw out information about common farming and marketing problems prevalent in the area.

3.6 Tools of Data Analysis (Empirical Model)

The data was first created, collated into Microsoft Excel, and then analyzed using statistical tools for social science (SPSS). The data was gathered from field surveys and focus group discussions. The local unit of measurement was converted into scientific units. The analyzed data and findings were interpreted and presented by graph, chart, table etc.

Gross Margin (Rs.) = Gross Return (Rs.) – Total variable cost (Rs.)

Gross return (Rs.) = Quantity sold (kg) × farmgate price of onion (Rs/kg)

Total variable cost = Summation of all variable cost items

Total fixed cost= Summation of all fixed costs

$$\text{B/C ratio} = \frac{Gross\ return}{Total\ Cost}$$

where,

Total cost= Total Variable cost + Total Fixed cost

Source: Adhikari (2002)

Price spread = $\frac{Cp-Pp}{Cp}$ * 100percent

where,

C_p = Price paid by consumer for 1 kg onion

P_p = Price received by producer for 1 kg onion

Source: Adhikari (2002)

$P_S = \frac{P_F}{P_R} \times$ 100 percent

where,

P_S = Producer share

P_R = Retail Price

P_F = Farm gate price

Source: Adhikari (2002)

MME = $\frac{RP}{MC+MM} - 1$

where,

MME = Modified Marketing Efficiency

RP = Retail Price

MC = Total Marketing Costs

MM = Net Marketing Margins

Source: Bhandari et al. (2021)

Mathematically,

Importance of problems can be computed by the formula:

Source: Bhandari et al. (2021)

Iimp = Σ(Si*Fi/N)

where,

Iimp = Index of importance

Σ = Summation

Si = Scale value

Fi = Frequency of respondents

N = Total number of respondents

3.7 Operational Definition of Variables

Variables like gender, family size, occupation, educational status, ethnicity, size of land holding and plantation were analyzed by using descriptive statistics such as frequencies, percent, mean and standard deviation.

3.7.1 Cost of Production

For the analysis of the production cost, variable cost categories were considered. the price of seeds and planting supplies was one of the variable costs. Others were farm expenditure on labor, fertilizers, pesticides, insecticides, irrigation, staking etc. Total variable cost of production was calculated by adding all the expenditure on variable inputs. The cost on machineries and tools needed in various operations are included in total fixed cost. The family members were not included in the group of labor and eventually it did not add to labor cost.

Total Cost (TC)=Total Fixed Cost (TFC)+ Total Variable Cost (TVC)

3.7.2 Marketing Channel

Marketing channel consists of the people, organizations and activities necessary to transfer the ownership of goods from the point of production to the point of consumption. It is the way products get to the end-user and the consumer. It is also known as a distribution channel. Agriculture products go through adjustments to time, place, forms, and ownership during the marketing process, which helps with supply. Their marketing channel is made up of the chains that the various items travel through to get from manufacturers to consumers. Agriculture products are marketed through a variety of channels, depending on the commodity, producer, lot, scale, and time of year.

3.7.3 Gross Margin Analysis

The producer's supply of output less the variable costs incurred during the production process is their gross margin. As a result, the difference between an enterprise's revenue and its varied expenses is what is considered its gross margin in a particular enterprise's study. It is the simple and quick method of analyzing a farm business. It is the disparity between the variable cost spent and the gross return. Only variable costs will be taken into account for the measurement of the business's gross margin. According to Sankhyan (1983), the variable costs that are unique to the one enterprise (the onion) and change roughly in relation to the scale of the enterprise will be taken into account.

The gross margin of onion producers in this study was calculated as:

Gross Margin (Rs.) = Gross Return (Rs.) – Total variable cost (Rs.)

Gross return (Rs.) = Quantity sold (kg) × farmgate price of onion (Rs/kg)

Total variable cost = Summation of all variable cost items

3.7.4 Benefit -Cost Analysis

B/C was analyzed after calculating the total cost and gross return from the onion cultivation for both the case of producer having own land and land on lease. Farmers sell their major proportion of production to local trader and some to the wholesaler and retailer. Cost of production was calculated by summing the variable as well as fixed cost items in the production process. For calculating gross return, income from onion sales were accounted for.

$$\text{B/C ratio} = \frac{Gross\ return}{Total\ Cost}$$

where,

Total cost= Total Variable cost + Total Fixed cost

Gross return= Farmgate price (Rs/Kg) * Quantity Sold

3.7.5 Price Spread

Price spread is defined as the difference between the price paid by consumers and the net price received by the producer for an equivalent quantity of farm produce. It is expressed as percent of consumer price. It has an inverse relation with marketing

efficiency. Higher the price spread lower will be the efficiency of the marketing channel.

$$\text{Price spread} = \frac{Cp - Pp}{Cp} * 100\text{percent}$$

where,

C_p = Price paid by consumer for 1 kg onion

P_p = Price received by producer for 1 kg onion

3.7.6 Producer's Share in Consumer's Rupee

It is the price received by producers as a percent in consumer price. It has a positive relation with marketing efficiency. Higher the producer share greater would be the marketing efficiency or vice versa. This specifies the price received by the onion producer and indicated in percent of rupee paid by the consumer. It was calculated as:

$$P_S = \frac{P_F}{P_R} \times 100 \text{ percent}$$

where, P_S = Producer share

P_R = Retail Price

P_F = Farm gate price

3.7.7 Marketing Efficiency

Marketing efficiency was calculated by using following formula;

$$\text{MME} = \frac{RP}{MC + MM} - 1$$

where, MME = Modified Marketing Efficiency

RP = Retail Price

MC = Total Marketing Costs

MM = Net Marketing Margins

3.7.8 Indexing

The scaling approach shows the respondents' attitude and orientation toward various propositions. A five-point Likert scale with the categories of most serious, serious, serious, moderate, somewhat serious, and least serious can be used to represent the farmer's perception of the marketing issues. For the most serious, serious, moderate,

somewhat serious, and least significant problems, respectively, the scale supply of 1, 0.8, 0.6, 0.4, and 0.2 was chosen (Figure 1). It was computed using the following formula.

Mathematically, $Iimp = \Sigma(S_i f_i/N)$

where,

$Iimp$ = Index of importance

Σ = Summation

S_i = Scale supply

f_i = Frequency of respondents

N = Total number of respondents

3.7.9 Socio-demographic and Economic Variables

Variables like family size, occupation, educational status of respondents, ethnicity, size of land holding, major source of income and plantation were analyzed by using descriptive statistics such as frequencies, percent, mean and standard deviation.

CHAPTER IV
DATA PRESENTATION AND ANALYSIS

4.1 Introduction

Data analysis is a process for obtaining raw data and subsequently converting it into information useful for decision-making by users. In this chapter; collected data are classified, tabulated and presented in the meaningful format.

4.2 Demographic characteristics of the respondents

4.2.1 Gender of respondents

The respondents from different trading category were classified according to their gender.

Table 4.1: Gender of onion trader

Category of trader	Gender		Total
	Male	Female	
Producer	63.6	36.4	22
Local trader	100	0	3
Wholesaler	100	0	4
Retailer	30	70	10
Consumer	60	40	25
Total	70.72	29.28	64

Note: Figure indicate percentage

Source: Field Survey, 2023

Table 4.1 revealed that men controlled the onion commerce industry. Only 29.28 percent of respondents were female, with 70.72 percent of respondents being men. However, women outnumbered men in the retail sector by a ratio of 70% to 30%, whereas local dealers and wholesalers received only male responses.

4.2.2 Age of respondents

Age of different categories of respondents were observed from questionnaire discussion and presented in the following table.

Table 4.2 Age of respondents

Category of trader	Age of respondent (mean ± SD)	Min	Max
Producer	51.67 ± 12.044	35	70
Local trader	41.50 ± 7.235	28	55
Wholesaler	42.60 ± 8.473	36	60
Retailer	48.13 ± 12.808	30	54
Consumer	42.56 ± 12.952	25	53

Source: Field Survey, 2023

Table 4.2 showed that nearly majority of the responders had an average age of more than 40 years. The survey's participants' average ages were 51, 41, 42, 48, and 42 years old, respectively, for producers, local traders, wholesalers, retailers, and consumers. The study indicated that consumers were disproportionately younger and that producers were older.

4.2.3 Family size of respondents

The number of families in the research region typically dictates how many people are available for the production and selling of onions. As a result, the average family size in each household was determined.

Table 4.3: Family size of respondents

Parameters	Family size
Average	6
Minimum	2
Maximum	10

Source: Field Survey, 2023

Table 4.3 demonstrated the study area's average family size was 6, which was greater than the 4.88 statistic for the country as a whole in 2011 (CBS, 2011a). Due to the prevalence of joint families in the research area, the maximum family size of 10 is reported.

4.2.4 Education status of respondents

Five categories were used to evaluate the respondents' educational backgrounds: illiterate, primary, secondary, higher secondary, and university level.

Table 4.4: Education status of the respondent

Trading category	Education level										Total
	Illiterate		Primary		Secondary		Higher secondary		University		
	M	F	M	F	M	F	M	F	M	F	
Producer	8	5	4	2	2	1	0	0	0	0	22
Local trader	1	0	2	0	0	0	0	0	0	0	3
Wholesaler	1	0	2	0	1	0	0	0	0	0	4
Retailer	0	2	2	3	1	1	0	1	0	0	10
Consumer	3	3	4	3	3	2	4	2	1	0	25
Total	13	10	14	8	7	4	4	3	1	0	64

Note: Figure indicate number

Source: Field Survey, 2023

Table 4.4 showed that 58.7% of onion growers were illiterate, whereas 21.7 % had completed elementary school, 10.9 % had completed secondary school, and 8.7 % had completed a higher secondary level. 25% and 37.7%, respectively, of wholesalers had completed secondary education. 45.5 percent of the retailers had completed primary school, 22.7 percent were illiterate, and 13.7 percent had completed secondary school. Consumers' levels of education ranged from illiterate to university-educated, with primary school accounting for the biggest percentage (28%) of consumers.

4.2.5 Major source of income

People seem to have been involved in various occupation for their livelihood ranging from agriculture to industrial and business sector. Varieties of sources of income were associated with the varied respondents.

Table 4.5: Major source of income

Major source of income	Total
Agriculture	45.45
Business	27.27
Labor	13.64
Remittance	13.64
Total	22(100)

Source: Field Survey 2023

Table 4.5 showed that 45.45 percent of the respondents had agriculture occupation as primary source of income, remittance and service with equal shares of 13.64 percent, and Business with 27.27 percent respectively.

4.3 Major marketing channel, present status and constraints of production and marketing of Onion

4.3.1 Marketing channel in study Site

The direction of flow of the products beginning from producer and ultimately to the consumers is referred to as a marketing channel. Various actors play important role in the marketing channel with their distinct characteristics.

Table 4.6: Marketing channel used by the onion producers in the study site

Producer-local trader-wholesaler-retailer-consumer	53.33
Producer-wholesaler-retailer-consumer Producer-local trader-retailer-consumer Producer-retailer-consumer	26.8 10.86 8.6
Total	100

Note: Figures indicate percent

Source: Field Survey, 2023

Table 4.6 showed the use of different marketing channels by the producers. The study shows that the most common marketing channel was producers-local trader-wholesalers-retailers-consumers" which was known to be used by 53.33 percent of the total respondent producers followed by "producers-wholesaler-retailer-consumers" used by 26.8 percent of the respondent farmers.

4.3.2 Onion supply chain map

The supply chain map illustrates the flow of an onion through several routes as it travels from producers to consumers. The supply chain's linkages are displayed vertically, from the bottom to the top. The left-hand blocks on the supply chain map list the chain's primary functions. The left-hand side blocks represent the functions of the supply chain such as input supply, production, collection, wholesaling, retailing and consumption. The middle vertical line boxes represent the actors who are involved in the functioning of the supply chain. In the right-side of the map, the various enablers who were involved directly or indirectly for the facilitation of the chain are represented.

Majority of the onions are transferred from producers to wholesalers compared to other actors. Wholesalers are obtaining onions not only from the producers but local traders from the district and outside the district. In addition, most of the consumers are purchasing onions from the retailers whereas some of them are getting directly from the

producers. Agrovets and Cooperatives are the suppliers of the onion seeds to the growers.

4.3.3 Supply chain actors and their role in onion market chain

Input suppliers, credit providers, producers, farmer traders, wholesalers, middlemen, retailers, and consumers are the main actors in the supply chain.

4.3.3.1 Input suppliers

The input suppliers are those actors who are contributed for the supply of inputs such as seed, fertilizer and other technical services. There were altogether 7 agro-vets and 2 agricultural cooperatives in the study area. Many farmers also received inputs from local government offices and AKC.

a. Extension service providers

Agriculture Development Office of Local government is the main body that provides extension service to the farmers. Other government offices such as AKC and locally existing NGOs such as Swabalamban Bazar, Byabasthapan Tatha Rojgar were also found to be providing ag extension services.

b. Credit suppliers

Formal credit institutions such as Agricultural Development Bank, Nepal Bank Ltd., RBB and other private banks and FIs were found to be operating as credit suppliers in the study area. Other informal sources of credit such as local money lenders were also operating as credit suppliers in the study area.

c. Producers/farmers

Farmers are the primary and most valuable actor in the agriculture supply chain. There are basically two categories of producers in production areas i.e., subsistence and commercial producers. In contrast to commercial farmers, subsistence farmers typically organize the necessary agro-input purchases, produce mostly for household consumption, and sell in a tiny market at the neighborhood haat bazar.

d. Local traders

Local collectors act as the bridge between producers and wholesalers. They engage in a variety of trading activities, such as purchasing and assembling, repackaging, sorting, and wholesaler market sales. The local traders were responsible for collecting onion from farmer and supplying that to wholesaler.

4.3.3.2 Wholesalers

Wholesalers are responsible for buying the commodity from local collectors and traders and supplying them to the retailers. The major wholesale market for the onion produced in the study site was Wholesale market of Golbazar. One wholesaler has a number of local traders in contract.

4.3.3.3 Retailers

Retailers are those market participants who interact directly with customers. They purchase the products from the wholesalers and ultimately sell to the consumers. They engage in supply chain tasks such as purchasing from wholesalers or middlemen, shipping goods to retail stores, classifying, exhibiting, and selling to customers. Retailers played direct role in the distribution of onion to the consumer market. The size of retailers varies widely in terms of paid-up capital, location.

4.3.3.4 Consumers

Ultimate point of consumption or use of produced commodities are consumers. Consumers with respect to this study are the individual households and hotels nearby the study area.

4.3.3.5 Enablers and facilitators

The regular support provided directly or indirectly for the functioning of the supply chain are known as enablers. Government organizations such as an office of local level, AKC, AIC, AEC etc. and non-government organizations such as ENSSURE, SBRSK are playing enablers in the study area.

4.3.4 Present Status of Onion Production in Nepal

Awasthi (2007) states that in Nepal, vegetable development first began in the early 1940s. Many different vegetables may be successfully produced in Nepal thanks to its varied topography and climatic conditions. More than 50 of the more than 247 cultivated vegetable crops are widespread in Nepal. Domestic production can no longer meet the rising demand as a result of urbanization and dietary changes. According to the Agriculture Project Services Centre and John Mellor Associates (1995), 67 percent of Nepal's intake of vegetables and 85 percent of its consumption of fruit are imported. Vegetable crops only make up 9.71 percent of the AGDP and the graphic shows that they produce 8% of all other crops. (MOALD,2014).

Similarly, on overviewing the scenario of vegetable production in Siraha district, both the area grown and production of vegetables seems to be drastically reduced in the year 2011/12 with slight increment in successive years which is mentioned in figure 3. Vegetable production in the years 2014–2015 was estimated to be 1560 hectares and 25615 tons, with a yield of 16.4 tons per hectare. (DADO, 2014/15).

Singh (2010) suggested that Ishworpur (Sarlahi), Dhalkebar (Dhanusha), Panchakhal (Kavre), Namatar, Bajrabarahi, and Handikhola (Makawanpur), Lamatar (Lalitpur), Hirapur (Mahottari), and Harre (Siraha) are where onions are most frequently farmed in Nepal.

Table 4.7: Trend of Onion Production in Nepal

Year (B.S.)	Area (ha)	Production (mt)	Yield (mt/ha)
2071-72	20712	248584	12
2072-73	20070	238590.7	11.9
2073-74	20821	269485	12.1
2075-76	20908	291538	13.94
2076-77	20424	284926	13.95
2077-78	20,251	289,055	14.27

Source: MOALD (2022)

Table 4.7 suggested that according to MOALD, the rate of productivity of onions has been increasing in the country. In the year 2071/72 the productivity was around 12

metric tons per ha, it got reduced in the next year by 0.1 metric ton per ha but after that the productivity has been continuously increasing. According to the recent data the productivity is around 14.27 metric tons per ha but the area of production has been reduced as compared to the previous year.

4.3.5 Problem of Marketing and Production of Onion in Siraha

The production and marketing of onion together faced various constraints over the nation. These problems were centered to various actors in the supply chain and the Sarlahi district being terai area is no prone to be saved from indifferent circumstances of storage, transport and many more aspects.

Table 4.8: Problem of marketing of onion in Siraha (for traders)

Problems	1	0.8	0.6	0.4	0.2	Sum	Score	Rank
Lack of storage facility	23	13	6	2	2	46	0.830	I
Fluctuating market price	13	16	5	4	8	46	0.695	II
Lack of transportation	4	8	23	6	5	46	0.6	III
Lack of proper market	2	7	7	15	12	46	0.504	IV
Inefficient middleman	1	3	4	17	21	46	0.365	V

Source: Field Survey, 2023

Table 4.8 revealed that the storage issue received the highest problem score. Thus, storage was the main issue for onion traders in Siraha (local traders, wholesalers, and retailers). Because onions are extremely delicate and there was minimal storage, post-harvest losses were at their maximum. A separate market had the lowest rating. As a result, it was considered to be the least problematic of the other issues. Although traders ranked the onion trade as the least profitable among others in Siraha, there was no separate market for it.

Table 4.9: Problem of production of onion in Siraha (for producers)

Problems	Rank
Weed infestation	I
Storage	II
Timely unavailability of seed material	III
Lack of fertilizers	IV
Pest and disease incidence	V

Source: Field Survey, 2023

Table 4.9 also revealed that the major constraint of production of onion was the level of weed infestation. Being perishable in nature, onion experienced the problem of storage too which was in the second position. Other constraints such as timely unavailability of seed material, lack of the fertilizers and the incidence of pests and diseases were also ranked.

4.3.6 Means of transportation

Variety of means of transportation is needed in the market by the traders. The means of transport is mainly dependent to the level of adoption of the innovations by the traders, convenience and the location of the market and many more.

Table 4.10: Transportation used by traders in Siraha

Trader category	Transportation medium					Total
	Truck	Pickup	Auto	Motorcycle	Cycle	
Producer	0.00	36.36	9.09	22.72	31.8	22
Local trader	66.67	33.33	00	00	00	3
Wholesaler	25	75	0.00	0.00	0.00	4
Retailer	0.00	20	20	40	20	10
Total	7.69	35.90	10.26	23.08	23.08	39

Note: Figure indicate percentage

Source: Field Survey, 2023

Table 4.10 observed the majority of producers (36.36percent) used pickup, followed by cycle (31.8percent), motorcycles (22.72percent), and auto (9.09percent). Only trucks and pickup were used by the local trader as they used to transport a large quantity of onion. 66.67percent of local traders used trucks for transportation and the remaining 33.33percent used pickup. The wholesaler only utilized trucks and pickups since they needed to move a lot of onions. Transport was handled by pickup for 75% of local traders, and trucks for the remaining 25%. Most of retailers used pickup (20percent), cycle 20percent, motorcycle 40percent, and auto 20percent. In addition, pickup trucks were the most popular and trucks were the least popular modes of transportation. The study conducted by (Lamichhane et al., 2016) also found 51 percent of the maize seeds produced in Dadeldhura district were being transported by farmers themselves to the market. The study also revealed that 82.22 percent of the produced maize seeds of study areas are directly sold to traders and the remaining 17.78 percent of produced onions are sold to collection centers within the district. The study of (USAID ,2011-15) on supply chain analysis of off-season vegetables showed that local traders were the major factor for buying farmers produced vegetables.

4.4 Economics of production of onion

4.4.1 Cost of production of onion

The production of onions depends on the level of inputs like labor, planting materials, fertilizers and manures, irrigation, chemicals etc. The study mainly focuses on the economics of onion cultivation.

Table 4.11: Yield, cost, revenue and B:C ratio of onion production, 2023

PARTICULARS	OWN LAND	RENTED LAND
Yield (mt/ha)	**15.134**	**15.73**
Fixed Cost (Rs/ha)	18,750	38,750
TOOLS	18,750	18,750
LAND RENT		20,000
VARIABLE COST (Rs/ha)	99,225	1,10,125
LABOR AND PLOUGHING	81,828.75	90,320
IRRIGATION	2359.5	2,900.5
SEEDS	3539.25	3,550.25
PESTICIDES AND FERTILIZERS	11797.5	13,354.25
Total Cost (Rs/ha)	1,179,75	1,48,875
Selling Price of Onion (Rs/kg)	22.4	22.4
Onion sold (kg/ha)	13562	14,157
Revenue (Rs/ha)	303788.8	317116.8
Net margin (Rs/ha)	185813.8	168241.8
B/C ratio	**2.535**	**2.13**

Source: Field Survey, 2023

Table 4.11 showed the calculation of benefit-cost ratio for different categories of land owned by farmers. Due to the seasonal behavior of onion the variable items were considered under cost while calculating cost of production. The fixed costs were also taken into account in the analysis. On their own land, the average yield of onion was found to be 15.134 Mt/ha in the study area. Yield was found higher as compared to the National average. In the study area, the average cost for cultivation was found to be Rs. 1,17,975/ha. The study also revealed that an average of Rs. 7.79 is required to produce one kg onion. The land on lease was found to be yielding more in numbers as compared to native land. This was mainly due to the commercialization prospect. Rented land farming were too profitable with benefit-cost ratio 2.13 but not more than that of own-land farming which was solely due to increased total cost in production.

Table 4.12: Benefit-cost ratio of producers with different level of education

Level of Education	Benefit-cost ratio
Illiterate	2.603
Primary level	2.664
Secondary level	2.5487

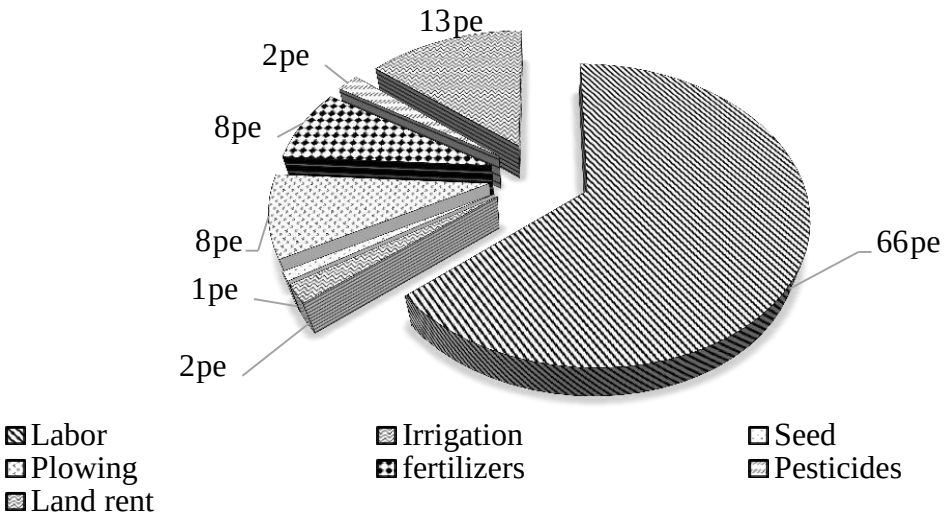
Source: Field Survey, 2023

Table 4.12 observed the analysis of the benefit-cost ratio of onion producers in accordance to their level of education. Among the producers, one with the primary level of education were found to have higher benefit-cost ratio (2.664) than those groups with no education and secondary level of education. The increased yield among the growers with secondary education showed that it was all due to the increased cost of production, both variable costs and fixed costs of production.

4.4.2 Cost components of onion production

The overall cost of production comprises total fixed cost and total variable cost. Land, equipment's, vehicle and other machineries are included in fixed cost whereas variable cost includes labor, seed, fertilizers and others. The study reported two different structures of cost of production of onion for producer having own land and land on lease.

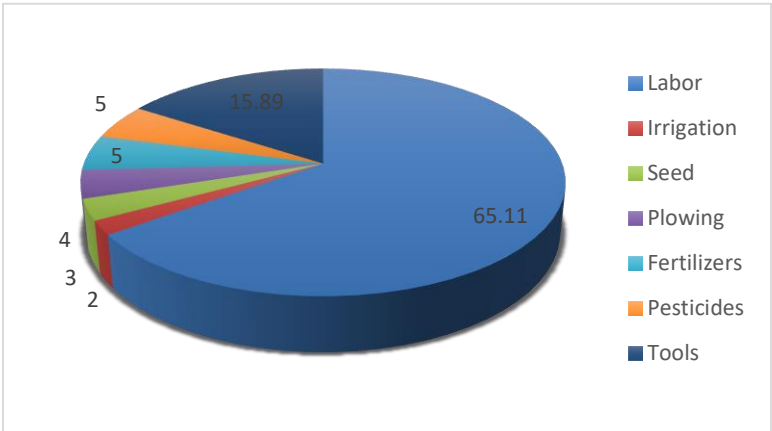
Figure 4.1: Cost components for rented land



Source: Field Survey, 2023

Figure 4.1 showed that onion cultivation practice was labor intensive. Labor cost comprised 66 percent of total cost of production followed by land rent 13 percent, plowing 8 percent, fertilizers 8 percent, pesticides and irrigation 2 percent and seed materials percent.

Figure 4.2: Cost components for own land



Source: Field Survey, 2023

Figure 4.2 showed the cost components of onion production for the growers in their own land. Altogether 69.11 percent was comprised by labor and ploughing which was followed by pesticides (5 percent) and fertilizers (5 percent). The total fixed cost included only the cost of tools and equipments which was about 15.89 percent.

4.4.3 Postharvest loss in wholesaler, local trader and retailer

Agricultural commodities are mostly perishable in nature and onion is not exception to that. So post-harvest losses are experienced at various level of market distribution, from local traders to retailers, due to storage problem. The loss in the shelf life of onion is accounted only after the producers in the supply chain. The study is concerned to know about the actual post-harvest losses.

Table 4.13: Loss of onion in Siraha

Category of trader	Illiterate Loss percent	Primary Loss percent	Secondary Loss percent	Higher Secondary Loss percent	Overall, Loss percent (Mean ± SD)
Wholesaler	36	30.5	17	0	28.50 ± 8.103
Local trader	32	22	0	0	25.34±5.859
Retailers	34.5	26.8	22.5	19	26.70 ± 5.034

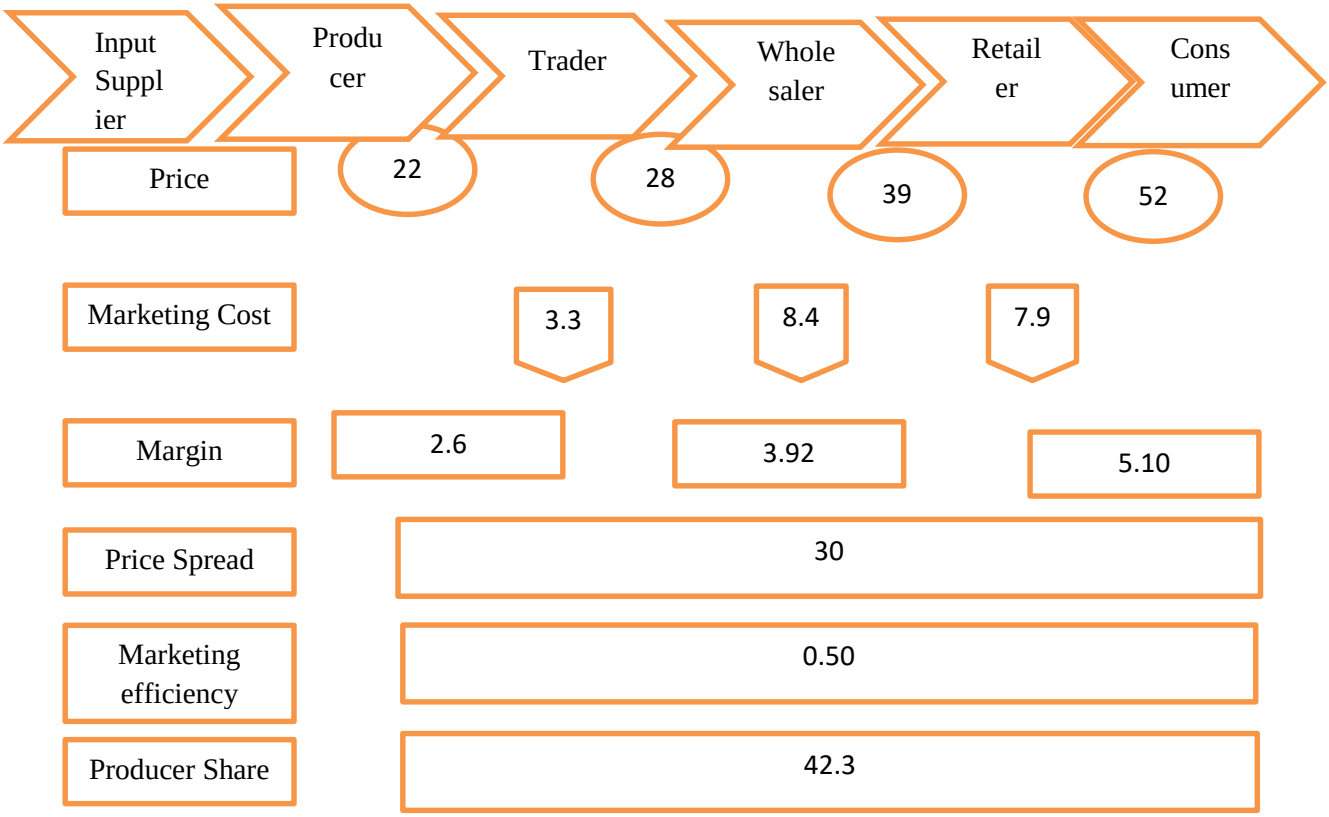
Source: Field Survey, 2023

Table 4.13 showed that storage was the main problem for onion marketing. The Siraha district experienced a high level of post-harvest loss, according to the study. Losses in the wholesaler were higher than the retailer. Comparing the losses with the educational status, traders with no any sort of education i.e., Illiterate were found to be facing higher post-harvest losses than to those with primary and secondary education whereas traders with higher secondary or university level education were found to have half the post-harvest losses.

4.5 Marketing Cost, Price Spread, Margin, Marketing Efficiency and Producers Share Price

In the supply chain for onions, a summary of supply to each actor, marketing expenses, profit margin, marketing effectiveness, pricing spread, and producers' shares on the consumer's rupee (Rs.) per kilogram of onion are provided below.

Figure 4.3: Marketing cost, price spread, marketing efficiency and producer's share



Source: Field Survey, 2023

Figure 4.3 showed the graphical representation of overall supply chain of onion.The average farm price per kg of onion was found to be Rs. 22. Similarly, the average selling price for traders and wholesalers was found to be Rs. 28 and Rs. 39 respectively. The average retail price paid by the consumers was Rs. 52 per kg. The marketing cost incurred for local traders, wholesalers and retailers was Rs. 3.3, Rs. 8.4 and Rs. 7.9 respectively. The price spread in the supply chain was Rs. 30 per kilogram, or roughly 58 percent of the price. The study revealed that retailers were having higher margins (Rs. 5.10) among the actors of the supply chain. It was found that marketing efficiency and producers share was 0.50 and 42.3 percent respectively.

4.6 Consumers Purchasing Pattern

The pattern of purchasing onions varies according to the consumer's family size, income of the family, availability of the onion in the market and many more. The varied intakes of onions are observed as their need and consumption.

Table 4.14: Pattern of Purchase in the consumers

Purchasing Pattern	No. of Consumers (percent)
Daily	32
Weekly	36
Twice a month	20
Once a month	12

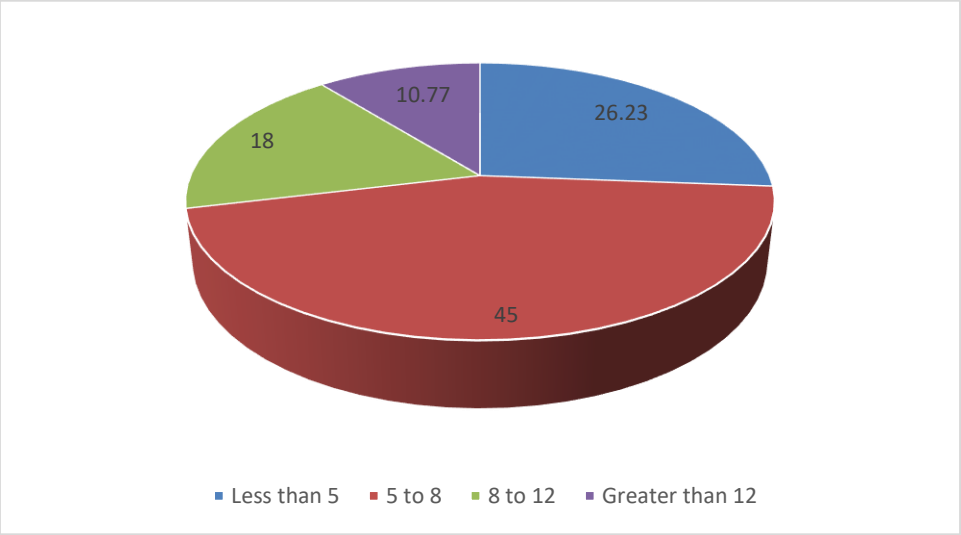
Source: Field Survey, 2023

Table 4.14 represented majority of the consumers, which is around 36 percent, was seen to prefer the weekly purchasing of onion followed by the daily purchasing. Only 12 percent of the respondents were seen purchasing onions once in a month time.

4.7 Monthly Consumption of Onion

The monthly consumption greatly depends upon the family size, food culture, religion, income of the family and more. This different level of consumption emphasizes the changing demand in the market.

Figure 4.4: Monthly consumption of Onion by household (kg)



Source: Field Survey, 2023

Figure 4.4 represented that in a month, 45 percent of the consumers were observed consuming onion at the rate of 5-8 kg. Only 10.77 percent of the consumers were consuming the bulk amount of >12 kg onions.

4.8 Consumer Cost Opinion

The response from the consumers about the cost of the commodity overall deals with the pricing of it in the market. Variation among the consumer's opinion on the price affects the purchasing power of onion in the market.

Table 4.15: Consumer cost opinion on onion of Siraha

Opinion	Percentage
Expensive	12
Moderate	60
Cheap	28
Total	100

Source: Field Survey, 2023

Table 4.15 represented that during the survey, the consumer was asked about the price of onion in the market of Siraha. In a survey of 50 consumers, 60% said the price of onions is moderate, 12% said it is costly, and 28% said it is cheap.

4.9 Discussion

A study conducted by (Gautam et al. ,2000) in Nepal revealed that 45 percent of the producers followed producers-wholesalers-retailers- consumers channel. The result is also in line with a study of (Adnan et al. ,2014) where they found 55 percent of onions marketed by "producers-wholesalers-retailers-consumers" channel. Analysis of Marketing System in Punjab carried out by (Sidhu, 2008) found productivity of onion 14.27Mton/ha average cost of production as 1,15,570 Rs/ha, and Rs. 8.09/kg. This implies that our findings are in line with findings of (Sidhu, 2008). Joshi and Tamang (2014) found B/C ratio from their study in Nawalparasi, this implies that our findings are more consistent with findings of our study in which B/C ratio of onion production was found 4.3. According to Marketing Research Directorate (2006), producing one kilogram of onions in an open system cost roughly Rs 4. Similarly, the study of (Subedi, et. al.,2020) found that labor cost comprised the most (39.20 percent) compared to the

other cost components. Our findings were also in line with (Sidhu, 2010) who also found labor cost comprising 53 percent of total cost.

The study conducted by Tiwari, et al. (2020) reported the postharvest loss of 30-33 percent. The producers share found lower as compared to 67 percent producers share as reported by (Bapari et al. 2010). Poudel and Adhikari (2018) found that the price spread was Rs. 27 which was more similar to our finding.

CHAPTER V
SUMMARY AND CONCLUSIONS

5.1 Introduction

This chapter does consist summary of the findings of prevalent Onion market structure and channel with supply chain involving various actors from production function to consumption function. In addition, it presents the conclusion of the findings along with the suggestions in policy making.

5.2 Summary

A crucial element of the production-distribution system is onion marketing. The onion is a perishable fruit. The second-largest market for the production and consumption of onions in Nepal is in the Siraha district. In Siraha, there is no systematic database or analysis of the onion marketing system. Keeping in view these aspects, this study was designed to assess the quality and marketing of onion in the Siraha. Altogether 22 onion producers, 3 local traders, 4 wholesalers, 10 retailers, and 25 onion consumers were interviewed using a semi-structured questionnaire. Purposively Golbazaar municipality were selected for convenience. 22 farmers were surveyed using simple random sampling. Local traders, wholesalers, retailers and consumers were selected by purposive sampling. Other pertinent information was retrieved from the secondary sources and the primary data were gathered using a questionnaire survey.

The study revealed that around 45.45 percent of the respondents had agriculture as the major source of income. Around 27.60 percent of the yield loss of onion is caused by post-harvest loss. The most common marketing channel was “producers-wholesalers-retailers-consumers” followed by “producers-local trader-wholesaler-retailers-consumers”. The result of the study showed that most of the farmers (37.03 percent) used pickup vans as means of transport, followed by cycle 23.08 percent and Motorbike 23.08 percent and Auto 10.26 percent. The study conducted by Tiwari, et al., (2020) also showed that 58 percent of the produced onions were being transported by four-wheeler mini vehicles.

The study also revealed that season of the production was found to be the most important factor governing the price of produced onions, followed by availability in the

market, ranked second most important factor. Wholesalers were found to be most responsible actors for determining price of the onions produced followed by local collectors. The major problem and constraint for onion production was weed infestation which ranked first followed by storage. According to the respondents of the farmers of the study, the timely unavailability of important factors of production like labor, chemical fertilizers and seed material as major problems for the onion production.

The yield of onion in the study area was found to be 15.134 Mt/ha and the total cost incurred for onion production was found to be Rs. 1,17,975 per hectare and Rs. 7.79/kg. Similarly, total revenue and net profit in onion production was found to be Rs. 3,30, 788.8 per hectare and Rs. 20.07/kg respectively with the benefit cost ratio of 2.535 of the producers with their own land. Moreover, the case of rented land by producers showed the benefit-cost ratio of about 2.13. Onion growers with various level of education (Illiterate, Primary level and Secondary level) was also studied with respect to the benefit-cost ratio. Producers with primary level of education were found to show higher ratio of benefit-cost. The study revealed that onion cultivation was labor intensive which comprised 64 percent of total cost of production followed by land rent 13 percent, FYM 8 percent, chemical fertilizers 8 percent, pesticide and irrigation 2 percent each and seed materials 1 percent respectively. The margins for local traders, wholesalers and retailers for onion were Rs. 2.3, 3.5 and 3.8 per kg respectively. The producers' share was found to be 42.3 percent and the price spread to be Rs. 30 per kilogram.

The major portion of onion consumed in Siraha was produced in Siraha i.e., 91.49percent itself and few portions 8.51percent of onion imported from India. After the arrival of Nepalese onion in the market, importation of Indian onion reduced to zero as it cost much more than the Nepalese onion. Onion supplied by producers to local traders was 46.8percent, to the wholesaler was 22.7percent, to the retailers was 16.9percent and 13.6percent was direct to the consumer. Local traders supplied 65.4percent to wholesalers and 34.6percent to retailers. Wholesalers supplied 48.5percent to retailers, 22.7percent to consumers and 28percent to the other districts. Onion from Siraha was supplied to the different districts of Nepal. Most of the onions were supplied to the Dhanusha. The major onion varieties imported from India were Nasik-53 and Durga.

According to the study, most customers thought onion prices were moderate, while a small percentage thought they were pricey. The post-harvest loss was high due to a lack of proper storage. Some traders had to lose 50percent of the onion or even more. The study showed that the total loss incurred to the wholesaler while storing onion was 28.50 percent and the retailers was 26.70 percent. It was noted that the availability of markets and storage facilities pose similar, serious issues for the sale of onions in Siraha. Most customers thought Siraha's onion marketing situation was average; a select number thought it needed to be better.

5.3 Conclusion and Policy Implication

Majority of the male with average age of 50 were included in the production process of Onion alongside with no females in local traders and wholesaler's unit. The study showed the dominance of joint family in the study area, excluding consumers, resulting more involvement in the process of supply chain. Majority of the respondents, consumer as exception and more volatile section including from all education level, with minimum primary level of education were observed in the production, retailing and wholesaling process followed by illiterates. With agriculture as the source of income to maximum number of respondents mainly producers and consecutively increasing production, the major policy of innovation, commercialization and climate-resilient agriculture would be fruitful.

From the study it was found that the weed infestation was the major constraint for the production of onion suggesting that the improved cultivation practices would be beneficial to boost the production, other problems being considered. Other traders of supply chain entailing no consumers and producers were facing the major problem of storage and fluctuating market price. This too suggests that the major contribution of concerned authorities in providing market and storage facilities would be a really important action to bolster the onion production and boss the supply chain. The study also revealed the most common marketing channel as "producers- local traders-wholesalers- retailers-consumers".

The study also showed profitable benefit-cost ratio among the producers both with having own land and on lease. Producers with primary level of education displayed more favourable benefit-cost ratio among various education levels suggesting better

educational policy would be applauded more by the respondents. Policies of subsidies on agricultural tools and efficient fertilizers would curb the issues of higher labor cost. Comparatively higher post-harvest loss among the wholesalers with illiterate group bearing more losses were considered from the study. The establishment of well-structured cold storage within the reach of the producers, wholesalers and retailers would help in decreasing the incidence of post-harvest losses. Adding to this, the market margin analysis of onion was highest for retailers with the price spread of Rs.30. Producer's share on consumer rupee was observed as 42.3 percent. The body as collection centers when established and operated by government would control the market supply and reduce the price fluctuation.

5.4 Scope for the further research

Siraha being one of the major onion cultivation areas, the marketing of onion has great scope. It includes production, marketing, and processing of commercial onion commodities. From this research, the following topics on further research were identified:

- Research on the onion production system
- Study on post-harvest practices (storage, packaging, and transportation) system of onion
- Study on analysis of determinants of onion marketing and profitability among onion traders

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APPENDIX I

Questionnaire

Namaste! I am Anjali Sah from Janakpurdham. I am currently studying at Patan Multiple Campus. I am like to ask you for some information that I can use in my research. Please take a moment to answer to my inquiries regarding the value chain analysis of onions in the Siraha district. Your information will aid in creating a comprehension of what is occurring locally and what needs to be done. We'll keep all of the information you provide us private. It should take no more than five minutes. I appreciate your time and contribution in advance. Now, shall we proceed?

Interviewer: ……

Date: …… Form No.:……

For Farmer

A. Personal Background

S.N.	Details	Response
a)	Name of respondent	
b)	Address	
c)	Gender	1. Male ☐ 2.Female ☐ 3. Other☐
d)	Age	1.0-14 ☐ 2. 15-39☐ 3.40-59☐ 4. 60&+☐
e)	Primary Occupation	1. Agriculture ☐ 2. Business ☐ 3. Government job ☐ 4.Abroad ☐ 5.Non-government Job ☐ 5. Others (Specify……)
f)	Annual family Income	1. Agriculture…… 2. Others……
g)	Ethnicity	1.Bramhin ☐ 2.Chettri ☐ 3.Janajati ☐ 4.Madhesi ☐ 5. Dalit ☐ 6.Others.☐……
h)	Education status	1.Illiterate ☐ 2.Read/Write ☐ 3.Primary ☐ 4.Secondary ☐ 5.Higher Secondary ☐ 6. Bachelors and Above ☐
i)	Religion	1. Hindu☐ 2.Buddhist ☐ 3. Christian☐ 4. Islam ☐ 5.Others (specify……..)
j)	Do you have any land?	1.Yes ☐ 2.No ☐
k)	Tenancy status	1. Owned……..ha 2. Leased…….. ha
l)	Which type of land?	1.Upland ☐ 2.Lowland ☐ 3.Both ☐

m)	Family size	1.Male	2.Female	Total
n)	Active members in agriculture	1.Male	2.Female	Total

B. Product

What is your product?

Seed	
Fresh Product	

C. Input availability during production

1.What are the major inputs that you use?

Inputs:	Type:	price	Quantity:	Supplier(s)
Fertilizers				
N				
P				
K				
Other:				
Pesticides(specify)				
Seed(specify*)				
Labor(specify**)				
Financial(specify)				
Other(specify)				

*(Be specific here source of seedlings, plants and price see end of documents)

** (be specific here in case family labor is used, gender and work allocation etc.)

2. Where did you obtain these agricultural inputs for the production of onions?

2.1 Government 2.2 Cooperatives 2.3 agro vets 2.4 others (specify……..)

3. Why did you favor the selected sources for gathering the required inputs? _____

4. How did you obtain the information from the sources you mentioned? (*Multiple responses are possible)

S.N.	Types of inputs used	*How(write the code)	1. Through purchase 2. On credit bases 3. As gift 4. Through exchange 5. Others (specify)
1	Improved seed		
2	Fertilizer		
3	Pesticides/herbicides		
4	Farm implements(specify)		

5. Do you always receive inputs on time and in the appropriate amount?

A)Yes…… B)No……

6. What is your average cost of production of onion in your farm?.....

7. In what source do you depend for irrigation?

a. Pump set b. canal(kulo) c. water harvesting pond d. rainfed

D. Marketing

1. To whom do you primarily sell your product to?

Description	tick	Name of the market/agents
Local consumers		
Wholesaler		
Retailer		
Exporters		
Intermediaries		

2. What is the season for onions?

Scarce season…

Abundant season…….

3. What are the prices of onions?(seed)

Crop type	Price at abundant season	Price at scarce season

.

4. What is the cost of and how are your products transported from the fields to your farm?

5. Are goods rated based on their quality?

#. Yes (please specify how and the differences in prices)

#. No

6. What was the total production last year and how much was sold?

	Amt. in Kg.
Total Production	
Total sold	
HH consumption	
Kept for own	
Seed losses	

7. Mention the quintal volume of the entire damaged product, followed by the percentage loss at harvest and in the field.

Crop type	Total loss (qt)	% of loss before harvest	% of loss after harvest
onion			

8.What is your income from onion production and marketing?.....

E. Framework conditions

1. Are you a member of a producer organization?

1.1 yes (please specify their function…….) 1.2 No (please specify why not……..…)

2. Are there any service providers in your environment from which you can have any kind support? of

No Yes If

yes,

Institution	type of support
1. Government(Specify……..	
2. NGO/INGO (specify…….	
3. Private company (specify……..	
4. Community member(specify…….	

3.Do you have access to credit at formal/informal credit institutes for onion cultivation? If yes,

S.N.	access to credit from	
1.	Formal credit institution(please specify…….	
2.	friend/neighbor	
3.	local money lender	
4.	Others specify……..	

Purpose of credit:1- Agriculture 2.- business 3- other specify

4. Did you ever participate in an extension program?

4.1 Yes (please specify when and which)

4.2 No

5. What are your biggest problems concerning onion production?

5.1Production problems (please specify……) 5.2 Marketing problems (please specify……)

5.3 storage problem

6.What are the major problems you face in your field? (Give 1-6, as increasing order)

High weed population	
Final consumer	
Farm workers	
Insect	
Disease	
High rainfall/tempr/others	

7.What was the productivity of onions in the previous year?

……. (kg/Katha)

8. Which type of seed do you use for onion cultivation?

Local seed OPV hybrid seed

9. If you sell, then through which source?

a.Farmers groups b.Local trader c.Agro vet d. Seed company

10. How easily the product is marketed?

I. Very Easily ii. Easily iii. Difficult iv. Much difficult

11.How far the market is situated from your site?……km.

12.What means of transportation do you use for transporting onions ?

i. Own vehicle (bike, pick-up)

ii. Public vehicle

iii. Co-operative vehicle

iv.Rented Vehicle

v. Other

13.How much transportation cost do you pay?

Rs……...per (Kg/quintal)

14. Total Fixed cost

Land Rented……

Machineries…….

Tools……

Sprayers…….

Others….

15. Total Variable cost

Seed…….

Labor……

Fertilizer…….

Pesticide…..

Others….

16. Total Cost……..

Questionnaire for Traders

A. General information

1. Name of trader: ……..
.Age……....

Sex……

Address:……

2. Type of trade:
   a. Retailer
   b. Wholesaler
   c. Collector
   d. Other…….

3. Are you a member of a trader association?
   a. Yes
   b. No

4. How long have you been operating the business?.....

5. Did you trade alone or in partnership?
   a. Alone
   b. Partnership
   c. Others…….

6. Total number of peoples employed in your business:

	Male	Female	Total
Family member			
Non-family member			
Total			

7. Do you participate in onion trading year-round?
   a. Yes
   b. No
8. Do you practice trading other than vegetables?
   a. Yes

b. No

9. No. of market days in a week? ……..
10. Do you carry out any physical treatment to maintain product quality?
    a. Yes
    b. No
11. What mode of transportation did you use and what does it cost?
    .....

12. Do you have to pay a stand fee or tax?
    a. Yes
    b. No
13. Is the vegetable graded according to the quality?
    a. Yes
    b. No

14. Linkage with commercial value chain actors:
    a. Farmers
    b. Retailers
    c. Wholesalers
    d. Consumers
    e. Local collectors
    f. Brokers
    g. Others

B. Purchase practice

1. From which market and supplier did you buy vegetables? (*Multiple market area is possible, ** Multiple answers are possible and write the codes in correspondence to the market area and other answers should be written in accordance)

Crop types	Market*(location name)	From **	1.Producers 2.Retailers 3.Wholesaler 4.Collectors 5.Cooperatives 6.Brokers 7.Others (specify)	Quantity purchased (qt)	Average price /kg	%age of Purchased vegetables	Payment 1.Cash 2.Credit 3.Advance payment

2. From which market do you prefer to buy most of the time?.....

3. Do you always buy from the same suppliers?

3.1 Yes (please specify kind of contract) ☐ 3.2 No (please specify why not)

4. Do you have special requirements?

4.1 variety ☐ 4.2 frequent supply ☐ 4.3physical appearance ☐ 4.4other (please specify…….)

5. In which season do you prefer to collect onion?

5.1Scarce season ☐ 5.2 Abundant seasons ☐

6. Who sets the purchase price?

6.1Myself ☐ 6.2Set by demand and supply ☐ 6.3Sellers ☐

7. What are the purchasing and selling prices in the abundant and scarce season? (In kilogram)

Crop type	purchasing price at abundant season	Selling price at abundant season	Purchasing price at scarce season	Selling price at scarce season
Onion				

For Consumer

Name:

Address:

Family Size:

Male
Female

Gender:

1. Family Income:

Above 60000
45000-60000
30000-45000
15000-30000
Less than 15000

2. How often do you purchase onion?

2.1 Daily 2.2 Weekly 2.3 Twice a month 2.4 Once a month

3. What is your monthly consumption?

Below 5(kg)	5-10	10-15	15-20	Above 20

At what price do you buy onion?

Seasonal Price(kg)	Off season Price

APPENDIX I

Table 6. 1: Factors influencing consumers during purchasing onion in Siraha

Factors	Frequency
Price	32
Freshness	48
Size	20
Total	100

Note: Figure indicate percent

Source: Field Survey, 2023

Table 6.2: Benefit-cost ratio of producers with various level of education

Particulars	Primary education level	Illiterate	Secondary education level
Yield (mt/ha)	15.64	15.44	15.91
Fixed Cost (Rs/ha)	17836	19794	20222
Variable Cost (Rs/ha)	98989	101323	105624
Total Cost (Rs/ha)	116825	121117	125846
Selling Price of Onion (Rs. / kg)	22.4	22.4	22.4
Onion Sold (Kg/ha)	13896	14076	14319
Revenue (Rs/ha)	311270.4	315302.4	320745.6
Net Margin (Rs/ha)	194445.4	194185.4	194899.6
B/C Ratio	2.664	2.603	2.5487

Source: Field Survey, 2023