

**VALUE CHAIN ANALYSIS OF POTATO IN SOME
SELECTED AREAS OF MUNSHIGANJ DISTRICT IN
BANGLADESH**

ABDUL MANNAN



**DEPARTMENT OF AGRIBUSINESS AND MARKETING
SHER-E-BANGLA AGRICULTURAL UNIVERSITY**

DHAKA-1207

JUNE, 2020

**VALUE CHAIN ANALYSIS OF POTATO IN SOME
SELECTED AREAS OF MUNSHIGANJ DISTRICT IN
BANGLADESH**

BY

ABDUL MANNAN

REGISTRATION NO: 11-04614

A Thesis

Submitted to the Faculty of Agribusiness Management
Sher-e-Bangla Agricultural University, Dhaka
In Partial Fulfillment of the Requirements for the Degree of

**MASTER OF SCIENCE (MS)
IN
AGRIBUSINESS AND MARKETING**

SEMESTER: JANUARY-JUNE, 2020

Approved by:



Supervisor
Mahfuza Afroj
Assistant Professor
Department of Agribusiness and
Marketing
Sher-e-Bangla Agricultural University

Co-Supervisor
Bisakha Dewan
Assistant Professor
Department of Agribusiness and
Marketing
Sher-e-Bangla Agricultural University

Md. Rashidul Hasan
Chairman
Examination Committee
Department of Agribusiness and Marketing
Sher-e-Bangla Agricultural University

JUNE, 2020



DEPARTMENT OF AGRIBUSINESS AND MARKETING

Sher-e-Bangla Agricultural University

Sher-e-Bangla Nagar, Dhaka -1207

CERTIFICATE

This is to certify that the thesis entitled “**Value chain analysis of potato in some selected areas of Munshiganj district in Bangladesh**” submitted to the Faculty of Agribusiness and Management, Sher-e Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree **of Master of Science in Agribusiness and Marketing**, embodies the result of a piece of bona fide research work carried out by **Abdul Mannan**, Registration No: **11-04614** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information, received during the course of this investigation has been duly acknowledged.

Date: _____

Place: Dhaka, Bangladesh

Supervisor

Mahfuza Afroj

Assistant Professor

Department of Agribusiness and Marketing

Sher-e-Bangla Agricultural University

Dhaka-1207

DEDICATION

I humbly dedicate this dissertation to my beloved parents
for their endless love and support.

ACKNOWLEDGEMENT

All admiration are due to almighty the merciful Allah, whose blessing have enabled me to complete the study successfully. Guidance, help and co-operation have been received from several persons during the tenure of the study; the author is immensely grateful to all of them.

I would like to express my heartfelt gratitude to my respected supervisor Mahfuza Afroj, Assistant Professor, Department of Agribusiness and Marketing, Sher-e-Bangla Agricultural University, for her untiring and painstaking guidance, innovative suggestions, continuous supervision, timely instructions and inspirations throughout the tenure of research work.

Heartfelt gratitude and profound respect to his Co-supervisor, Bisakha Dewan, Assistant Professor, Department of Agribusiness and Marketing, Sher-e-Bangla Agricultural University, for her constructive criticism, valuable suggestions and co-operation throughout the study period.

The author also expresses his profound respect and sincere gratitude to all other teachers, Departments of Agribusiness and Marketing, for providing suggestions and inspirations through the whole period of my research work.

I am also very much thankful to the farmer, wholesaler, retailer, bepari and faria, in Sirajdikhan Upazila of Munshiganj district.

I would like to express thanks to Moshiur Rahman my younger brother who helped me to collect all the data.

The Author

ABSTRACT

The study was conducted to assess value chain of potato in some selected area of Munshiganj district in Bangladesh. To fulfil the objectives of this study, 25 farmers, 65 middlemen and 5 cold storage owners were interviewed by using a structured questionnaire from February to April, 2020. In this study, profitability analysis, regression analysis and moving average method was used to analyze data. This study shows that highest sales price per 100kg of potato received by retailer was Tk.2175.00 and the lowest sales price was received by farmer Tk.1325.55. Additionally, value addition by the retailer, wholesaler, bepari and faria was 26.25%, 32.24%, 26.25% and 15.26% respectively. Moreover, marketing cost of retailer, wholesaler, bepari and faria was 19.49 %, 44.95%, 31.05% and 4.51% respectively. On the other hand, net marketing margin of retailer was 40.38%, wholesaler was 5.66%, bepari was 16.22% and faria was 37.74%. Additionally, seasonal price fluctuation analysis shows that price becomes very low during peak harvesting period while it becomes too high before planting period. Moreover, proper credit facility should be ensured to the value chain actors as it was mentioned by highest number of respondents.

Table of Content

Description	Page
Dedication sheet	i
Acknowledgement	ii
Abstract	iii
Table of content	iv-vii
CHAPTER I: INTRODUCTION	1-3
1.1 Background of the study	1
1.2 Research questions	2
1.3 Objective of the study	2
1.4 Justification of the study	2
CHAPTER II: REVIEW OF LITERATURE	4-16
2.1 Potato value chain analysis	4
2.1.1 Value chain	4
2.1.2 Market chains versus value chains	5
2.1.3 Major concepts guiding agricultural value chain analysis	6
2.1.3.1 Effective demand	6
2.1.3.2 Production	6
2.1.3.3 Value chain governance	6
2.1.4 Market and marketing	7
2.1.4.1 Marketing efficiency	7
2.1.4.2 Marketing channel	8
2.1.3.3 Marketing performance	8
2.1.4.4 Marketing costs	8
2.1.4.5 Marketing margin	8
2.1.4.6 Measuring value chain	9
2.2 Developing value chain systems towards the benefits of the poor	9
2.3 Review of empirical studies:	10
2.3.1 Value chain approach	10
2.3.2 Determinants of marketable surplus	11
2.3.3 Determinants of market channel choices	12
CHAPTER III: METHODOLOGY	17-20
3.1 Selection of study area	17
3.2 Period of study	17
3.3 Selection of sample	17

3.3.1 Selection of potato growers	17
3.3.2 Value chain actor of potato	17
3.3.3 Cold storage plants	18
3.4 Data collection and analytical technique	18
3.4.1 Gross return and net return of the farmer	18
3.4.2 Marketing margin and net margin of value chain actors	19
3.5 Problems encountered in collecting data	20
CHAPTER IV: RESULTS AND DISCUSSION	21-42
4.1 Socio-demographic profile of the respondents	21
4.1.1 Age of potato value chain actors	21
4.1.2 Educational background of actors in value chain	21
4.1.3 Family size of potato value chain actors	22
4.1.4 Experience of potato value chain actors	22
4.2 Value addition of potato	23
4.2.1 Actors involved in potato value chain	23
4.2.2 Different value chain actors	26
4.2.2.1 Cost and return analysis of farmer	26
4.2.2.2 Cost and margin analysis of faria	28
4.2.2.3 Cost and margin analysis of bepari	29
4.2.2.4 Cost and margin analysis of wholesaler	31
4.2.2.5 Cost and margin analysis of retailer	33
4.2.2.6 Cost and margin analysis of cold storage owner	35
4.3 Seasonal price fluctuation of potato	39
CHAPTER VI: CONSTRAINTS FACED BY POTATO VALUE CHAIN ACTORS	43-44
5.1 Problem faced by farmers	43
5.2 Constraints faced by middlemen	44
CHAPTER VII: SUMMARY, CONCLUSION AND RECOMMENDATION	45-48
6.1 Summary	45
6.2. Conclusion	48
6.3. Recommendation	48
REFERENCE	49-54
APPENDIXES	55-69
Interview Schedule	55-67
A. Interview Schedule for Farmer	55
B. Interview Schedule for Cold Storage Owner	58
C. Interview Schedule for Faria	60

D. Interview Schedule for Bepari	62
E. Interview Schedule for Wholesaler	64
F. Interview Schedule for Retailer	66
Appendix Table 1. Acreage, production and yield of potato in Bangladesh during the period from 1995-96 to 2012-18	68
List of Table	Page
Table 1. Enterprise relations: production chain versus value chain	5
Table 3.1 Different actors and size of sample	18
Table 4.1 Age of potato value chain actors	21
Table 4.2 Educational background of potato value chain actors	22
Table 4.3 Family size of the value chain actors	22
Table 4.4 Experience of potato value chain actors	23
Table 4.5 Average production cost and return of potato for 100 Kg	26
Table 4.6 Profitability of potato farmer	27
Table 4.7 Value addition of potato by farmer	28
Table 4.8 Daily transactions and value addition incurred by Faria	28
Table 4.9 Marketing cost incurred by Faria	29
Table 4.10 Value addition and marketing margin of potato incurred by Faria	29
Table 4.11 Daily transactions and value addition incurred by Bepari	30
Table 4.12 Marketing cost incurred by Bepari	30
Table 4.13 Value addition and marketing margin of potato incurred by Bepari	31
Table 4.14 Daily transactions and value addition incurred by wholesaler	31
Table 4.15 Marketing cost incurred by wholesaler	32
Table 4.16 Value addition and marketing margin of potato incurred by wholesaler	33
Table 4.17 Daily transactions and value addition incurred by Retailer	33
Table 4.18 Marketing cost incurred by retailer	34
Table 4.19 Value addition and marketing margin of potato incurred by retailer	34
Table 4.20 Cost and margin of cold storage owner	35

Table 4.21 Information on cold storage	35
Table 4.22 Information on storage of different value chain actor	36
Table 4.23 Value addition, marketing cost and net marketing margin of different market actors of potato	36
Table 4.24 Seasonal price variation of potato	40
Table 4.25 Range of seasonal price variation of potato in Munshiganj and Dhaka markets	41
Table 5.1 Constraint faced by farmers	43
Table 5.2 Constraint faced by middlemen	44

List of Figure	Page
Figure 1.1: Typical agricultural value chain and associated business development services	5
Figure 4.1: Value chain actors of potato in Munshiganj district and distant markets	24
Figure 4.2: Value addition, marketing cost and net marketing margin of different market actors in potato marketing	37
Figure 4.3: Share of different actors in value addition, marketing cost and net marketing margin of potato	37
Figure 4.4: Value chain of potato	38
Figure 4.5: Seasonal price variation of potato	40
Figure 4.6: Range of seasonal price variation of potato between Munshiganj and Dhaka markets	41

CHAPTER I

INTRODUCTION

1.1 Background of the study

Potato is an important and leading staple crop of the world and occupied topmost position after rice and wheat in respect of production consumption (Akhter *et al.*, 1998). Bangladesh experienced much progress in its potato production in the past decades as it has increased by 5% per annum (Islam *et al.*, 2000). The country has ranked seventh position in the world in terms of potato production in 2015 (FAO, 2015). In 2014-15, around 92,54,000 metric tons of potato have been produced from 4,71,000 hectares (3.09% of total cultivated area) of land in Bangladesh (BBS, 2015). Among all crops, potato (*Solanum tuberosum*L.) is one of the most important vegetables as well as cash crops in Bangladesh (Haque *et al.*, 2012). In Bangladesh per capita potato consumption is 23 kg in Bangladesh, 32 kg in China and 15 kg in India (Reardon *et al.*, 2012). With the advent of modern technology, the relatively high yield and low cost of crop production may have given farmers an opportunity to increase the region as well as the production of potato, thus raising the marketable surplus of potatoes in Bangladesh. However, farmers do not get good prices due to lack of adequate storage and marketing facilities even often they do not afford to recover the cost of production. Owing to the lack of storage facilities and cash requirements of the farmers must sell much of their goods directly after harvesting at a very low price. Farmers will have to sell potato in most potato growing areas of Bangladesh at a very low price at peak harvest time. On the other hand, potato prices have been found to be very high during the off season and also in the peak season in some regions. If farmers do not sell their produce at an incentive price, they are likely to discontinue their production, which could have a negative effect on the country's economy. So for the sake of both farmers and customers, it is very important to make the market successful. Potato value chain research can be conducted to identify the different issues related to potato development and marketing problems and to help identify likely solutions.

The current research aims to recognize the major gaps in existing potato production and marketing processes in order to identify interventions for sustainable production development and value-added activities.

It is widely believed that potato growers do not get a fair price due to lack of storage facilities, existence of middle men, transportation facilities, and the lack of proper marketing information and urgent requirement of money immediately after the harvesting of potato by the farmers. Because of its semi-perishable existence, which contributes to post-harvest market glut, the seasonal nature of potato is significantly affected by the farmer's inability to rely on them. In order to accelerate and maintain potato production and thus foster agricultural growth in the region, there is a clear need for an effective marketing system. Performance in selling to suppliers whose position is vital to the benefit of the ultimate customer.

1.2 Research questions

The most important research questions of this study are:

- a) What is the current socio-economic status of the potato value chain actors in the research area?
- b) How much value each actors add during supply of potato from the production point to the end consumers?
- c) What are the major constraints in the supply chain of potato?
- d) What are the steps needed to overcome the current constraints?

1.3 Objectives of the study

The main objectives of this study are

- To identify the socio-demographic condition of potato value chain actors;
- To analyze the value edition of potato by the actors in potato value chain;
- To analyze seasonal price fluctuation of potato in study area and
- To identify the constraints of potato marketing system and give some recommendation to improve it.

1.4 Justification of the study

The field of production and yield has been boosted by rising crop productivity due to the introduction of new high yielding varieties and advanced production and post-harvest technology over many decades. However, due to the lack of demand-driven new processing technology, the lack of adequate storage and marketing facilities does not give farmers a reasonable price, particularly they cannot provide enough resources to recover the cost of production.

Owing to the lack of storage facilities, farmers will have to sell much of their produce at a very low price directly after harvesting.

On the other hand, potato price is very high in some places during the off season and also in the peak season, which can have a negative effect on the economy. Thus, for the sake of both farmers and customers, it is very important to make the market successful. Some studies were conducted on potato marketing system and supply chain analysis. Additionally a very few studies were done on value chain of potato, but none focused on potato value chain in Munshiganj district in Bangladesh. Thus it would be identify to work on this area.

CHAPTER II

REVIEW OF LITERATURE

The information available in the literature belong to the basic concepts of value chain, guiding principles of agricultural value chains, benefit of value chain in agricultural sector, markets and marketing, market channel, market performance, measuring value chain, developing value chain towards the benefit of the poor, value chain governance and upgrading of value chains and status of potato production and marketing of potato in Bangladesh have been reviewed and presented in this section.

2.1 Potato value chain analysis

2.1.1 Value chain

A value chain is made up of a series of actors (or stakeholders) from input suppliers, producers and processors, to exporters and buyers engaged in the activities required to bring agricultural product from its conception to its end use (Kaplinsky and Morris, 2001). Bammann (2007) has identified three important levels of value chain.

- i. Value chain actors: The chain of actors who directly deal with the products, i.e. produce, process, trade and own them.
- ii. Value chain supporters: The services provided by various actors who never directly deal with the product, but whose services add value to the product.
- iii. Value chain influencers: The regulatory framework, policies, infrastructures, etc.

According to Anandajayasekeram and Berhanu (2009), value addition results from diverse activities including bulking, cleaning, grading, and packaging, transporting, storing and processing. Figure 1 shows the case of a typical agricultural value chain.

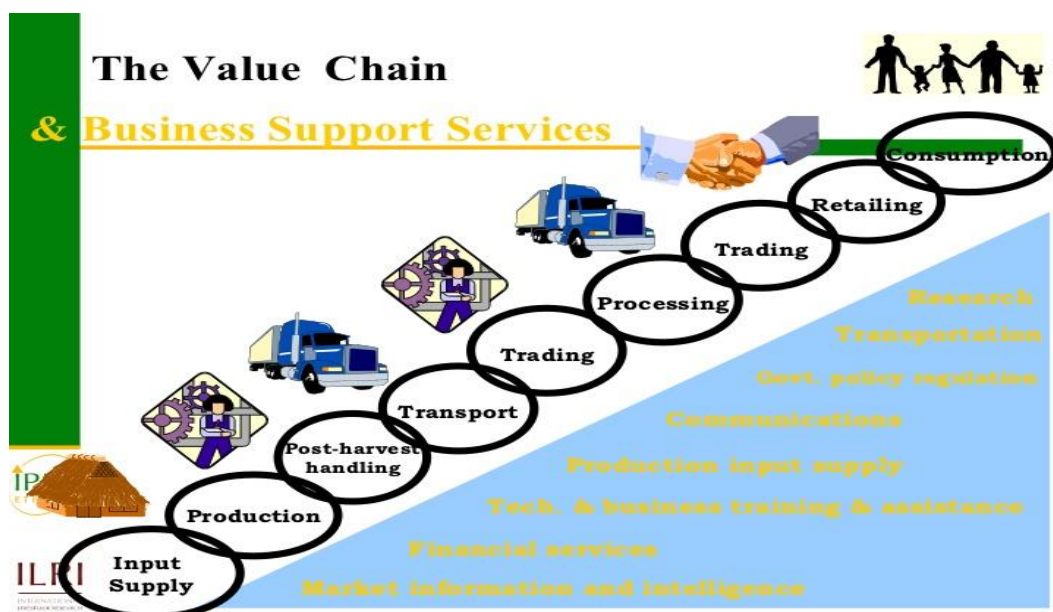


Figure 1.1: Typical agricultural value chain and associated business development services.

Source: Anandajayasekaram and Berhanu (2009).

2.1.2 Market chains versus value chains

A value chain is differentiated from a production/supply chain because participants in the value chain have a long-term strategic vision, disposed to work together, oriented by demand and not by supply, shared commitment to control product quality and have a high level of confidence in one another that allows greater security in business and facilitates the development of common goals and objectives (Hobbs *et al.* 2000).

Table 1.1 Enterprise relations: production chain versus value chain

Factors	Production market chain	Value market chain
Information flow	Little or none	Extensive
Principal focus	Cost / price	Value / quality
Strategy	Basic product (commodity)	Differentiated product
Orientation	Led by supply	Led by demand
Organizational structure	Independent actors	Independent actors
Philosophy	Competitiveness of the enterprise	Competitiveness of the market chain

Source: Hobbs *et al.* (2000).

The goal of a value chain is to optimize performance in the industry using the combined expertise and abilities of the members of the chain. Successful chains depend on integration, coordination, communication and cooperation between partners with the traditional measure of success being the return on investment (Bryceson and Kandampully, 2004).

2.1.3 Major concepts guiding agricultural value chain analysis

According to the Anandajayasekeram and Berhanu, (2009); Kaplinsky and Morris, (2000), four major key concepts guiding agricultural value chain analysis. These are effective demand, production, value chain governance, and upgrading.

2.1.3.1 Effective demand

Agricultural value chain analysis views effective demand as the force that pulls goods and services through the vertical system. Hence, value chain analysis need to recognize the dynamics of how demand is changing at both domestic and international markets, and the implications for value chain organization and performance. Value chain analysis also needs to observe barriers to the transmission of information in the changing nature of demand and incentives back to producers at various levels of the value chain (Hossain, 2016).

2.1.3.2 Production

In agricultural value chain analysis, a stage of production can be referred to as any operating stage capable of producing a marketable product serving as an input to the next stage in the chain for ultimate consumption or use. Typical value chain linkages include input supply, production, assembly, transport, storage, processing, wholesaling, retailing, and utilization, with exportation included as a major stage for products destined for international markets. According to Anandajayasekeram and Berhanu (2009), stage of production in a value chain performs a function that makes significant contribution to the effective operation of the value chain and in the process adds value.

2.1.3.3 Value chain governance

According to Kaplinsky and Morris (2000), governance refers to the role of coordination and associated roles of identifying dynamic profitable opportunities and apportioning roles to key players. Value chains imply the repetitiveness of linkage interactions. Governance ensures that interactions between actors along a value chain reflect organization, rather than randomness.

The governance of value chains emanate from the requirement to set product, process, and logistic standards, which then influence upstream or downstream chain actors and results in activities, roles and functions. Trust-based coordination is central for goods and services, whose characteristics change frequently, making a standardized quality determination for the purposes of industrial coordination difficult (Raikes *et al.* 2000). This applies to the manufacturing industry as well as agri-food chains. It is possible to identify in one industry with several coordination forms used by different firms where the choices rely on the trust existent between the firms. According to Kaplinisky and Morris (2000), value chains can be classified into two based on the governance structures: buyer-driven value chains, and producer driven value chains. Buyer-driven chains are usually labor intensive industries, and so more important in international development and agriculture. In producer-driven value chains which are more capital intensive, key producers in the chain, usually controlling key technologies, influence product specifications and play the leading role in coordinating the various links. Some chains may involve both producer and buyer driven governance.

2.1.4 Market and marketing

According to Hossain Mohammad Anwar (2016), a market is a point, or a place or sphere within which price making force operates and in which exchanges of title tend to be accompanied by the actual movement of the goods affected. The concept of exchange and relationships lead to the concept of market. According to Kotler and Armstrong (2003), it is the set of the actual and potential buyers of a product. Conceptually, a market can be visualized as a process in which ownership of goods is transferred from sellers to buyers who may be final consumers or intermediaries.

2.1.4.1 Marketing efficiency

Efficiency in marketing is the most used measure of market performance. Improved marketing efficiency is a common goal of farmers, marketing organizations, consumers and society. It is a commonplace notation that higher efficiency means better performance whereas declining efficiency indicates poor performance. Most of the changes proposed in marketing are justified on the grounds of improved efficiency (Kohls and Uhl, 1985).

2.1.4.2 Marketing channel

According to Kotler and Armstrong (2003), marketing channel is a business structure of interdependent organizations that reach from the point of product or origin to the consumer with the purpose of moving products to their final consumption or destination.

2.1.4.3 Marketing Performance

Market performance can be evaluated by analyzing costs and margins of marketing agents in different channels. A commonly used measure of system performance is the marketing margin or price spread. Margin or spread can be useful descriptive statistics if it used to show how the consumer's price is divided among participants at different levels of marketing system (Mendoza, 1995).

2.1.4.4 Marketing costs

Marketing costs are the embodiment of barriers to access to market participation by resource poor smallholders. It denotes to those costs, which are incurred to perform various marketing activities in the transportation of goods from producer to consumers. According to Holloway *et al.*, (2002), marketing costs includes handling cost (labor, loading and unloading, costs of damage, transportation, etc) to reach an agreement, transferring the product, monitoring the agreement to see that its conditions are fulfilled, and enforcing the exchange agreement.

2.1.4.5 Marketing margin

Marketing margin is defined as the difference between the price the consumer pays and the price that is obtained by producers, or as the price of a collection of marketing services, which is the outcome of the demand for and supply of such services (Cramers and Jensen, 1982; William and Robinson, 1990 and Holt, 1993). The size of market margins is mainly dependent upon a combination of the quality and quantity of marketing services provided the cost of providing such services, and the efficiency with which they are undertaken and priced. For instance, a big margin may result in little or no profit or even a loss for the seller involved depending upon the marketing costs as well as on the selling and buying prices (Mendoza, 1995). Under competitive market conditions, the size of market margins would be the outcome of the supply and demand for marketing services, and they would be equal to the minimum costs of service provision plus "normal" profit. Therefore, analyzing market margins is an important means of assessing the efficiency of price formation in and transmission through the system.

According to Mendoza (1995); Scarborough and Kydd (1992), three methods generally used in estimating marketing margin: (a) detailed analyses of the accounts of trading firms at each stage of the marketing channel (time lag method); (b) computations of share of the consumer's price obtained by producers and traders at each stage of the marketing chain; and (c) concurrent method: comparison of prices at different levels of marketing over the same period of time.

2.1.4.6 Measuring value chain

A major aspect of global value chain research is how 'value' itself, is conceptualized and measured. Profit, value addition and price markups are indications of income shares across value chain actors (Gereffi, 1999). Value-added shares can be calculated for different links in the chain. A second way to calculate value added is to look its distribution by each value chain actors of vegetable market and decomposing for each actor to get approximations of each value-added share. Marketing margin is the difference between the value of a product or a group of products at one stage in the marketing process and the value of an equivalent product or group of products at another stage. According to Smith (1992), measuring this margin indicates how much has been paid for the processing and marketing services applied to the product(s) at that particular stage in the marketing process.

2.2 Developing value chain systems towards the benefits of the poor According to OECD (2006), in recent years, the pro-poor growth approach has become one of the key concerns of developmental organizations. The focus of the approach lies in the promotion of economic potentials of the poor and disadvantaged groups of people. According to Berg *et al.* (2006), the main aim is to enable them to react and take advantage of new opportunities arising as a result of economic growth, and thereby overcome poverty. The promotion of value chains in agribusiness aims to improve the competitiveness of agriculture in national and international markets and to generate greater value added within the country or region. The key criterion in this context is broad impact, i.e. growth that benefits the rural poor to the greatest possible extent or, at least, does not worsen their position relative to other demographic groups. Pro-poor growth is one of the most commonly quoted objectives of value chain promotion. In recent years, the need to connect producers to markets has led to an understanding that it is necessary to verify and analyze markets before engaging in upgrading activities with value chain operators.

Thus, the value chain approach starts from an understanding of the consumer demand and works its way back through distribution channels to the different stages of production, processing and marketing (Meyer and Waltring, 2006).

2.3 Review of empirical studies

2.3.1 Value chain approach

There are a number of studies that have employed the value chain approach to agricultural commodities. Used of value chain analysis to examine inter-country distributional outcomes of the global coffee sector by mapping input-output relations and identifying power asymmetries along the coffee value chain (Fitter and Kaplinsky, 2001). Their study indicated that returns to product differentiation taking place in the face of globalization do not accrue to the coffee producers. They also found that power in the coffee value chain was asymmetrical.

At the importing end of the chain, importers, roasters and retailers compete with each other for a share of value chain rents but combine to ensure that few of the rents return to the farmer or the producer country.

USAID (2011) in Nepal value chain study conducted on off-season vegetables indicated that the subsector faces some challenges such as unavailability of quality planting materials, lack of knowledge among the producers of the proper usage of fertilizers and pesticides as well as poor soil fertility management, lack of irrigation facilities, labor shortage, postharvest loss due the perishable nature of vegetables, limited access to reliable market information, unorganized market center, limited collection centers, and lack of proper packaging and transportation facilities. The study recommended short-term and long term infrastructural and institutional innovation to reduce the above challenges.

Ponte (2002) also used a value chain analysis to examine the impact of deregulation, new consumption patterns and evolving corporate strategies in the global coffee chain on the coffee exporting countries in the developing world. The study concluded that the coffee chain was increasingly becoming buyer-driven and the coffee farmers and the producing countries were facing a crisis relating to changes in the governance structure and the institutional framework of the coffee value chain. According to Bezabih (2008), horticulture value chain study conducted in Eastern parts of Ethiopia identified different problems on the chain.

The major constraints of marketing identified by the same study include lack of markets to absorb the production, low price for the products, large number of middlemen in the marketing system, lack of marketing institutions safeguarding farmers' interest and rights over their marketable produces, lack of coordination among producers to increase their bargaining power, poor product handling and packaging, imperfect pricing system and lack of transparency in market information communications.

Value chain study conducted on mango by Dendena *et al.* (2009) indicated that the subsector faces some challenges. Among others: highly disorganized and fragmented industry with weak value chain linkages, long and inefficient supply chains, inadequate information flows and lack of appropriate production are explained as the major problems. The study recommended institutional innovation to reduce the above challenges.

2.3.2 Determinants of marketable surplus

The study of marketable surplus turned out to be very vital for agricultural based countries because the transition of smallholder farmers towards commercial production is determined by it. The transition of the small-scale sector towards commercial production will ultimately be determined by the ability and willingness of producers to provide a commodity (Getachew, 2009). Similarly, Mamo (2009) claimed that the development of markets, trade and the subsequent market supply that characterize commercialization are fundamental to economic growth.

There are a number of experiential studies on factors affecting the marketable surplus of agricultural commodities. Several factors affecting the marketable surplus of fruits by using OLS regressions. She found that fruit marketable supply was affected by; education level of household head, quantity of fruit produced, fruit production experience, extension contact, lagged price and distance to market (Ayelech, 2011).

Heckman two-stage model to analyze the determinants of vegetable market supply are applied by Akalu (2007). Accordingly, the study found out that marketable supply of vegetables were significantly affected by family size, distance from main road, number of oxen owned, extension service and lagged price.

Marketable supply of agricultural product could be affected by different factors including the size of land holding, the output level, family size, market access, price, inputs, formal education, oxen number, accesses to extension and credit services, distance to market, time of selling, access to labor and age (Wolday, 1994). In sum, empirical evidences indicate that marketable supply approach has become an important framework to analyze economic agents in agricultural sector. In this study an attempt was made to identify factors affecting the marketable supply of vegetables.

2.3.3 Determinants of market channel choices

As regards factors affecting channel choices of the households, different researchers used multinomial logit and probit for categorical marketing system for different agricultural commodities.

A study by Ferto and Szabo (2002) identified variables influencing producers' decision for channel choices. The analysis was based on a survey among three supply channels of fruit and vegetable producers in Csongrad, Hungary in respect the choice of marketing channels which are wholesalers, marketing cooperative and producers' organization channel. A multinomial logit model was applied to reveal on the determinants influencing these choices among various supply channels. Farmer's decisions with respects to supply channels were influenced differently by transaction costs, and producers sell to wholesale market were strongly and negatively affected by the farmer's age, information costs, and negatively by the bargaining power and monitoring costs. The probability that farmers sell their product to marketing cooperative is influenced by the age and information costs positively, whereas by the asset specificity and bargaining power negatively.

The educational level of the operator, off-farm employment, own means of transportation and age of operator had positive effect where household size was negatively associated with supper marketing channel choices is confirmed by Rao *et al.* (2011). In second stage second stage of treatment model, off-farm employment and own means of transportation affected income of vegetables growers positively. Furthermore, dummy variable for channel choices were positive and significant. This indicated that supplying vegetable to supermarket channels rendered better income gain over spot marketing channel.

On the other hand, ownership of livestock negatively influenced income of vegetables growers supplying traditional or spot marketing channel. Jari and Fraser (2009) identified that market information, expertise on grades and standards, contractual agreements, social capital, market infrastructure, group participation and tradition significantly influence household marketing behavior. The study uses multinomial regression model to investigate the factors that influence marketing choices among smallholder and emerging farmers.

Bongiwe and Masuku (2013) identified that age of the farmer, quantity of baby corn produced and level of education were significant predictors of the choice to sell vegetables to NAM Board market channel instead of selling to other-wholesale market channel. The age of the farmer, distance from production area to market, membership in farmer organization and marketing agreement were significant determinants of the choice to use non-wholesale market channel over other-wholesale market channel. The study uses expressive and multinomial logistic regression analyses to investigate factors that influence market channel choices.

Mamo and Degnet (2012) identified that gender and educational status of the household head together with household access to free aid, agricultural extension services, market information, non-farm income, adoption of modern livestock inputs, volume of sales, and time spent to reach the market have statistically significant effect on whether or not a farmer participates in the livestock market and his/her choice of a market channel. The study uses binary logit and multinomial logit to explore the patterns and determinants of smallholder livestock farmer's market participation and market channel choice using a micro-level survey data from Ethiopia.

Akter (1973) conducted a study on potato marketing in ComillaSadarUpazila of Bangladesh and he found some structural and functional features of potato marketing. Sabur and Gangwar (1984) carried out a study on production and price structure of potato in Bangladesh and showed that the growth rate of potato in terms of production, area and productivity during the proliferation period. The study also showed that the growth rates in terms of area, production and productivity for the western districts were higher than those for the northern districts.

Sabur (1986) conducted a study on marketed surplus of potato in two districts of Bangladesh and found that production and marketed surplus of potatoes moved in same direction and land under potatoes was the most important factor determining the marketed surplus. He showed that the average production cost per hectare was Tk.29637.57 which was the lowest medium farmers and net returns and benefit cost ratio were calculated at Tk.30947.82 per hectare and 1: 2.25 respectively which were the highest for medium farmers in both the areas. Regional Agricultural Research station, Jamalpur under the Farm Research Division of BARI, Joydebpur conducted a research on "Improvement of existing fanning system through holistic approach". They summarized the findings in a report (1992-93). They found that the yield per hectare of HYV potato was 9.25 tones and cost per hectare was Tk. 17,000.00. They observed that the net return depended largely on the harvest price of potato.

Islam (1987) carried out a study on potato preservation in cold storage in Bangladesh including the marketing aspects. He found that price spread per tones of potato appropriated by traders was higher in the case cold stored potato than that of non-stored potato.

Sarkar (1990) conducted a research on potato marketing in Bangladesh. His study expounded that only few growers store their potato in cold storage plants due to high storage charge. His study revealed that communication system should be developed to transport potato from production area to the terminal market to strengthen the economic condition of the potato growers. Storage facilities should be improved at the primary and secondary markets by establishing public as well as private cold storage plants at different points of potato marketing channel. His study emphasis on the improvement of ordinary storage in scientific manner as well as innovation of low-cost storage technique which would not only ensure timely availability of quality seed but also better price at reduced storage costs throughout the year by enlarging storage period at farm level.

Saklayen (1990) investigated that the potato marketing in selected areas of Munshiganj district. This study was mainly based on Sadar Upazila and Tongibari Upazila of Munshiganj district. The sample included 30 farmers and 30 market intermediaries of Munshiganj Sadar Upazila and Tongibari Upazila. He found that the marketing cost per quintal of potato incurred was Tk. 43.46 and Tk 44.36 for farmers of Munshiganj Sadar Upazila and Tongibari Upazila respectively.

The marketing costs incurred per, quintal potato were Tk. 60.95, Tk 56.87, Tk. 133.60 and Tk. 37.81 for Bepari, Paiker, cold storage owners and retailer of Munshiganj bazar respectively. The marketing costs incurred per quintal were Tk 45.42, Tk 61.21, Tk. 134.64 and Tk. 37.32 for Bepari, Paiker, cold storage owners and retailers of Tangibari bazar respectively. The net margins of per quintal potato of Bepari, paiker, the cold storage owners and retailers of Munshiganj bazaar were calculated at Tk. 21.73, Tk. 21.50, Tk. 19.57 and Tk. 23.28 respectively.

The net margin of per quintal potato of Bepari, Paiker, the cold storage owners and retailers of Tongibari bazar were calculated at Tk. 30.02, Tk. 26.91, Tk. 25.62 and Tk. 21.94 respectively.

Kawsar (2001) carried out a study entitled "An Economic Analysis of Diamant Potato Production in Some Selected Areas of Bangladesh". The study was mainly designed to analyze the socio-economic characteristics of farmers and to estimate the costs and returns of diamant variety of potato and to determine the factors affecting yield and returns. One hundred thirty nine farmers were purposively selected from 5 Upazilas of five districts Bogra, Comilla, Munshigonj, Rangpur and Thakurgaon. Findings showed that Diamant potato production is profitable considering the selected farm categories both in East and North Bengal. Per hectare gross margin was the highest for Rangpur whereas net returns were the highest for Munshigonj. Both gross margin and net return were higher for North Bengal. On the other hand, medium farmers obtained the highest amount of gross margin and net return.

Hossain (2004) investigated that the potato marketing in selected areas of Bogra district. This study was mainly based on SadarUpazila of Bogra district. The sample included 30 farmers and 30 intermediaries. Production cost, yield, marketing cost, marketing margin and net margin of potato farmers and intermediaries were calculated in this study.

Saiyem (2007) investigated the potato marketing system and price behavior in selected areas of Rangpur district. The samples include 60 sample farmers and intermediaries. In this study production cost, yield, marketing cost, marketing margin, net margin and price behavior of potato farmers and intermediaries were estimated.

Hajong (2011) found many intermediaries are involved such as faria, bepari, paikar, retailers and cold storage owners in the production and marketing system of potato. The farmers distribute their production for family consumption, gift and kind payment to relatives, seed and maximum portion for sell. Again some potatoes were damaged and loss during storage. Storing of potato in the cold storage plants certainly reduces the excessive losses of potato but all farmers can not avail the facility of cold storages due to several reasons, such as high cold storage charge, uncertainty of future market price, financial insolvency, bad communication and inadequate transport facilities and lack of any provision in getting compensation for damage of potato in the cold storage plants.

The aforesaid reviews reveal that studies were undertaken exclusively on the marketing aspect of potato. Systematic research study report on value chain analysis of potato is meager in Bangladesh. So the existing research has been undertaken to make an in depth study to provide knowledge in the field of potato production and marketing. The findings of the study might help farmers, value chain actors and consumers to take decision in production, trading and consuming potato.

CHAPTER III

METHODOLOGY

3.1 Selection of study area

The present study was conducted in some selected areas of Munshiganj district. Munshiganj district is the leading zone in respect of potato production in Bangladesh. Sirajdikhan Upazila especially is the leading potato producing area of Munshiganj district. The study area has some favorable characteristics like topography, soil and climate condition for producing potato.

3.2 Period of study

The present study covered 6 months from January to July 2020. Data were collected during the period from February to April, 2020 through face to face interview with potato growers, potato traders, and cold storage owner using structured survey schedule. For collecting supplementary data the researcher personally visited the area.

3.3 Selection of sample

Twenty five potato growers, sixty five other value chain actors (potato traders, Faria, Bepari, wholesaler and retailer) and five cold storage owners were selected from the study area by using random sampling technique and in following manner.

3.3.1 Selection of potato growers

Considering the limitation of time and fund, the sample size for potato grower was fixed at 25. Out of 25 selected growers, 10 from Bashaile, 10 from Bujarhati and 5 from Soforchor village were selected in Sirajdikhan Upazila of Munshiganj district through simple random sampling technique by using random number table for the present study.

3.3.2 Value chain actor of potato

Sixty five value chain actors of potato from each of two retail markets Ramkrishnodi Bazar and Guakhola Bazar were selected from Sadar Upazila. In addition, two Haats such as Bujarhati Haat and Bashaile Haat were chosen from Sirajdikhan Upazila of Munshiganj district by applying purposive sampling technique for the present study.

In the selected areas potato farmers and intermediaries were considered as the population of the study.

Table 3.1 Different actors and size of sample

Value chain actors	Sample size
Growers	25
Faria	15
Bepari	15
Wholesaler	15
Retailer	20
Total	90

3.3.3 Cold storage plants

Five cold storage plants comprising about 20% of the total number of cold storage plants located in the study area were selected through simple random sampling technique by applying lottery method for the present study. Five out of twenty five plants from Munshiganj district was selected through simple random sampling technique.

3.4 Data collection and analytical technique

Data were collected through an interview schedule with the help of pre-designed and pre-tested interview schedule. The collected data were edited, summarized, tabulated and analysed to fulfil the objectives of the study. Tabular method tools was used in presenting the results of the study. Profitability of potato production was examined on the basis of gross margin, total return and benefit cost analysis and multiple regression was used to analyse data. Additionally, moving average methods was used to analyse seasonal price fluctuation.

3.4.1 Gross return and net return of the farmer

Gross return was calculated by multiplying the total volume of output of an enterprise by the average price in the harvesting period (Dillon and Hardaker, 1993). It consisted of sum of the volume of main product and by product. The following equation was used to estimate gross return:

$$GR = \sum Q_m \cdot P_m$$

Where:

GR= Gross return from potato, Q_m = Quantity of potato

P_m =Avg. price of potato

Net return was calculated by deducting all costs (variable and fixed) from gross return. To determine the net return of potato production the following equation was used in the present study:

$$\Pi = \text{Gross return} - (\text{Variable cost} + \text{fixed cost})$$

Here,

Π = Profit per cycle

Gross return = Total production x per unit price of potato

Variable costs,

- i. Production cost of potato

Fixed costs,

- i. Land use cost
- ii. Interest on operating capital

Marketing cost of potato

- i. License fee
- ii. Loading and unloading
- iii. Power and electricity charge
- iv. Telephone charge
- v. Market toll
- vi. Transportation
- vii. Grading
- viii. Storage cost
- ix. Personal expenses
- x. Unofficial payment

3.4.2 Marketing margin and net margin of value chain actors

The marketing margin and net margin of different value chain actors were estimated by the following formula:

- a) Marketing Margin = Sales price – Purchase price
- b) Net marketing margin = Marketing margin – Marketing cost
- c) Value Addition (%) = [(Sales price – Purchase price) / Purchase price] x 100
- d) Interest on operating capital = (Amount of operating capital X Interest rate (%) X Time required (in years)) / 2
- e) Variable cost of potato production was considered as operating capital.

The important methods of measuring seasonal movements are:

- a) Method of simple average;

- b) Ratio to trend method;
- c) Ratio to moving average method; and
- d) Link relative method.

In the present study ratio to moving average method was applied to examine the price fluctuation of potato considering the following factors.

- a) It is an improvement over the ratio to trend method.
- b) It is the most satisfactory and popular method and is widely used for estimating the seasonal variations because it eliminates both trend and cyclical components from the indices of seasonal variations.

3.5 Problems encountered in collecting data

While the respondent potato producers were available in the village, it was not an easy task to collect the necessary data. During data collection, the investigator of the analysis had to face some concerns, which are noted below:

- a. Education of the respondents was a pre-requisite factor for having accurate data. Since most of the respondents were not well educated they were suspicious of outsiders and therefore, they were likely to be less co-operative;
- b. No written accounts of the faring events were maintained by certain respondents. The researcher had to rely, therefore on their memory;
- c. Respondents from all groups were often unable to remember correct facts, such as revenue, amount of sales, expense, overall performance, etc. Therefore the durability of data was somewhat confusing;
- d. time and staff constraints and limited knowledge on the processing and marketing aspects of potatoes were found and for that reason, details and other required information had to be gathered within the shortest possible time;
- e. Since the respondents were busy at work, they were not always present at home. In order to get information from them, regular visits were made for this purpose
- f. Cold storage owner and maximum value chain actor was avoiding information about their loan and tax.

CHAPTER IV

RESULTS AND DISCUSSION

4.1 Socio-demographic profile of the respondents

The socio-demographic data are an important part of the study and should be examined carefully. Socio-demographic profile helps to understand the age, educational qualification, farming / trading experience and size of family of the respondents at a glance. As people differ from one another in many aspects, behavior of an individual is largely determined by his/her characteristics. Socio-demographic profile also helps to understand the behavior or characteristics of respondents.

4.1.1 Age of potato value chain actors

Table 4.1 shows age of the potato value chain actors. The age of farmer was categorized 0-20, 21-30, 31-40, 41-50 and 51-above years respectively where majority 40% farmer were from 21-30 age group and only 8% were from 0-20 age range. The highest 33.33% of faria, belong to the 21-30 years age category. The highest 33.33% of bepari, 40% of wholesaler, and 35% of retailer are belong to 31-40 years age category and the lowest 6.67% of faria and wholesaler, 5% retailer were from 50-above age group and 6.67% bepari were from 0-20 age range.

Table 4.1 Age of potato value chain actors

Age categor	Farmer		Faria		Bepari		Wholesaler		Retailer	
	N	%	N	%	N	%	N	%	N	%
0-20	2	8	2	13.3	1	6.67	2	13.33	2	10
21-30	10	40	5	33.3	4	26.6	3	20	6	30
31-40	8	32	4	26.6	5	33.3	6	40	7	35
41-50	4	16	3	20	3	20	3	20	4	20
51-Above	1	4	1	6.67	2	13.3	1	6.67	1	5
Total	25	100	15	100	15	100	15	100	20	10

Source: (Field survey, 2020)

4.1.2 Educational background of actors in value chain

Table 4.2 shows majority 40% farmer and faria, 53.33% wholesaler, 45% retailer and 46.67% bepari respectively were from higher secondary education. Lowest 8% farmers are illiterate. The illiterate rate of faria, bepari, wholesaler and retailer are 0%.

Table 4.2 Educational background of potato value chain actors

Education category	Farmer		Faria		Bepari		Wholesaler		Retailer	
	N	%	N	%	N	%	N	%	N	%
Illiterate	2	8	0	0	0	0	0	0	0	0
Primary	4	16	1	6.67	1	6.67	0	0	3	15
Secondary	3	12	5	33.33	7	46.67	2	13.33	4	20
Higher Secondary	10	40	6	40	2	13.33	8	53.33	9	45
Above Degree	6	24	3	20	5	33.33	5	33.33	4	20
Total	25	100	15	100	15	100	15	100	20	100

Source: (Field survey, 2020)

4.1.3 Family size of potato value chain actors

Table 4.3 shows that, majority of the famer (48%) having a medium family size of (6-8) members and only 20% were from large family size of above 8 members. Highest 53.33% faria, 46.67% bepari, 53.33% wholesaler and 55% retailer were from small family size of (1-5) members respectively and lowest 13.33% faria, 20% of bepari, wholesaler and retailer were from large family size of above 8 members respectively.

Table 4.3 Family size of the value chain actors

Family size	Farmer		Faria		Bepari		Wholesaler		Retailer	
	N	%	N	%	N	%	N	%	N	%
Small(1-5)	8	32	8	53.33	7	46.67	8	53.33	11	55
Medium(6-8)	12	48	5	33.33	5	33.33	4	26.67	5	25
Large(Above 8)	5	20	2	13.33	3	20	3	20	4	20
Total	25	100	15	100	15	100	15	100	20	100

Source: (Field survey, 2020)

4.1.4 Experience of potato value chain actors

Table 5.4 shows the experience of potato value chain actors. The following table shows that, majority 40% farmer, 46.67% bepari and 33.33% retailer having 10-20years, experience of potato farming respectively and 46.67% faria and 45% retailer having 0-10 experience of potato farming. The lowest experience level of farmer, faria, bepari, wholesaler, and retailer is 12%, 6.67%, 13.33%, 13.33%, and 5% respectively having 30 or above 30 years experience of potato farming.

Table 4.4 Experience of potato value chain actors

Years of experience	Farmer		Faria		Bepari		Wholesaler		Retailer	
	N	%	N	%	N	%	N	%	N	%
0-10	7	28	7	46.67	4	26.67	4	26.67	9	45
10-20	10	40	5	33.33	7	46.67	5	33.33	7	35
20-30	5	20	2	13.33	2	13.33	4	26.67	3	15
30-Above	3	12	1	6.67	2	13.33	2	13.33	1	5
Total	25	100	15	100	15	100	15	100	20	10

Source: (Field survey, 2020)

4.2 Value addition of potato

One of the purposes of the present study is to estimate the value added by the value chain actors, particularly the producers of potatoes and different traders. The practices of value addition are specifically concerned with improvements in utilities. In economics, the difference between the purchase price of a good and the cost of the products to make it is value added. It applies to the contribution of the production factors, i.e. property, labour and capital goods, to the rise in the value of a commodity in the national accounts used in macroeconomics and correlates to the profits earned by the owners of those factors. Value added refers to the additional value of a commodity over the cost of commodities used to produce it from the previous stage of production. The value added to any product or service is the result of a particular process.

4.2.1 Actors involved in potato value chain

A marketing channel is considered to be the chain of actors in which the exchange of products takes place between the manufacturer and the customer. In achieving every organization's marketing targets, marketing networks play a significant part. Considering that potato is an important vegetable in Bangladesh, through the same chains, i.e. through some market players such as faria, bepari, wholesaler, manufacturer and owner of cold storage, the stock moved from sellers to customers. The study showed that potato had passed from the point of development to the point of customer through some players in the study region creating a chain in the potato industry.

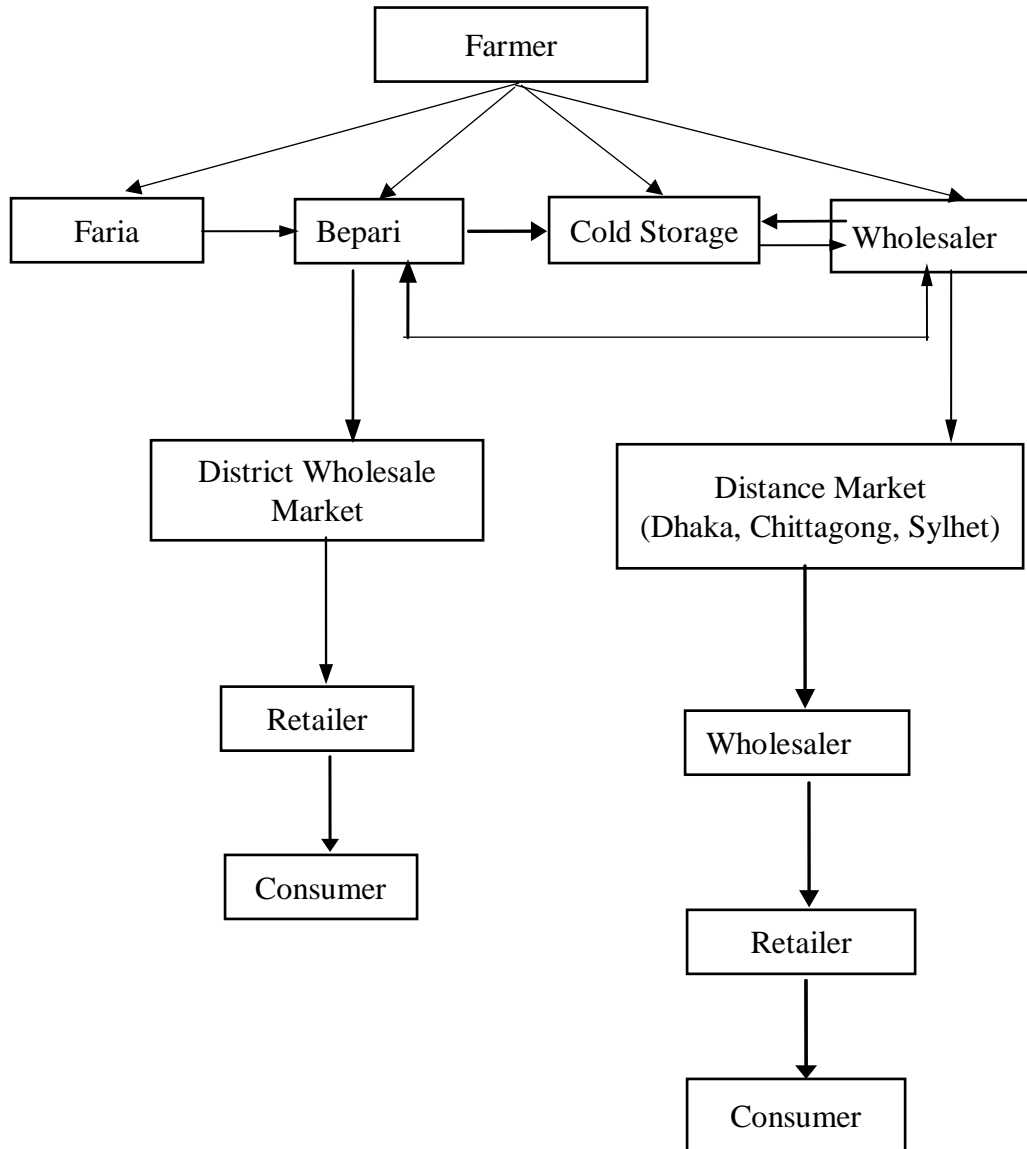


Figure 4.1: Value chain actors of potato in Munshiganj district and distant market

Figure 4.1 shows that the potato in Munshiganj district is moved through the following chains:

Chain I: Farmer → Faria → Bepari → District Wholesaler → Retailer → Consumer.

Chain II: Farmer → Bepari → District Wholesaler → Retailer → Consumer.

Chain III: Farmer → Faria → Bepari → Wholesaler → Distance Wholesaler → Retailer → Consumer.

Chain IV: Farmer → Bepari → Wholesaler → Distance Wholesaler → Retailer → Consumer.

Chain V: Farmer → Wholesaler → Distance Wholesaler → Retailer → Consumer.

The study indicates that the selling of potatoes in the district of Munshiganj has passed from the hands of farmers to the hands of consumers via five different chains. The longest value chain is chain III. In this chain the main marketing actors were the farmer, Faria, Bepari, wholesaler, distance wholesaler and retailer who added value in the marketing channels. At each point of value addition activity, they took a part of the margins

4.2.2 Different value chain actors

4.2.2.1 Cost and return analysis of farmer

Table 4.5 Average production cost and return of potato for 100 Kg

Items	Cost Items	Cost(TK./100 Kg)
Variable cost	Land preparation	60.10
	Seed cost	49.18
	Labor (family)	35.32
	Labor (hired)	70.23
	Organic manure	5.14
	Chemical fertilizer	60.35
	Weeding	65.10
	Insecticides spray	55.32
	Irrigation	70.56
	Other costs	4.33
	Total	475.63
Fixed costs	Rent of land	216.35
	Interest on operating capital	5.85
	Total	222.20
Total production cost(TK./100Kg)		697.83
Marketing cost	Grading and sorting	59.65
	Transport cost	40.23
	Loading and unloading	17.83
	Market toll	17.20
	Personal expense	22.00
	Others cost	19.28
	Total	176.19
Total cost		874.02
Cold storage		365.25

Source: (Field survey, 2020)

Table 4.5 found that the summation of the costs for variable inputs was taka 475.63/100kg. Then the summation of the costs of fixed inputs made total fixed cost that was Tk. 222.20/100 kg. 100 kg of potato costs was Tk. 5.85 for interest on operating capital and Tk. 697.8 for 100 kg was the total production cost of potato. The marketing cost of farmers comprised of the cost of grading, washing and sorting, transportation, loading and unloading, market toll, personal expense, and unofficial payment. It was projected that marketing cost was Tk. 176.19 per 100 kg of potato. After including the marketing costs the total cost was Tk. 874.02. The cold storage charge per 100 kg of potato was Tk. 51.40.

Table 4.6 shows that gross return per 100 kg potato was Tk. 1325.55 and Tk.13.26 per kg respectively. Then the variable cost was Tk. 4.76 per kg. The variable cost was Tk. 475.63 per 100 kg of potato. Total cost was Tk. 8.74 per kg. Total cost was Tk. 874.02 per 100 kg of potato cultivation and Tk. 8.74 per kg of potato cultivation respectively. Gross margin was measured by deducting total variable cost from gross return. Gross margin per 100 kg of potato was Tk. 849.93 and Tk.8.50 per kg respectively. Net return was calculated by subtracting total cost from gross return. Net return was Tk. 451.53 per 100 kg of potato and Tk.4.52 per kg of potato respectively.

Table 4.6 Profitability of potato farmer

Particulars	Tk. / 100 Kg	Tk. /Kg
Gross return	1325.56	13.26
Variable cost	475.63	4.76
Total cost	874.02	8.74
Gross margin (Gross return – Variable cost)	849.93	8.50
Net return (Gross return –Total cost)	451.53	4.52

Source: (Field survey, 2020)

Farm gate price is that price which farmer gets through selling their produce at the farm yard. From table 4.7 it was revealed that the average farm gate price was Tk. 1060.73 per 100 kg of potato. Average market price was Tk.1325.55 per 100 kg of potato. The average marketing cost was Tk. 165.28 per 100 kg of potato. Value addition was Tk. 264.82 per 100 kg of potato and Tk.2.65 per kg of potato respectively. Farmer covered the 24.97 percent of value addition among the total value addition.

Table 4.7 Value addition of potato by farmer

Average farm gate price Tk. Per 100 Kg	Market price Tk. Per 100 Kg	Average marketing cost Tk. Per 100 kg	Average marketing cost Tk. Per kg	Value addition Tk. per 100 Kg	Value addition Tk. Per Kg	Value addition (%)
1060.73	1325.55	165.28	1.65	264.82	2.65	24.97

Source: (Field survey, 2020)

4.2.2.2 Cost and margin analysis of Faria

From Table 4.8 it was found that the average transaction per day was 1020 kg of potato by Faria. Average total return of potato was Tk.14830.80 per day. The average purchase price was Tk. 1329 per 100 kg of potato. The sales price was Tk. 1454 per 100 kg of potato. The average price was Tk.13.29 per kg of potato. The sales price was Tk. 14.54 per kg of potato. Value addition was Tk.125.00 (marketing margin) per 100 kg of potato and 1.25 per kg of potato.

Table 4.8 Daily transactions and value addition incurred by Faria

Particulars	Amount (kg)	Tk./Kg	Tk. / 100 Kg	Total return (Tk)
Average transaction (Per day)	1020	–	–	–
Average purchase price	–	13.29	1329.00	–
Average sales price	–	14.54	1454.00	14830.80
Value addition	–	1.25	125.00	–

Source: (Field survey, 2020)

Faria mainly sold potato to the bepari or wholesaler. From Table 4.9 it was obtained that the estimated average marketing cost per 100 kg of potato incurred by the Faria was Tk.25.

Among the cost items market toll covered the highest cost that was 64% of total cost. Personal expense was the second highest cost that was 20% of total cost. Telephone bill was 12% and others cost was and 4%.

Table 4.9 Marketing cost incurred by Faria

Cost items	Average cost (Tk./Kg)	Percentage of total cost
Personal expenses	0.05	20
Telephone charge	0.03	12
Market toll	0.16	64
Others cost	0.01	4
Total	0.25	100

Source: (Field survey, 2020)

From Table 4.10 it was revealed that the average purchase price was Tk.1329.00 and sales price was Tk.1454.00 per 100 kg of potato. The average purchase price was Tk. 13.29 and sales price was Tk. 14.54 per kg of potato respectively. The amount of value addition was Tk.125.00 (marketing margin) per 100kg of potato and value addition was Tk. 1.25 per kg of potato. Among the value addition faria covered the 9.41% of total value addition

Table 4.10 Value addition and marketing margin of potato incurred by Faria

Particulars	Tk. / 100 Kg	Tk. / Kg	Value addition (%)
Purchase price	1329.00	13.29	–
Sales price	1454.00	14.54	
Value addition (Purchase price – Sales price)	125.00	1.25	9.41
Marketing cost	25.00	0.25	–
Net marketing margin (Value addition – Marketing cost)	100.00	1.00	–

Source: (Field survey, 2020)

4.2.2.3 Cost and margin analysis of Bepari

Table 4.11 it was shows that the average transaction per day was 3000 kg of potato by bepari. The average total return of potato per day was Tk. 50400.00. The average purchase price was Tk. 1465.00 per 100 kg of potato and Tk. 14.65 per kg of potato. Then the average sales price was Tk. 1680.00 per 100 kg of potato and 16.80 per kg of potato. The amount of value addition was Tk.215.00 (marketing margin) per 100kg of potato and Tk. 2.15per kg of potato respectively.

Table 4.11 Daily transactions and value addition incurred by Bepari

Particulars	Amount (kg)	Tk. /Kg	Tk. / 100 Kg	Total return (Tk.)
Average transaction (Per day)	3000	–	–	–
Average purchase price	–	14.65	1465.00	–
Average sales price	–	16.80	1680.00	50400.00
Value addition	–	2.15	215.00	–

Source: (Field survey, 2020)

From Table 4.12 it was found that the average marketing cost was Tk. 1.72 per kg of potato incurred by bepari. The highest cost was transportation cost which was 43.61% of total cost and second highest cost was storing cost of potato which was 32.56% of total cost. Among the other cost items, loading and unloading, market toll, telephone charge, personal expense, and unofficial payment are 9.88%, 9.30%, 1.74%, 2.33 % and 0.58 % respectively.

Table 4.12 Marketing cost incurred by Bepari

Cost items	Average cost (Tk./Kg)	Percentage of total cost
Rent of store	0.00	0.00
Loading and unloading	0.17	9.88
Market toll	0.16	9.30
Transportation	0.75	43.61
Telephone charge	0.03	1.74
Unofficial payment	0.01	0.58
Storage charge	0.56	32.56
Personal expense	0.04	2.33
Total	1.72	100

Source: (Field survey, 2020)

From Table 4.13 it was revealed that the average purchase price was Tk. 1465.00 per 100 kg of potato. The average sales price was Tk. 1680.00 per 100 kg of potato. The amount of value addition was Tk.215.00 (marketing margin) per 100kg of potato and Tk. 2.15 per kg of potato respectively. Bepari covered 14.68% of value addition among the total value addition.

The average marketing cost was Tk. 172 per 100 kg of potato. The storage cost was Tk. 58.00 per month per 100 kg of potato.

Table 4.13 Value addition and marketing margin of potato incurred by Bepari

Particulars	Tk. / 100 Kg	Tk. / Kg	Value addition (%)
Purchase price	1465.00	14.65	–
Sales price	1680.00	16.80	–
Value addition (Purchase price –Sales price)	215.00	2.15	14.68
Marketing cost	172.00	1.72	–
Net marketing margin (Value addition – Marketing cost)	43.00	0.43	–
Storing cost (Per month)	58.00	0.58	–

Source: (Field survey, 2020)

4.2.2.4 Cost and margin analysis of wholesaler

Table 4.14 it was shows that the average transaction per day was 7500 kg of potato by wholesaler. The average total return of potato per day was Tk.146325.00.00. The average purchase price was Tk. 1687.00 per 100 kg of potato and Tk. 16.87 per kg of potato. Then the average sales price was Tk.1951.00 per 100 kg of potato and 19.51 per kg of potato. The amount of value addition was Tk.264.00 (marketing margin) per 100kg of potato and Tk. 2.64 per kg of potato respectively.

Table 4.14 Daily transactions and value addition incurred by wholesaler

Particulars	Amount (kg)	Tk./Kg	Tk. / 100 Kg	Total return (Tk.)
Average transaction (Per day)	7500	–	–	–
Average purchase price	–	16.87	1687.00	–
Average sales price	–	19.51	1951.00	146325.00
Value addition	–	2.64	264.00	–

Source: (Field survey, 2020)

From Table 4.15 it was found that the average marketing cost was Tk. 2.49 per kg of potato incurred by wholesaler. The highest cost was transportation cost which was 25.70% of total cost and second highest cost was storing cost of potato which was 24.90% of total cost. Among the other cost items, loading and unloading, grading, market toll, telephone charge, personal expense, unofficial payment and license cost are 9.24%, 18.07%, 16.03%, 4.82%, 5.62%, 1.61% and 0.40% respectively.

Table 4.15 Marketing cost incurred by wholesaler

Cost items	Average cost (Tk./Kg)	Percentage of total cost
Loading and unloading	0.23	9.24
Transportation	0.64	25.70
Storage cost	0.62	24.90
Grading	0.45	18.07
Telephone charge	0.12	4.82
Unofficial payment	0.04	1.61
License cost	0.01	0.40
Market toll	0.15	6.03
Personal expense	0.14	5.62
Others	0.09	3.61
Total	2.49	100

Source: (Field survey, 2020)

Table 4.16 shows that the average purchase price was Tk. 1687.00 per 100 kg of potato. The average sales price was Tk.1951.00 per 100 kg of potato. The amount of value addition was Tk.264.00 (marketing margin) per 100kg of potato and Tk. 2.64 per kg of potato respectively. Wholesaler covered 15.65% of value addition among the total value addition. The average marketing cost was Tk. 249 per 100 kg of potato and Tk. 2.49 per kg of potato. The storage cost was Tk. 62.70 per month per 100 kg of potato.

Table 4.16 Value addition and marketing margin of potato incurred by wholesaler

Particulars	Tk. / 100 Kg	Tk. / Kg	Value addition (%)
Purchase price	1687.00	16.87	–
Sales price	1951.00	19.51	–
Value addition (Purchase price – Sales price)	264.00	2.64	15.65
Marketing cost	249.00	2.49	–
Net marketing margin (Value addition – Marketing cost)	15.00	0.15	–
Storing cost (Per month)	62.00	0.62	–

Source: (Field survey, 2020)

4.2.2.5 Cost and margin analysis of retailer

Table 4.17 revealed the average transaction per day was 120 kg of potato by retailer. The average total return of potato per day was Tk.2610. The average purchase price was Tk. 1960.00 per 100 kg of potato and Tk. 19.60 per kg of potato. Then the average sales price was Tk. 2175.00 per 100 kg of potato and 21.75 per kg of potato. The amount of value addition was Tk. 215.00 (marketing margin) per 100 kg of potato and Tk. 2.15 per kg of potato respectively.

Table 4.17 Daily transactions and value addition incurred by retailer

Particulars	Amount (kg)	Tk./Kg	Tk. / 100 Kg	Total return (Tk.)
Average transaction (Per day)	120	–	–	–
Average purchase price	–	19.60	1960.00	–
Average sales price	–	21.75	2175.00	2610.00
Value addition	–	2.15	215.00	–

Source: (Field survey, 2020)

Retailers collect potato from the district wholesale market and they sold it directly to the ultimate customer. From Table 4.18 it was found that the average marketing cost was Tk. 1.08 per kg of potato incurred by retailer. The highest cost was license cost which was 23.14% of total cost and second highest cost was electricity cost of potato which was 20% of total cost.

Among the other cost items, loading and unloading, market toll, telephone charge, personal expense and unofficial payment cost are 11.11%, 10.19%, 9.26%, 14.82%, 3.70%, respectively.

Table 4.18 Marketing cost incurred by retailer

Cost items	Average cost (Tk./Kg)	Percentage of total cost
Loading and unloading	0.12	11.11
Electricity charge	0.22	20.37
Telephone charge	0.10	9.26
License cost	0.25	23.14
Unofficial payment	0.04	3.70
Market toll	0.11	10.19
Personal expense	0.16	14.82
Others	0.08	7.41
Total	1.08	100

Source: (Field survey, 2020)

Table 4.19 shows that the average purchase price was Tk. 1960.00 per 100 kg of potato and Tk. 19.60 per kg of potato. The average sales price was Tk. 2175.00 per 100 kg of potato and Tk.21.75 per kg of potato. The amount of value addition was Tk.215.00 (marketing margin) per 100kg of potato and Tk. 2.15 per kg of potato respectively. Retailer covered 10.97% of value addition among the total value addition. The average marketing cost was Tk. 108 per 100 kg of potato and Tk. 1.08 per kg of potato.

Table 4.19 Value addition and marketing margin of potato incurred by retailer

Particulars	Tk. / 100 Kg	Tk. / Kg	Value addition (%)
Purchase price	1960.00	19.60	–
Sales price	2175.00	21.75	–
Value addition (Purchase price –Sales price)	215.00	2.15	10.97
Marketing cost	108.00	1.08	–
Net marketing margin (Value addition – Marketing cost)	107.00	1.07	–

Source: (Field survey, 2020)

4.2.2.6 Cost and margin analysis of cold storage owner

Table 4.20 revealed that the total cost of cold storage owner was Tk. 866624.00 per month. The highest cost of cold storage owner was power and electricity cost which is Tk. 716655.65 per month and second highest cost was salary and wage cost which was 125000.00 per month. Among the other cost items, repair and maintenance, license fee, cold storage rent, cold storage charge (100kg), machine charge and others cost are Tk.20300.50, Tk.700.60, Tk.165.50, Tk.450.50, Tk.500.50 and Tk. 2850.75 respectively.

Table 4.20 Cost and margin analysis of cold storage owner

Cost items (Per month)	Tk./ Month
Salary and wage	125000.00
Power and electricity	716655.65
Repair and maintenance	20300.50
License fee	700.60
Cold storage rent	165.50
Cold storage charge (100 Kg)	450.50
Machine charge	500.50
Others	2850.75

Source: (Field survey, 2020)

Table 4.21 shows that the starting month of potato is 1st March and release month is November and the average capacity (100kg) of cold storage was 8366690.00 Kg. During production period the price of potato was Tk.950.00, during harvesting period price was Tk. 1050 and during the storage period price was Tk. 1175 (100Kg).

Table 4.21 Information of cold storage

Average capacity (Kg)	Month of storage	Month of release	Price before harvesting (Tk./100 Kg)	Price during harvesting (Tk./100 Kg)	Price during storage (Tk./100 Kg)
8366690	1 st March	November	950	1050	1175

Source: (Field survey, 2020)

Table 4.22 shows that the average storage amount of table potato of farmer was 1455520 Kg and seed potato was 3095520 Kg. The average storage amount of table potato of bepari and wholesaler was 2580000 Kg and 948840 Kg respectively.

Both the actors start their storage in the month of March and release in the month of November. The average cold storage charge was Tk. 438.50 (100Kg) for both value chain actors.

Table 4.22 Information on storage of different value chain actors

Actors	Table potato (Kg)	Seed potato (Kg)	Duration of the storage		Cost of storage (Tk. / 100Kg)
			Table potato	Seed potato	
Farmer	1455520	3095520	March to November	March to November	438.50
Bepari	2580000	–	March to September	–	438.50
Wholesaler	9488400	–	March to June	–	438.50

Source: (Field survey, 2020)

Table: 4.23 Value addition, marketing cost and net marketing margin of different market actors of potato

Actors	Value addition (Tk. per Kg)	Marketing cost (Tk. per Kg)	Net marketing margin (Tk. per Kg)
Faria	1.25	0.25	1.00
Bepari	2.15	1.72	0.43
Wholesaler	2.64	2.49	0.15
Retailer	2.15	1.08	1.07

Source: (Field survey, 2020)

Following two diagrams (**Figure 4.2 and Figure 4.3**) were made according to the above table (**Table 4.23**).

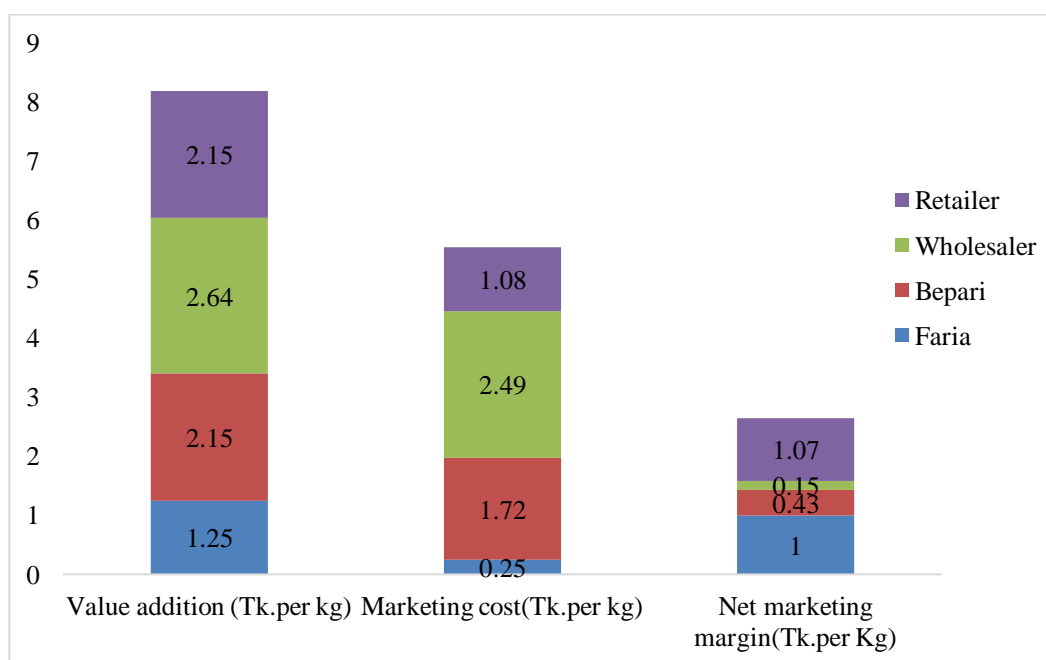


Figure 4.2: Value addition, marketing cost and net marketing margin of different market actors in potato marketing

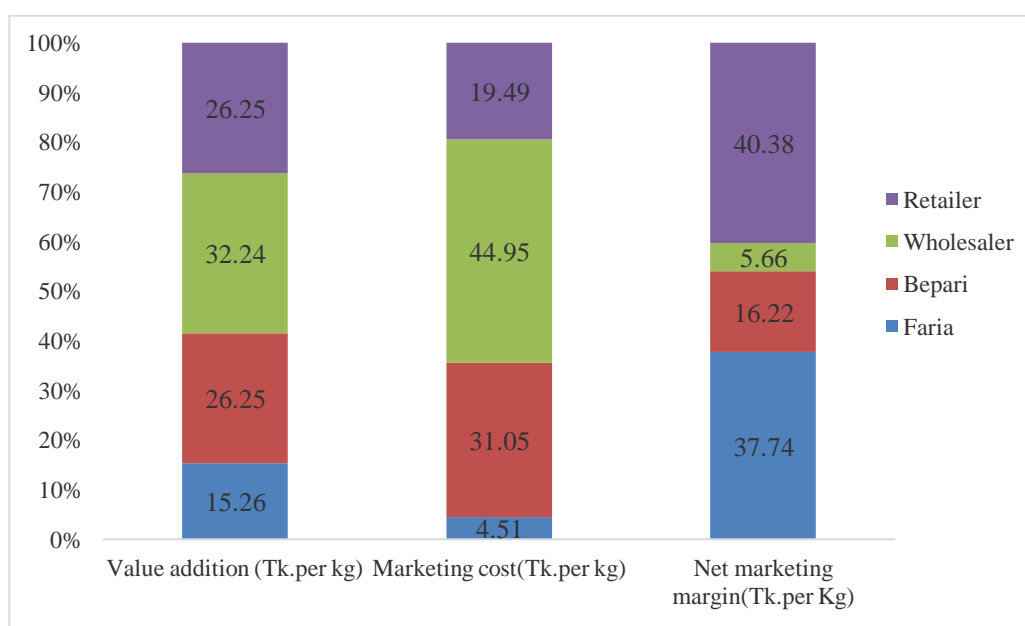


Figure 4.3: Share of different actors in value addition, marketing cost and net marketing margin of potato

Among the different actors, wholesaler incurred highest marketing cost but earning lowest net marketing margin, on the other hand faria incurred lowest (in percentage) marketing cost but earning second highest net marketing margin (near to highest net marketing margin (**Figure 4.2**)).

Figure 4.4 shows the potato value chain in Bangladesh. From this flow chart, different actors involved in potato value chain has been identified with their share. Here the center point is the producer of potato. Farmers sell potato at 1325.55 taka per 100kg after harvest. Here, the farmers added the highest value is 24.97%. Faria Bepari, wholesaler and Retailer added 9.41%, 14.68%, 15.65% and 10.97% Of value respectively.

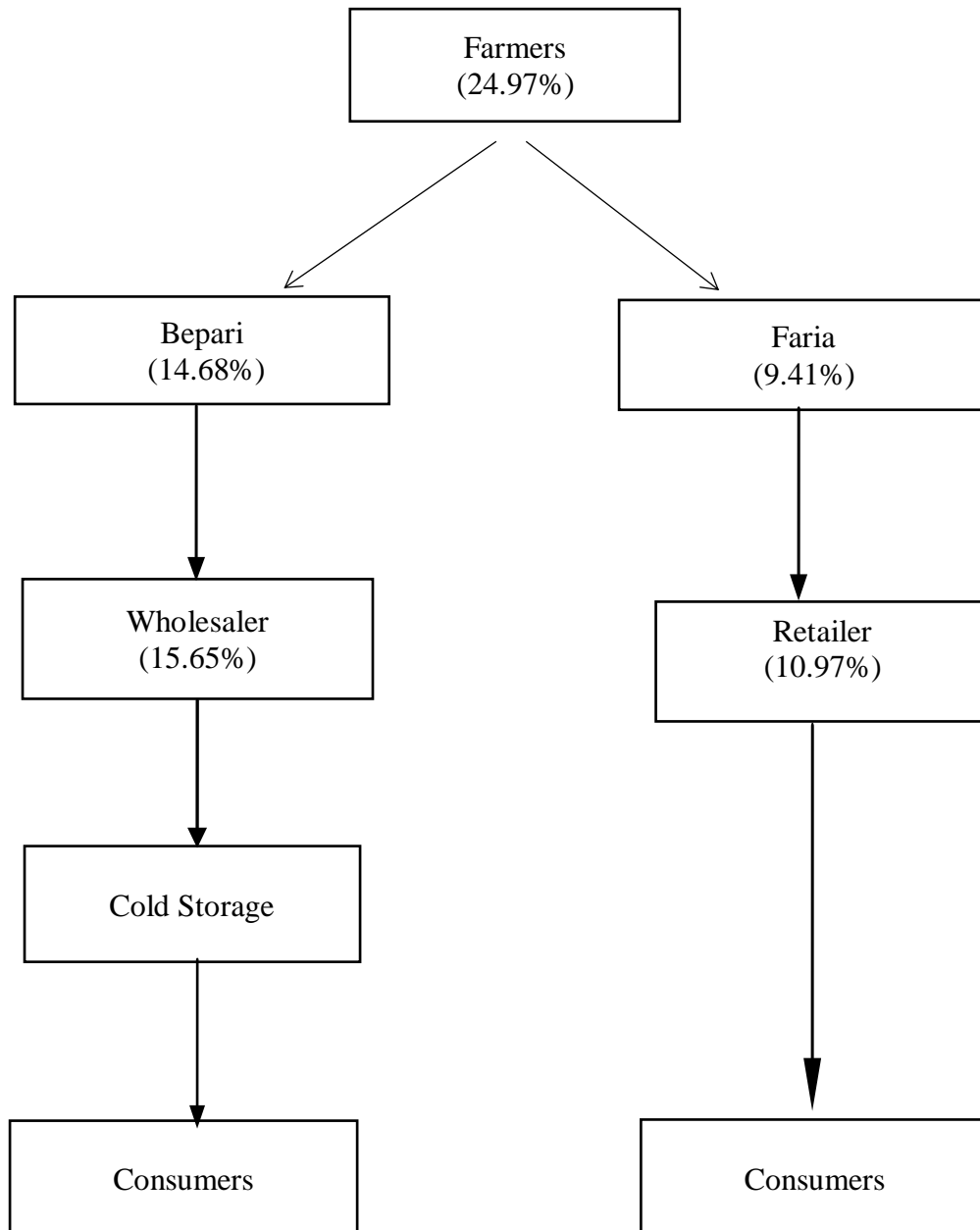


Figure 4.4: Value chain of potato

Source: (Field survey, 2020)

4.3 Seasonal price fluctuation of potato

The seasonal price fluctuation in prices results from seasonal demand, inadequate storage facilities and loss of staying power of the producers. Potato came on the market because of inadequate storage facilities, which created surplus on the market, resulting in a decline in price. A significant feature of the time series data is the seasonal fluctuation of values.

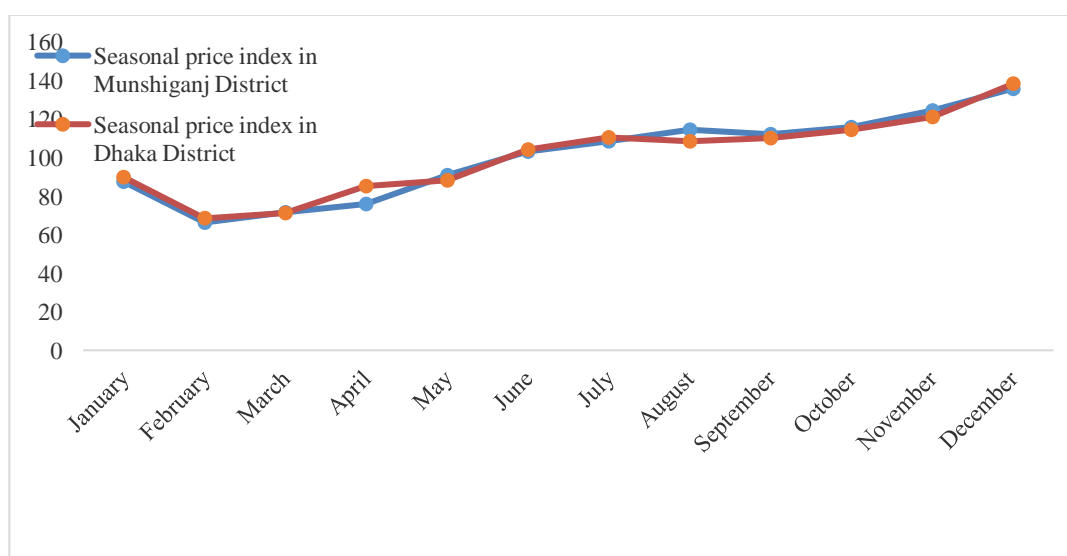
For the period from 2008 to 2018, monthly wholesale prices of potatoes were used in the Munshiganj and Dhaka markets to analyze seasonal price fluctuations. Table 4.25 indicates that the seasonal potato price index was the highest 135.80 in the district of Munshiganj and 138.30 in the district of Dhaka in December, and the lowest 66.33 in the district of Munshiganj and 68.45 in the district of Dhaka in February. By April, rates had begun to escalate and hit a peak in December. The price of potatoes remained low throughout the harvest period and then steadily increased until the start of the next harvesting period. The standard deviation between the Munshiganj and Dhaka markets (22.00, 20.62) is approximately the same which implies that the prices of potatoes in the Munshiganj and Dhaka districts were largely correlated during that time. Figure 4.5 indicates that seasonal price variation ranges by months are higher in Munshiganj than in most cases in the Dhaka market, but in the case of December, the seasonal price variation range in the Dhaka market is higher than in the Munshiganj market.

Table 4.24 Seasonal price variation of potato

Month	Seasonal price index in Munshiganj District	Seasonal price index in Dhaka District
January	87.50	89.93
February	66.33	68.45
March	71.46	71.35
April	75.98	85.27
May	90.85	88.35
June	103.17	104.08
July	108.44	110.49
August	114.30	108.40
September	112.25	110.05
October	115.72	114.52
November	124.45	120.98
December	135.80	138.30
Maximum value	135.80	138.30
Minimum value	66.33	68.45
Mean	105.2	100.85
Range	69.47	69.85
Standard	22.00	20.62

Source: (BBS, 2018)

Following diagram (**Figure 4.5**) was made according to the above table (**Table 4.24**).



Source: (BBS, 2018)

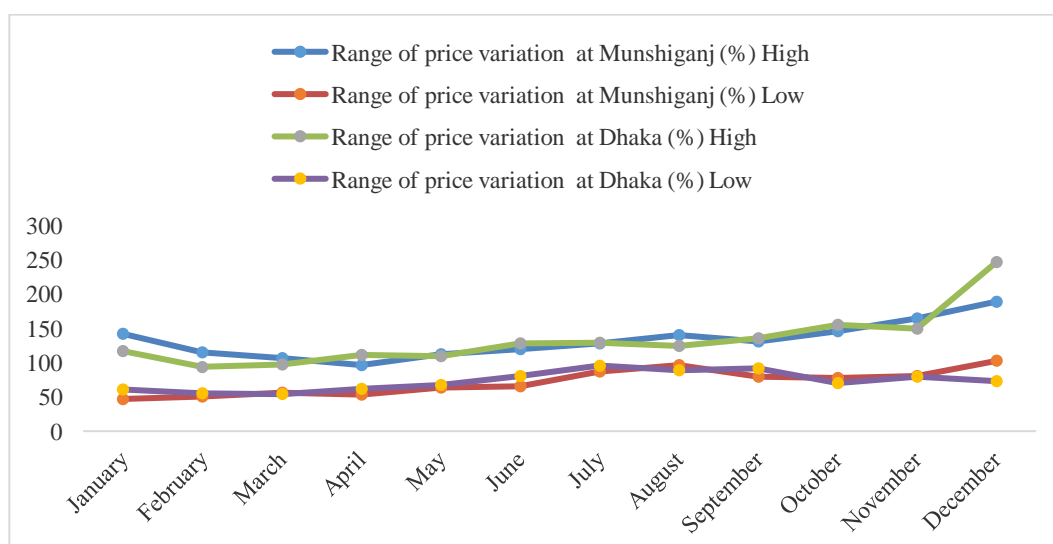
Figure 4.5: Seasonal price variation of potato

Table 4.25 Range of seasonal price variation of potato in Munshiganj and Dhaka market

Month	Range of price variation at Munshiganj (%)		Range of price variation at Dhaka (%)	
	High	Low	High	Low
January	141.95	46.85	116.35	60.75
February	114.75	49.98	93.76	54.68
March	106.67	55.68	97.52	53.83
April	96.24	53.25	111.22	61.85
May	111.65	63.15	109.26	66.78
June	119.20	65.70	127.67	79.81
July	127.75	86.83	128.76	95.57
August	139.77	95.73	124.30	88.29
September	130.67	79.35	135.49	91.88
October	145.31	77.43	155.19	69.61
November	164.68	80.73	149.46	79.75
December	188.74	102.35	246.29	72.97

Source: (BBS, 2018)

Following diagram (**Figure 4.6**) was made according to the above table (**Table 4.25**)



Source: (BBS, 2018)

Figure 4.6 Range of seasonal price variation of potato between Munshiganj and Dhaka market

In general, potato prices have been shown to fluctuate in various seasons. The causes of this fluctuation may be:

- a. Potato supplies end in November-December, especially in November, but demand remains unchanged and is also growing.
- b. The farmers also store seed potatoes throughout the season. So the price of table potato is beginning to increase.
- c. The explanation for the decline in potato prices in February is that the availability of potatoes was higher due to the harvesting season) than the demand for potatoes. Other winter crops are widely available at this period and the price of potato starts to decrease steadily.
- d. Storage costs also increase the cost of potatoes.

CHAPTER V
CONSTRAINTS FACED BY POTATO VALUE CHAIN
ACTORS

5.1 Problem faced by farmers

In the study areas of potato some major production problems faced by farmer.

Table 5.1 shows the constraints reported by farmer are presented bellow;

5.1 Constraint faced by farmers

Constraints	No. of farmer	Percentage
Inadequate capital	2	8
Lack of quality seeds and improved production technique	2	8
Inadequate knowledge and skills on soil, fertilizer, seeds and disease and pest management	1	4
Lack of knowledge of seed treatment	1	4
Inadequate knowledge on harvesting, post-harvest handling, storage and transportation	2	8
Prevalence of sales of poor quality and adulterated inputs (fertilizers and pesticides) by the input supplier	4	16
Inadequate knowledge and skills in adhering to the use of recommended pesticides	3	12
Higher transportation cost	2	8
Lower sales price of potato	3	12
Shortage of marketing information	2	8
Higher cold storage charge	3	12
Total	25	100

Source: (Field survey, 2020)

Table 5.1 shows that highest 16% of farmers described prevalence of sales of poor quality and adulterated inputs (fertilizers and pesticides) by the input supplier as major constraint of potato production.

On the other hand only 4% of farmers explained inadequate knowledge and skills on soil, fertilizer, seeds and disease and pest management and lack of knowledge of seed treatment as constraint of potato production.

5.2 Constraints faced by middlemen

In the study areas middlemen were mention the constraints they faced in potato marketing. Table 5.2 shows the constraints reported by middlemen are presented bellow;

5.2 Constraint faced by middlemen

Constraints	No. of Middlemen	Percentage
Inadequate capital	15	23.08
Higher transportation cost	20	30.77
Inadequate market information	5	7.70
Lack of poor marketing initiative and market linkages	10	15.38
Lack of adequate storage facilities	7	10.77
Higher cold storage charge	8	12.30
Total	65	100

Source: (Field survey, 2020)

Table 5.2 shows the constraints faced by the middleman in a potato value chain. It represents that highest 30.77% of middleman focus higher transportation cost constraint in marketing of potato. On the other hand only 7.70% of middleman reported inadequate market information as a problem of potato marketing.

CHAPTER VI

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 Summary

Potato is an important cash and multipurpose food crop of Bangladesh. Both the poor and wealthy people in Bangladesh use potatoes as food as well as vegetables. As a consequence, the capacity for addressing the country's persistent food crisis cannot be overlooked. Potato is cultivated for both sale and use as a cash crop. The attractive features of this crop are high yield, nutritious and palatable food products. A significant number of persons are interested in potato processing and marketing. In the supply chain of the potato marketing scheme, a variety of actor such as Faria, Bepari, wholesaler dealer and cold storage owner are involved. They played an important role in transferring potato to buyers, but the present study examines separate value chain at a sharper cost, in which the actors behaved with their costs and margins as intermediate. The study caused lights on the following specific objectives.

- a) To identify the socio-demographic condition of potato value chain actors;
- b) To estimate the value addition of potato by the actors in potato value chain
- c) To estimate seasonal price fluctuation of potato in study area
- d) To identify the constraints of potato marketing and give some recommendation to improve potato marketing in the selected area.

The research was limited to a small region where the production of potatoes was concentrated. The research was limited to three villages in the Munshiganj district of Sirajdikhan Upazila. In order to gather data from the potato farmers, the villages were purposively selected. The sample size of farmers was set at 25 from four villages for convenience. Out of the total 25 farmers, 10 from Bashaile, 10 from Bujarhati and 5 from Sofurchor village in Sirajdikhan Upazila. Data were also collected from some actors who worked in the valuation of marketing of potato in study areas. The actors involved in the marketing of potato included Faria, Bepari, wholesalers, retailers and cold storage owners. A total of 65 actors including 15 Faria, 15 Bepari, 15 wholesalers from Sirajdikhan Upazila and 20 retailers from Munshiganj sadar in some selected primary markets were selected purposively for the study.

For the present study, five cold storage plants representing approximately 20% of the total number of cold storage plants located in the study area were chosen using basic random sampling techniques. Using different interview schedules, primary data was obtained from the respondent farmers and various actors. Secondary data was obtained from numerous books, journals, various organizations such as Bangladesh's Department of Agricultural Marketing, internet scan, and publications of the government. For analyzing data, both tabular and descriptive methods were used.

Considering that potato is an important vegetable in Bangladesh, the product moved from the sellers to consumers through several changes i.e. through some market actor such as Faria, Bepari, wholesalers and retailers, since potato needs to move a long distance from the point of production to the consumers.

In Sirajdikhan Upazila, potato are transported through five different chains from the hands of farmers to the hands of consumers. The lengthiest publicity chain is chain III. The key marketing players in this chain were the producers, Faria, Bepari, wholesaler, distant wholesaler and retailer who conducted functions of value addition and took a portion of marketing as their potato.

Grading was performed by farmers and actors, often on the basis of visual estimation, depending on the size and consistency of the object. Much of the farmers and actors are self-financed for both production and operations in the supply chain. Farm gate price of potato received by farmers per 100 Kg was Tk. 1080.53 and highest purchase price per 100 Kg of potato paid by retailers was Tk. 1960.00. Highest sales price per 100 Kg of potato as received by retailer was Tk. 2175.00 and the lowest sales price as received by farmers was Tk. 1325.55. Interest on operating capital for farmer was Tk. 5.85 per 100 kg of potato. Gross return, gross margin and net return received by farmer per 100 kg of potato was Tk. 1325.55, Tk. 1051.92 and Tk. 451.53, respectively.

Highest average transaction of potato received by wholesaler was 7500 kg per day and lowest average transaction of potato received by retailer was 120 kilogram per day. Highest marketing cost received by wholesaler was Tk. 249 per 100 Kg of potato and lowest marketing cost received by Faria per 100 Kg of potato was Tk. 25.00. On an average highest storage cost per 100 Kg of potato for wholesaler was Tk. 62.70 per month and lowest storage cost per 100 Kg of potato for farmer was Tk. 51.40 per month.

Among the value addition highest value added by wholesaler per 100kg of potato was Tk. 264.00 of total value addition and lowest value added by Faria per 100 Kg of potato was Tk.125.00 of total value addition. As a percentage form of value addition highest value added by wholesaler was 15.65% and lowest value added by Faria was 9.41% of the total value addition.

Seasonal price fluctuation of potato was more prominent than that of many other field crops. During the peak harvest season, the price becomes very low while it becomes too high before the planting period. Frequent undue price changes have produced market price volatility and increased risks in both the production of potatoes and the potato industry. There was a reasonably correlated relation between the price fluctuations of potatoes in Munshiganj and the Dhaka market.

There were several problems facing farmers in the cultivation and marketing of potatoes in the two study areas. Lack of resources, scarcity of good quality crops, disease and pest attack, lack of sufficient input supply, low potato prices, transportation issues, shortage of market facilities, high shift in cold storage, shortage of storage facilities and the domination of players in the value chain were the main problems they faced.

The analysis established several big problems in the potato value chain faced by the actors. Lack of funds, unavailability of credit, high interest rates, poor communication facilities, low prices, lack of storage facilities, high storage charges and insufficient marketing facilities were the main problems faced by them.

The owners of cold storage in the sample area faced several difficulties in the management of their operations. Inadequate money, high interest rates on loans, uncertainties about the availability of electricity and income tax payments were all too high for the big obstacles they faced. As a result, details about their debts and taxes is avoided.

6.2. Conclusion

For the growth and sustainability of the agricultural sector, as well as for Bangladesh's national economy, potatoes are extremely important. It contributes directly to the nation's job growth, food security, and education and poverty alleviation. In the last decades, potato has seen a notable advancement despite minimal ability and abilities. However the government has not adequately recognised its contribution and its value to the private sector. Any initiatives related to technological and managerial expertise, input supplies, business and technology knowledge and certain policy concerns are desperately required to harness the value of this significant crop. In the foregoing sections of this report, an intensive investigation and analysis of the supply and value chains of potatoes has been carried out and constraints, service provisions to remove these constraints and potential service providers are also identified. Based on the findings, some important priority business development services are to be undertaken for development of potato industries in Bangladesh. An integrated private and public collaboration strategy will offer major changes to this sub-sector.

6.3. Recommendation

There are many problems in the potato production and marketing, here some probable solutions are discussed,

- Different financial organization and government can provide capital facilities, adequate input facilities, and adequate market information in the selected areas to increased production and marketing of potato in Bangladesh. Low cost storage facilities should be developed at the primary and secondary market by the government to provide storage of farmers.
- Government can insist of transportation to improve the communication system in the study area which will help to increase marketing efficiency by lowering the transportation cost.

REFERENCES

- Akalu, A. W. (2007). Vegetable market chain analysis in Amhara National Regional State: the case of Fogera woreda, South Gondar zone (Doctoral dissertation, Haramaya University).
- Akhter, G. M. (1973). Marketing of Potato in some Selected Areas of Comilla Kotwalli Thana. M. S. Thesis submitted to the Department of Cooperation Marketing, Bangladesh Agricultural University, Mymensingh. Bangladesh.
- Akhter, M. E. M. S., Ali, Z. N., Huq, A. K. M. A., Habib, M. A., and Hossain, A. B. S. (1998). Granula, Cleopatra and Binella New Potato Varieties in Bangladesh. *Progressive Science*, **24**(1):133-143.
- Anandajayasekeram, P. and Berhanu, G. (2009). Integrating innovation systems perspective and value chain analysis in agricultural research for development: implications and challenges. Improving Productivity and Market Success (IPMS) of Ethiopian farmers project working paper 16. ILRI (International Livestock Research Institute), Nairobi, Kenya.
- Ayelech, T. (2011). Market chain analysis of fruits for Gomma woreda, Jimma zone, Oromia National Regional State. Unpublished M. S. Thesis, Haramaya University.
- Bammann, H. (2007). Participatory value chain analysis for improved farmer incomes, employment opportunities and food security. *Pacific Economic Bulletin*, **22**(3):125.
- BBS. (2015). Year book of Agricultural Statistics of Bangladesh, Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.
- Berg, C., Bercher-Hiss, S., Fell, M., Hobinka, A., Müller, U., & Prakash, S. (2006). Poverty Orientation of Value Chains for Domestic and Export Markets in Ghana. Albrecht Daniel Thaer-Institut für Agrar-und Gartenbauwissenschaften.

- Bongiwe, G. and Masuku, M. B. (2012). Factors affecting the choice of marketing channel by vegetable farmers in Swaziland. Canadian Center of Science and Education. *Sustainable Agriculture Research*, **2**(1):123.
- Bryceson, K. and Kandampully, J. (2004). The balancing act: "E" issues in the Australian Agri-Industry sector.
- Cramers, L. and Jensen, W. (1982). Agricultural economics and agribusiness, 2nd Edition McGraw Hill Book Company, USA. 222p.
- Dendena, G., Lema, E. and Belay, L. (2009). Fresh mango value chain analysis in Arbamincharea. Organization of value chain competency. Addis Ababa, Ethiopia.
- Dillon, J. L. and Hardaker, J. B. (1993). Farm Management Research for Small Farmer Development, FAO, Rome, Italy.
- Emana, B. (2008). Value chain analysis of horticultural crops in Kombolcha districts of eastern Oromia Region, Ethiopia. A study conducted for Action Aid Ethiopia, Addis Ababa.
- Fakhrul Islam, S. M., Mazharul Anwar, M. and Manos, B. (2000, September). Potato production system in Bangladesh: resource use, productivity, efficiency and comparative profitability of true potato seed technology over traditional tuber technology. In *XIVth International Symposium on Horticultural Economics* **536**:261-268).
- Ferto, I. and Szabo, G. G. (2002). Vertical Co-ordination in Transition Agriculture: a Hungarian Cooperative Case Study (No. MT-DP-2002/10). IEHAS Discussion Papers.
- Gereffi, G. (1999). A commodity chains framework for analyzing global industries. *Institute of Development Studies*, **8**(12):1-9.
- Getachew, N. (2009). Honey market chain analysis: The case of Burie district, West Gojjam zone, Amhara National Regional State (Doctoral dissertation, M. S. Thesis, Haramaya University, Haramaya, Ethiopia).

- Hajong, P. (2011). Marketing and Storage System of Potato in Some Selected Areas of Rangpur District. M. S. Thesis, submitted to the Department of Agribusiness and Marketing, Bangladesh Agricultural University, Mymensingh. Bangladesh.
- Haque, M. A., Miah, M. M., Hossain, S. and Rahman, M. M. (2012). Profitability of BARI released potato (*Solanum tuberosum* L.) varieties in some selected locations of Bangladesh. *Bangladesh Journal of Agricultural Research*, **37**(1): 149-158.
- Holloway, G. and Ehui, S. (2002). Expanding market participation among smallholder livestock producers: A collection of studies employing gibbs sampling and data from the Ethiopian highlands. Socio-economic and Policy Research working paper 48. ILRI, Nairobi, Kenya. 85p.
- Holt, M. T. (1993). Risk response in the beef marketing channel: A multivariate generalized ARCH-M approach. *American Journal of Agricultural Economics*, **75**(3): 559-571.
- Hossain, A. M. J. (2004). Potato Marketing in a Selected Area of Bogra District. M. S. Thesis, submitted to the Department of Cooperation and Marketing, Bangladesh Agricultural University, Mymensingh. Bangladesh.
- Hossain, M. A. (2016). Value chain analysis of potato in selected areas of Bogra and Munshigonj districts of Bangladesh (Doctoral dissertation, BRAC University).
- Hossain, M. A. (2016). Value chain analysis of potato in selected areas of Bogra and Munshigonj districts of Bangladesh (Doctoral dissertation, BRAC University).
- Islam, M. T. (1987). An Economic Study of Potato Preservation in Cold Storage in Some Selected Areas of Bangladesh. Unpublished M. S. Thesis Submitted to the Department of Cooperation and Marketing, Bangladesh Agricultural University, Mymensingh, Bangladesh.

- Jari, B. and Fraser, G. C. G. (2009). An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat River Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Research*, 4(11):1129-1137.
- Kaplinsky, R. and Morris, M. (2000). A handbook for value chain research, IDRC. Ottawa, Canada.
- Kaplinsky, R. and Morris, M. (2001). A handbook of value chain analysis. Working paper prepared for the IDRC, Institute for Development Studies, Brighton, UK.
- Kawsar, K. M. (2001). An Economic Analysis of Diamant Potato Production in Some Selected Areas of Bangladesh. M.S. Thesis, submitted to the department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.
- Kohls, R. and Uhl, N. (1985). Marketing of agricultural products. 5th Edition. McMillian Publishing Company, New York, USA.
- Kotler, P. and Armstrong, G. (2003). Principle of marketing, 10th Edition. Hall of India Pvt. Ltd. New Delhi. pp 5-12.
- Mamo, G. (2009). Choice of marketing channels and transaction costs: The case of maize marketing in Shashemene District. M.S. Thesis presented to the School of Graduate Studies, Addis Ababa University. 74p.
- Mamo, G. and Abebaw, D. (2012). Patterns and determinants of livestock farmers' choice of marketing channels: micro-level evidence. Ethiopian Economics Association, Addis Ababa, Ethiopia. P55.
- Mendoza, G. (1995). A premier on marketing channel and margins. Lyme Rimer Publishers Inc., USA.
- Meyer-Stamer, J. and Waltring, F. (2006). Value chain analysis and 'making markets work for the poor'(m4p): Poverty reduction through value chain promotion. Eschborn, German Agency for Technical Cooperation (GTZ).

- OECD (Organization for Economic Cooperation and Development), (2006). Promoting pro-poor growth – Private Sector Development. Paris.
- Ponte, S. (2002). The late revolution? Regulation, markets and consumption in the global coffee chain. *World Development*, **30** (7):1099-1122.
- Raikes, P., Jensen, M. and Ponte, S. (2000). Global commodity chain analysis and the Frençfilière approach: comparison and critique. *Economy and Society*, **29** (3): 390-418.
- Rao, E. J. and Qaim, M. (2011). Supermarkets, farm household income, and poverty: insights from Kenya. *World Development*, **39**(5):784-796.
- Reardon, T., Chen, K., Minten, B. and Adriano, L. (2012). The quiet revolution in staple food value chains: enter the dragon, the elephant, and the tiger. Asian Development Bank.
- Sabur, S. A. (1986). Production and Price structure of Potato in Bangladesh. *Bangladesh Journal of Agricultural Economics*, **9**(1):1-15.
- Sabur, S. A. and Gangwar, A. C. (1984). Production and Price structure of Potato in Bangladesh, *Indian Quarterly Journal of agricultural Marketing*, **26**(4):10-16.
- Saiyem, M. A. (2007). “Marketing System and Price Behaviour of Potato in Selected Areas of Rangpur District. M.S. Thesis, submitted to the Department of Cooperation and Marketing, Bangladesh Agricultural University, Mymensingh. Bangladesh.
- Saklayen, M. G. (1990). Marketing of Potato in Some Selected Areas of Munshigonj District.
- Sarkar, S. C. (1990). “Marketing of Potatoes in Some Selected Areas of Naogaon Sadar Upazilla”. M.S. Thesis, submitted to the Department of Cooperation and Marketing, Bangladesh Agricultural University, Mymensingh. Bangladesh.

- Scarborough, V. and Kydd, J. (1992). Economic analysis of agricultural markets. A manual of marketing series 5, Chatham, UK: Natural Resource Institute: 172p.
- Smith, L. D. (1992). Costs, margins and returns in agricultural marketing. FAO.
- USAID (United States Agency for International Development), (2005). Global horticultural assessment, USA.
- William, G. and Robinson, L. (1990). Agricultural Product Prices. Cornell University Press, 3rd edition, Ithaca and London.
- Wolday, A. (1994). Food grain marketing development in Ethiopia after reform (1990). A case study of AlabaSiraro. PhD Dissertation Presented to Verlag Koster University, Berlin 293p.
- Fitter, R. and Kaplinksy, R. (2001). Who gains from product rents as the coffee market becomes more differentiated? A value-chain analysis. *IDS bulletin*, **32**(3):69-82.

APPENDIXES

Appendix-I

Interview Schedule

A. Interview Schedule for Farmer

Serial No: Date:

1. Area:

District:.....Upazila:.....

Union/Pourashava..... Village/Road:.....

2. Family size.....

3. Educational Qualification (put \checkmark mark):

Illiterate Primary Secondary Higher Secondary Above degree

4. Identification of land:

Types of land	Area (Decimals)
Owned Cultivated	
Taken for share cropping	
Rented in	

5. Experience of potato cultivation..... Years

6. Have you got training on potato cultivation? (Put \checkmark mark):

Yes No

If 'Yes', how many times?.....

7. What is the source of potato seeds? (Put \checkmark mark):

Open market (01) Neighboring farmer (02) Own stock (03)

Seed selling center (04) BADC\BADC dealer (05) BARI (06)

6. Cost of potato's cultivation

Cost Items	Cost (Tk./100 kg)
<u>Variable Cost</u>	
1.Land Preparation	
2. Seed	
3. Family Labor	
4. Hired Labor	
5 .Organic Manure	
6 .Chemical Fertilizer	
7.Insecticides	
8.Weeding and earthing-up	
9. Irrigation	
10. Other cost	
<u>Fixed Cost</u>	
1.Rented value of land	
2.Interest on operating capital	

7. After Production cost:

Cost Items	Cost (Tk./100kg)
1. Grading, washing, sorting	
2. Transportation cost	
3. Loading and unloading	
4. Market toll	
5. Personal expense	
6. Unofficial payment	
7. Cold storage charge.	

8. Problem face by potato farmer:

9. Solutions:

10. Production of fresh potato in this year (Kg.):

Signature:

Date:

B. Interview Schedule for Cold Storage Owner

Serial No:

Date:

1. Location of Cold Storage Owner

District:.....Upazila:.....

Union/Pourashava..... Village/Road:.....

2. (a) Relation with cold storage :(Put√ mark):

Own Manager Supervisor Staff

(b) Relevant experience of cold storage management.....year

3. Educational qualification: (Put √ mark)

Illiterate Primary Secondary Higher Secondary Above degree

4. Have you got training on cold storage management? (Put √ mark):

Yes No

If “Yes”, how many times?

5. When did you start your business?

7. Statement of monthly average operating cost (Tk.):

Cost Items	Cost
1. Salary and wage	
2. Power and electricity	
3. Repair and maintenances	
4. License fee	
5. Cold storage rent	
6. Others	
7. Cold storage charge (100 Kg)	

8. Average capacity of your storage:

9. Month of storage:

10. Month of release:

11. Price before harvesting:

12. Price during harvesting-

13. Price during storage -

14. Problem about your storage -

15. Probable solution-

Signature:

Date:

C. Interview Schedule for Faria

Serial No:

Date:

1. Location of faria:

District:.....Upazila:.....

Union/Pourashava..... Village/Road:.....

2. Educational qualification of faria (Put \surd mark):

Illiterate Primary Secondary Higher Secondary Above degree

3. When did you start your business?

4. Does the price vary for different sellers? (Put \surd mark):

Yes No

5 Cost of Potato Purchase (Farmer / Faria / wholesaler):

Cost Items	Cost
1. Personal expence	
2. Market toll	
3. Mobile charge	
4 Unofficial expresses	
5. Sales price	
6. Others	

7. Where do you sell your potato?

8. How do you set selling price?

a) Purchase + cost + fixed amount of profit

b) Price set by government

c) Market price

d) Others

9. Are you involved in storing? (Put√ mark):

Yes No

10. How much times do you store potato?

11. What are the main problems of your business?

12. What are the solutions?

Signature:

Date:

D. Interview Schedule for Bepari

Serial No:

Date:

1. Location of bepari:

District:.....Upazila:.....

Union/Pourashava..... Village/Road:.....

2. Educational qualification bepari: (Put√ mark):

Illiterate Primary Secondary Higher Secondary Above degree

3. When did you start your business?

4. From where do you buy potato? (Put √ mark):

Farmer Faria W.S Aratdar

5. Does the price vary for different sellers? (Put√ mark):

Yes No

6. Cost of Potato Purchase (Farmer / Faria/ wholesaler):

Cost Items	Cost
1. License	
2. Loading and unloading	
3. Transportation	
4. Storage cost	
5. Market cost	
6. Grading	
7. Mobile charge	
8. Personal expenses	
9. Unofficial express	
10. Sales price	
11. Others	

7. Where do you sell your potato?

8. How do you set selling price?

a) Purchase + cost + fixed amount of profit

b) Price set by government

c) Market price

d) Others

9. Are you involved in storing? (Put \sqrt mark):

Yes No

10. How much times do you store potato?

11. What are the main problems of your business?

12. What are the solutions?

Signature:

Date:

E. Interview Schedule for Wholesaler

Serial No:

Date:

1. Location of wholesaler:

District:.....Upazila:.....

Union/Pourashava..... Village/Road:.....

2. Educational qualification of wholesaler (Put \checkmark mark):

Illiterate Primary Secondary Higher Secondary Above degree

3. When did you start your business?

4. From where do you buy potato? (Put \checkmark mark):

Farmer Faria W.S Aratdar

5. Does the price vary for different sellers? (Put \checkmark mark):

Yes No

6. Cost of Potato Purchase (Farmer / Faria / wholesaler):

Cost Items	Cost
1. License	
2. Loading and unloading	
3. Transportation	
4. Storage cost	
5. Market cost	
6. Grading	
7. Mobile charge	
8. Personal expenses	
9. Unofficial expresses	
10. Sales price	
11. Others	

7. Where do you sell your potato?

8. How do you set selling price?

a) Purchase + cost + fixed amount of profit

b) Price set by government

c) Market price

d) Others

9. Are you involved in storing? (Put \surd mark):

Yes No

10. How much times do you store potato?

11. What are the main problems of your business?

12. What are the solutions?

Signature:

Date:

F. Interview Schedule for Retailer

Serial No:

Date:

1. Location of Retailer:

District:Upazila:

Union/Pourashava..... Village/Road:

2. Educational qualification: (Put√ mark):

Illiterate Primary Secondary Higher Secondary Above degree

3. When did you start your business?

4. From where do you buy potato? (Put √ mark):

Farmer Faria W.S Aratdar

5. Does the price vary for different sellers? (Put√ mark):

Yes No

6. Cost of Potato Purchase (Farmer/ Faria/ wholesaler):

Cost Items	Cost
1. License	
2. Loading and unloading	
3. Transportation	
4. Storage cost	
5. Market cost	
6. Grading	
7. Mobile charge	
8. Personal expenses	
9. Unofficial express	
10. Sales price	
11. Others	

7. Where do you sell your potato?

8. How do you set selling price?

a) Purchase + cost + fixed amount of profit

b) Price set by government

c) Market price

d) Others

9. Are you involved in storing? (Put $\sqrt{\quad}$ mark):

Yes No

10. How much times do you store potato?

11. What are the main problems of your business?

12. What are the solutions?

Signature:

Date:

Appendix Table 1. Acreage, production and yield of potato in Bangladesh during the period from 1995-96 to 2012-18

Year	Acreage ('000 ha)	Production ('000 tons)	Yield (quintal /ha)
1995-96	132.3	1492	112.8
1996-97	133.9	1508	112.5
1997-98	136.4	1553	114
1998-99	244.8	2762	112.8
1999-00	243.2	2933	120.6
2000-01	248.9	3216	129.2
2001-02	237.5	2994	126
2002-03	245.2	3386	138
2003-04	270.7	3908	144.2
2004-05	326.2	4856	149
2005-06	301.1	4161	164.9
2006-07	345.2	5167	149.7
2007-08	401.8	6648	165.5
2008-09	395.4	5268	133.2
2010-11	1137	8326	103.77
2011-12	1063	8206	102.55
2012-13	1165	9210	123.55
2013-14	1206	9509	135.30
2014-15	1226	9633	136.35
2016-17	1236	10489	142.45
2017-18	1235	9973	134.65

Source: (BBS, 2018)

Picture of collecting the survey data

