VALUE CHAIN ANALYSIS OF POTATO IN SOME SELECTED AREAS OF PANCHAGARH DISTRICT IN BANGLADESH

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VALUE CHAIN ANALYSIS OF POTATO IN THE SELECTED AREASOF THAKURGAON DISTRICT IN BANGLADESH

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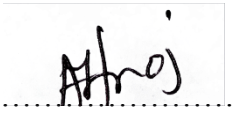

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CERTIFICATE

This is to certify that the thesis entitled **"VALUE CHAIN ANALYSIS OF POTATO IN THE SELECTED AREAS OF PANCHAGARH DISTRICT IN BANGLADESH"** submitted to the department of Agribusiness and Marketing, Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Sher-e- Bangla Nagar, Dhaka in partial fulfilment of the requirements for the degree of Master of Science (MS) in, Agribusiness and Marketing embodies the result of a piece of bona fide research work carried out by **MD MAHABUB ALAM, Registration No. 14-05848** 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, as has been availed of during the course of this investigation has been duly acknowledged by the Author.

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Dedicated To
My
Beloved Parents

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The Author

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ABSTRACT

Potato is one of the most important cash crops in Bangladesh, and the district of Panchagarh is one of the major potato producing areas in the country. The objective of this study was to analyze the value chain of potato in some selected areas of Panchagarh district, including the profitability, value addition, marketing cost, and net marketing margin of different actors in the chain. To achieve these objectives, a structured questionnaire was used to interview 25 farmers, 65 middlemen, and 5 cold storage owners from February to April 2023. The data collected were analyzed using profitability analysis, regression analysis, and moving average method. The findings of this study revealed that the sales price of potato varied significantly between different actors in the value chain. The highest sales price per 100kg of potato was received by the retailer at Tk.2225.00, while the lowest sales price was received by the farmer at Tk.1625.55. The value addition by different actors in the chain varied from 9.25% to 25.70%, with the wholesaler having the highest value addition. The marketing cost of the value chain actors varied from 4.51% to 45.90%, with the wholesaler incurring the highest marketing cost. The net marketing margin of different actors in the chain also varied significantly, ranging from 6.65% to 47.45%, with the retailer having the highest net marketing margin. In addition, the seasonal price fluctuation analysis showed that the price of potato was significantly lower during the peak harvesting period, while it was much higher before the planting period. Moreover, the study found that proper credit facilities should be ensured for the value chain actors, as this was mentioned by the highest number of respondents. The study provides valuable insights into the value chain of potato in Panchagarh district, and highlights the need for policies and interventions to improve the profitability and efficiency of the value chain.

CHAPTER I

INTRODUCTION

1.1 Background of the study

Bangladesh is an agrarian based country where more than 70% of people reside in rural areas and 77% of the working force is employed therein. About 87 % of rural households in Bangladesh rely at least partially on agriculture for their income, with two-thirds of those in remote rural areas and nearly half of all employees in Bangladesh directly employed by the sector (Rahman, 2017). In agriculture sector potato is a vital and main staple crop of the world and occupies the topmost position after rice and wheat in recognition of production intake (Akhter et al., 1998). Bangladesh skilled plenty of progress in its potato manufacturing in the past long time because it has extended by means of five% in keeping with annum (Fakhrul Islam et al., 2000). The usa has ranked seventh function inside globally in phrases of potato production in 2015 (FAO, 2015). In 2014-15, around 92,54,000 metric lots of potatoes were made from four 71,000 hectares (three.09% of general cultivated place) of land in Bangladesh (B.B.S, 2015). In FY 2021-22 total area under potato crop is 4,64,011 hectares, which was 4,68,680 hectares in FY 2020-21. The volume is 0.996% lower than last year. The total production of potato crop in FY 2021-22 was 101,44,835 MT, which was 98,87,242 MT in FY 2020-21. The yield is 2.61% higher than last year (B.B.S, 2022). Among all crops, potato (*Solanum tuberosumL.*) is one of the maximum essential veggies in addition to cash crops in Bangladesh (Miah et al., 2012). In Bangladesh, in keeping with capita, potato consumption is 23 kg in Bangladesh, 32 kg in China and 15 kg in India (Reardon & Chen, 2012). With the appearance of modern-day technology, the relatively high yield and occasional value of crop production may have given farmers an opportunity to boom in the vicinity in addition to the manufacturing of potatoes, as a consequence elevating the marketable surplus of potatoes in Bangladesh. However, farmers do now not get precise costs due to a lack of adequate garages and advertising centers; even frequently, they do now not have the funds to get better the cost of manufacturing. Owing to the shortage of garage centres and coins necessities, the farmers ought to sell lots of their goods directly after harvesting at a very low price. Farmers will need to promote potatoes in maximum potato-growing regions of Bangladesh at a totally low rate at peak harvest time. On the opposite hand, potato charges had been found to be very high at some point in the off-season and additionally inside the peak season in some areas. If farmers

no longer sell their produce at an incentive price, they're likely to stop their production, which can have a negative effect on us of a's financial system. So, for the sake of both farmers and customers, it's miles very important to make the marketplace a success. Potato fee chain research can be conducted to discover the one-of-a-kind issues related to potato improvement and advertising and marketing issues and to assist in perceiving probable solutions.

The cutting-edge studies pursuits to apprehend the major gaps in existing potato production and advertising methods to be able to perceive interventions for sustainable product development and value-added activities.

It is broadly believed that potato growers do not get an honest fee because of a lack of storage centres, lifestyles of centre men, transportation centres, and the shortage of right marketing statistics and urgent requirement of cash at once after the harvesting of potatoes via the farmers. Because of its semi-perishable life, which contributes to the submit-harvest marketplace glut, the seasonal nature of potatoes is considerably laid low with the farmer's incapacity to depend upon them. In order to boost up and hold potato production and, as a consequence, foster agricultural increase within the area, there is a clear want for an effective marketing gadget. Performance in promoting providers whose position is crucial to the benefit of the last patron.

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 actor adds 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 assess the socio-demographic profiles of individuals involved in the potato value chain;

- To evaluate the value-added activities carried out by participants within the potato value chain;
- To examine the seasonal price fluctuations of potatoes within the study area and
- To pinpoint the challenges within the potato marketing system and provide recommendations for improvement.

1.4 Justification of the study

The discipline of manufacturing and yield has been boosted via growing crop productivity due to the creation of the latest high-yielding varieties and advanced production and submit-harvest era over many, many years. However, due to the lack of demand-pushed new processing technology, the dearth of good enough garage and advertising facilities does not provide farmers with a reasonable fee, especially since they cannot offer enough resources to recover the fee of manufacturing.

Owing to the shortage of storage centers, farmers will sell lots of their produce at a very low charge without delay after harvesting.

On the other hand, potato charges may be very high in a few locations all through the off-season and additionally in the top season, which can have a bad impact on the financial system.

Thus, for the sake of each farmer and client, it's far very essential to make the market a success. Some research was performed on potato advertising and marketing systems and delivery chain evaluation. Additionally, a completely few studies have been completed on the price chain of potatoes; however, none focused on the potato price chain in the Panchagarh district in Bangladesh. Thus, it might have become aware of to paintings in this place.

CHAPTER II

REVIEW OF LITERATURE

The statistics to be had inside the literature belong to the primary ideas of price chain, guiding ideas of agricultural value chains, the benefit of value chain in the agricultural area, markets and advertising and marketing, marketplace channel, marketplace overall performance, measuring fee chain, growing price chain toward the gain of the bad, value chain governance and upgrading of fee chains and status of potato production and advertising of potato in Bangladesh were reviewed and offered in this section. In Bangladesh, potato production and marketing is an important sector, with significant potential for growth and development. However, there are also a number of challenges and constraints that need to be addressed, including limited access to markets and credit, poor infrastructure, and low levels of productivity. Efforts to address these challenges may involve a range of interventions, such as improving market linkages, supporting small-scale farmers, and investing in infrastructure and technology. Overall, understanding the key concepts and principles of agricultural value chains is essential for policymakers, practitioners, and researchers working in this field. By adopting a value chain approach, it is possible to identify opportunities for growth and development, while also addressing some of the challenges and constraints that can limit progress.

2.1 Potato value chain analysis

A value chain comprises actors (or stakeholders) from enter suppliers, producers, and processors, to exporters and buyers engaged in the sports required to carry agricultural products from their concept to their stop use (Kaplinsky & Morris, 2000),(Bammann, 2007) has recognized three crucial ranges of the value chain. Potato value chains cover all activities from input supply, production, processing, wholesale and retailing to the final consumer (Tadesse & Bakala, 2018).

i. Value chain actors: The chain of actors who at once deal with the goods, i.E. Produce, manner, change, and own them.

ii. Value chain supporters: The services supplied by various actors who in no way at once deal with the product, however, whose services upload price to the product.

iii. Value chain influencers: The regulatory framework, guidelines, infrastructures, etc.

According to Anandajayasekeram and Berhanu (2009), price addition results from numerous activities, which include bulking, cleaning, grading, packaging, transporting, storing, and processing.

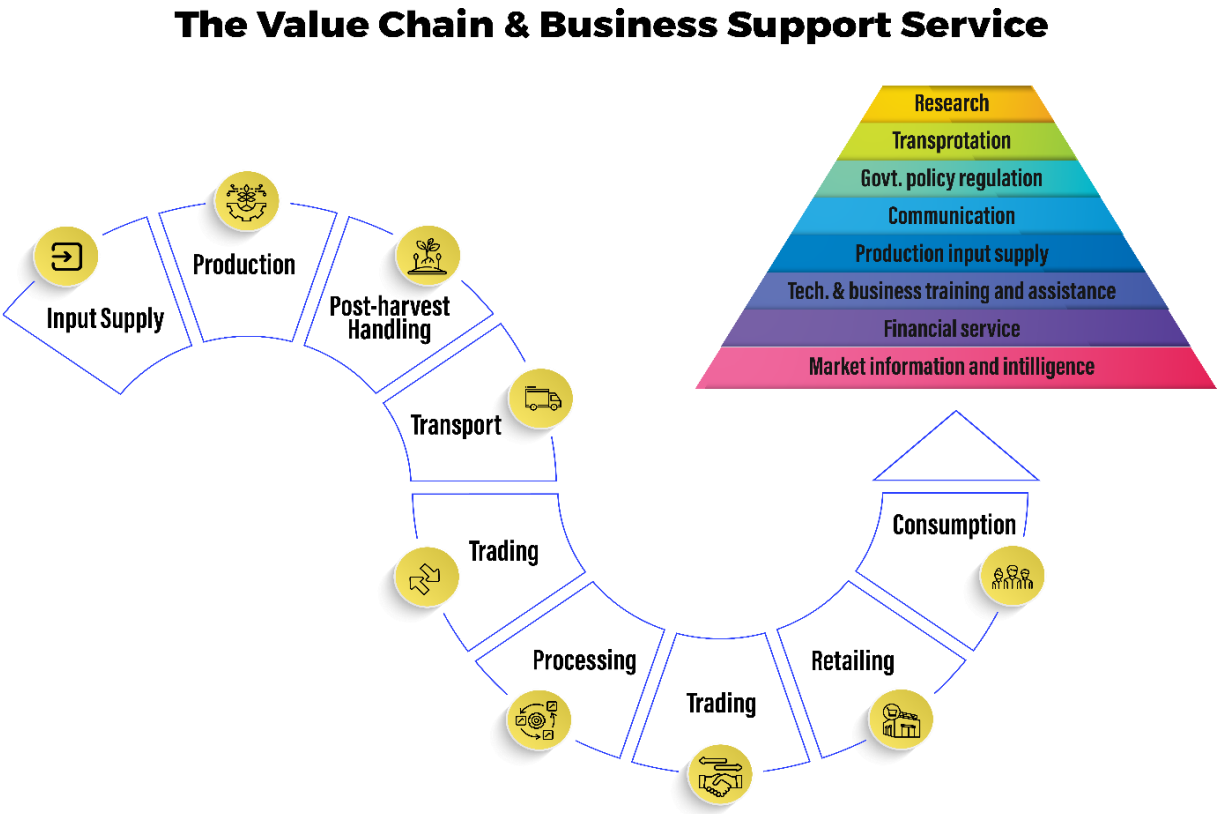

Figure 2.1: Typical agricultural value chain and associated business development services.

Source: Anandajayasekeram and Berhanu (2009).

The study (Shrestha & Yadav, 2018), aimed to analyze the value chain of potato production in the Ilam district, which is a significant source of income for rural farmers. The results showed that area, production, and productivity of potato are increasing significantly in both the country and the Ilam district. Farmers mainly grow local varieties, but also cultivate some improved varieties. The benefit-cost ratio of improved varieties is higher than that of local varieties. The study also revealed that farmers do not adopt grading and packaging, which is typically done by traders. The import of potato is sharply increasing, which is a major concern. Additionally, the study found that the farmers receive only 27% of the retail price, while traders and wholesalers extract substantial margins. Major constraints in potato production

include diseases, weak seed availability, high production costs, decreasing labor availability, and weak backward and forward linkages. The study recommends that government and development agencies should support farmers' organizations in adopting new varieties to overcome these constraints.

A commissioned study (Ugonna et al., 2013),examined the value chain analysis of Irish potato as an industrial raw material in Nigeria. Small, rural farmers mainly cultivate potatoes in marginal areas of the country. The research identified three sub-chains in the Nigerian potato value chain, including the production of potato for immediate consumption, the manufacturing of traditional products, and potato production for industrial processing and marketing of fresh potato and potato products. While all the sub-chains can improve income, the first two are suitable for small farmers and contribute greatly to the conservation of biological diversity. Nigeria is the fourth biggest producer of potato in Sub-Saharan Africa. However, constraints limit potato production, processing, and marketing, including inadequate supply of good quality seeds, poor storage facilities, poor diseases and pests' management, and reduced potency of potato varieties. Suggestions to improve the value chain of potato include using the value chain approach to fill the gaps through an efficient process technology, encouraging more research work on poor variety seeds, using modern agricultural equipment, improving storage facilities, and encouraging collaboration of relevant organizations to boost awareness creation of the importance of potatoes as an important energy source.

From the study (Wubet et al., 2022), Potatoes are a crucial crop grown in over 125 countries and consumed by over a billion people daily, particularly in impoverished regions. Developing countries are the main producers and distributors of potato products, making it a promising crop for smallholder families to achieve food security. In the Farta district of Ethiopia, potato production and value chain status have not been studied extensively, but a recent evaluation aimed to address this gap. The study found that wholesalers control the potato value chain in the area due to financial advantage, and identified several factors that positively influence market participation and sales quantity, including distance to the nearby market, land size allocated for production, and quantity of inorganic fertilizer. However, the study also identified several constraints to potato production and commercialization in the area, such as shortages of improved seed and market information, and absence of policy framework for price-setting strategy. The study suggests several solutions to address these constraints, such

as increasing access to farm inputs, introducing new crop varieties, and strengthening market information services.

(Sugri et al., 2017),Sweet potato is a versatile crop that can thrive with minimal external inputs, especially orange-fleshed cultivars which can benefit sub-Saharan Africa. However, the sweet potato value chain is not well-established in many producing countries, including Northern Ghana. The study characterized production operations and identified opportunities to improve the industry. The SWOT analysis revealed favorable production conditions, processing options, and strong local and international markets. Addressing production constraints such as access to seed and declining soil fertility is necessary, and institutional actors must network with primary actors to operate more profitably.

(Faris et al., 2018),The study analyzes the potato value chain in Ethiopia, where production is hindered by poor seed quality, low farmer skills, diseases, high post-harvest losses, and poor organization. The study identifies six main actors, including input suppliers, producers, wholesalers, retailers, small-scale processors, and consumers, as well as supporting actors. Margin analysis shows that small-scale processors gain the largest share of the value at 65.01%, followed by producers at 12.29%, retailers at 9.78%, wholesalers at 8.27%, and collectors at 3.27%. The major constraints are high seed prices, poor infrastructure, broker interference, low storage facilities, weak linkage, disease, and pests. Opportunities lie in favorable ecology and government support. Recommendations include improving linkages, training on storage and disease control, improving bargaining power of producers, and initiating small-scale processors.

(Wondim, 2021), Different studies failed to address effective production, marketing, and gender issues of highly perishable vegetable products. This review aims to evaluate the constraints in production, marketing, and value chain actors including gender aspects to aid policymakers in developing intervention policies for agricultural sector development. Production constraints include low yield, lack of skills, capital, and poor seed quality. Value chain actors involved include producers, middlemen/brokers, traders, consumers, and supporters/influencers. Marketing challenges include poor market access for rural smallholders, high middleman margins, limited storage facilities, and gender issues that require comprehensive approaches in future research.

(Mmasa & Msuya, 2012),The study aimed to map sweet potato value chain linkages in Tanzania using cross-sectional design, individual interviews, focused group discussions, and review of relevant documents. The study was conducted in Shinyanga rural and Mwanza urban districts, with 150 value chain actors participating. Data was revealing that "Michembe" and "Matobolwa" were preferred local value-added products. Sweet potato production had low productivity due to poor agronomic practices and low technology application. Three marketing channels existed: direct selling to consumers, producers to retailers to consumers, and producers to hawkers/village vendors to consumers. 50.7% of sampled producers set prices after hearing from fellow farmers, and 44% sold directly to the market. The sub-sector faced structural and technological problems requiring immediate attention for agricultural sector development.

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 & Young, 2000).

Table 2.1: 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	Independent actors	Independent actors
Philosophy	Competitiveness of the enterprise	Competitiveness of the market chain

Source: (Hobbs & Young, 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 & Kandampully, 2004).

According to (Anandajayasekeram & Gebremedhin, 2009); (Kaplinsky & Morris, 2000),four essential key ideas guide agricultural value chain evaluation. These are effective calls for production, price chain governance, and upgrading.

According to (Kaplinsky & Morris, 2000), governance refers to the role of coordination and associated roles of figuring out dynamic, profitable opportunities and apportioning roles to key players. Value chains suggest the repetitiveness of linkage interactions. Governance ensures that interactions among actors along a fee chain replicate organization, as opposed to randomness.

The governance of value chains emanates from the requirement to set product, manner, and logistic requirements, which then influence upstream or downstream chain actors and consequences in sports, roles, and capabilities. Trust-based coordination is principal for items and services whose traits change frequently, making a nice standardized dedication for the purposes of industrial coordination difficult (Raikes et al., 2000). This applies to the producing enterprise in addition to agri-meals chains. It is possible to discover in one enterprise with several coordination bureaucracies used by unique corporations where the choices depend on the beliefs existent between the companies. According to (Kaplinsky & Morris, 2000), value chains can be labeled primarily based on governance systems: purchaser-driven cost chains and manufacturer-pushed cost chains. Buyer-pushed chains are normally exertions in in-depth industries, and so more crucial in international development and agriculture. In manufacturer-driven cost chains, which are greater capital intensive, key producers within the chain, generally controlling key technologies, influence product specs and play the main position in coordinating the numerous links. Some chains may additionally contain both manufacturer and consumer-driven governance.

Agricultural value chain evaluation perspectives effective demand as the force that pulls goods and offerings via the vertical device. Hence, price chain analysis wants to recognize the dynamics of the way a call is changing at each domestic and global market and the results for the value chain company and overall performance. Value chain analysis also desires to examine obstacles to the transmission of information in the converting nature of the call for and incentives back to manufacturers at diverse degrees of the cost chain (Hossain, 2016).

In agricultural value chain analysis, a degree of manufacturing can be referred to as any operating stage capable of producing a marketable product serving as an input to the

subsequent degree inside the chain for remaining consumption or use. Typical value chain linkages include enter supply, manufacturing, assembly, transport, storage, processing, wholesaling, retailing, and usage, with exportation protected as a main degree for products destined for global markets. According to (Anandajayasekeram & Gebremedhin, 2009), the degree of production in a fee chain plays a feature that makes a vast contribution to the powerful operation of the fee chain and inside the procedure provides cost.

A study of (Nguyen et al., 2022), indicate that to determine the factors that restrict marketplace get admission for smallholder farmers and their advertising performance in agricultural value chains, with a focus on potato farmers in Kabale and Mbale districts in Uganda. The examine hypothesized that farmers with agreement preparations and direct hyperlinks to customers have higher marketplace get entry and efficiency. They took a look at using a survey to collect records from random potato farmers and buyers and analyzed the data using an Ordinary Least Square model, smash-even evaluation, and a price addition approach. The effects confirmed that having an agreement with shoppers, owning more land and forked hoes, and developing a wider variety of potatoes definitely and drastically influenced marketplace access. Adding prices to potatoes on the farm increased income by 25%. Market chains wherein farmers sell to local rural investors were greater green than other alternatives. The examine recommends that farmers get concerned with cost addition, collective and/or contractual marketing, and promoting directly to the closest actor inside the price chain to improve market get admission and efficiency.

Over the beyond few a long time, there have been widespread changes inside the international and domestic drivers of agri-food markets, leading to the current unsustainable manufacturing, processing, distribution, and intake styles. The paper argues that transitioning to sustainable agriculture and food structures is critical for correctly managing the worldwide agri-food market to help anticipated populace boom and make certain prevalent get entry to enough, safe, and nutritious food. They take a look at evaluations of the prevailing worldwide literature to recognize the evolutionary paths of sustainability troubles in agri-food markets, focusing on the drivers and tendencies that have led so far. The research highlights the improvement and importance of sustainability transition frameworks, specifically the relationship among markets, exchange, meals and nutrients safety, and rising troubles in agri-food markets. Finally, the examiner recommends extending research to improve primary understanding and

become aware of opportunities to design meaningful movements that can shape agri-meals markets and facilitate their transition to sustainability. (Borsellino et al., 2020)

According to (Hossain, 2016), a market is a point or a place or sphere inside which a price-making force operates and wherein exchanges of identity tend to be followed through the actual motion of the goods affected. The concept of trade and relationships leads to the concept of the market. According to (Kotler, 2003), it's miles the set of the actual and ability customers of a product. Conceptually, a marketplace may be visualized as a procedure wherein ownership of goods is transferred from sellers to buyers, who can be the very last purchasers or intermediaries.

Efficiency in advertising is the most used degree of marketplace performance. Improved advertising efficiency is a common goal of farmers, advertising groups, purchasers, and society. It is a common notation that higher performance means better performance, while declining performance suggests poor performance. Most of the modifications proposed in advertising and marketing are justified on the grounds of improved performance (Kohls & Uhl, 1985).

Marketing channels, also known as distribution channels or trade channels, play a critical role in facilitating the movement of goods and services from producers to consumers. The structure of marketing channels can vary widely, depending on factors such as the type of product being sold, the size and complexity of the market, and the degree of vertical integration among channel members. (Armstrong & Kotler, 2003) define a marketing channel as a set of interdependent organizations that work together to make a product or service available for use or consumption. The channel may consist of various intermediaries such as wholesalers, distributors, retailers, and agents, each adding value to the product by performing specific functions such as transportation, storage, promotion, and financing (Lamb et al., 2018). In today's global economy, marketing channels have become increasingly complex, with the advent of e-commerce, online marketplaces, and digital marketing (Rosenbloom, 2012)

The effectiveness of marketing channels is crucial for businesses to achieve success in the marketplace. Firms must carefully design and manage their channels to ensure that they meet the needs of both the producer and the consumer. Proper channel management can result in improved customer satisfaction, increased sales, and reduced costs. On the other hand, poor

channel management can lead to lost sales, channel conflict, and damaged relationships with channel partners.

To optimize marketing channels, companies must continuously analyze and adjust their strategies based on changes in the market and the behavior of channel partners and customers. This involves monitoring key performance indicators such as channel profitability, inventory turnover, and customer satisfaction (Srivastava, 2015)

Market overall performance can be evaluated via diverse metrics, including analyzing the costs and margins of advertising retailers throughout distinctive channels. One broadly used degree of market performance is the advertising margin or charge unfold. This metric may be specifically beneficial in expertise on how the price paid with the aid of clients is sent to the various diverse individuals in the marketing gadget. For example, studying the advertising margin can help identify inefficiencies within the device, inclusive of high markups or immoderate distribution charges, which could negatively impact patron welfare (Mendoza, 1995).

In addition to the marketing margin, there are several other metrics that can be used to evaluate market performance. One such metric is market concentration, which measures the degree to which a market is dominated by a small number of firms (Richstein et al., 2015).Another important metric is price elasticity of demand, which measures how responsive consumers are to changes in price. Understanding price elasticity can help firms make better pricing decisions and improve their overall performance (Keller & Kotler, 2022).

Overall, analyzing market performance is crucial for both firms and policymakers in understanding how well markets are functioning and identifying opportunities for improvement. By using a range of metrics, including marketing margin, market concentration, and price elasticity of demand, it is possible to gain a more comprehensive understanding of market performance and take steps to enhance consumer welfare and economic efficiency.

Marketing costs are a significant obstacle for resource-poor smallholders looking to enter markets (Reardon et al., 2012). These costs can vary depending on the type of product being marketed, the distance to the market, and the infrastructure available for transportation. In addition to the handling costs mentioned above, marketing costs can also include storage costs, fees for market access, and advertising costs to promote products.

One study by (Reardon et al., 1994) found that marketing costs accounted for 30-50% of the price of agricultural products in Africa. This high percentage of costs can be especially challenging for smallholder farmers who may not have the resources to absorb these expenses.

Marketing costs also have implications for the overall efficiency of markets. High marketing costs can lead to higher prices for consumers and lower prices for producers, reducing the incentive for smallholders to participate in markets (Tschirley et al., 2015). As a result, reducing marketing costs is a crucial step in promoting inclusive and sustainable economic growth.

Various strategies can be implemented to reduce marketing costs for smallholders, such as improving transportation infrastructure, establishing market information systems, and providing training on market access and negotiating skills (Holloway & Ehui, 2002). By implementing these strategies, smallholder farmers can improve their access to markets, increase their profits, and contribute to overall economic development.

Marketing margin is described because the difference between the fee the consumer pays and the rate this is obtained by way of producers or as the rate of a group of advertising services, that is, the final results of the demand for and supply of such offerings (Cramer et al., 2001; Holt, 1993; Robinson, 1990). The size of market margins is specifically dependent upon an aggregate of the high quality and amount of advertising and marketing offerings furnished, the value of offering such services, and the efficiency with which they're undertaken and priced. For example, a large margin may additionally bring about little or no earnings or maybe a loss for the seller worried, relying upon the advertising prices as well as on the promoting and buying charges (Mendoza, 1995), Under competitive market situations, the dimensions of market margins would be the final results of the delivery and demand for advertising services, and they would be equal to the minimum costs of provider provision plus "normal" income. Therefore, studying marketplace margins is a critical manner of assessing the performance of price formation and transmission via the device.

According to (Lamb et al., 2018; Mendoza, 1995; Scarborough & Kydd, 1992), three techniques commonly utilized in estimating advertising and marketing margin:

(a) detailed analyses of the money owed to buying and selling companies at every stage of the advertising channel (time lag approach);

(b) computations of share of the client's charge obtained via manufacturers and buyers at each degree of the marketing chain; and

(c) concurrent approach: evaluation of charges at exceptional tiers of advertising and marketing over the identical time frame.

A significant component of global value chain research is how ‘cost’ itself is conceptualized and measured. Profit, cost addition, and charge markups are symptoms of income shares across fee chain actors (Gereffi, 1999). Value–brought shares may be calculated for exclusive hyperlinks inside the chain. A 2d way to calculate fee added is to look at its distribution via each value chain actor of the vegetable market and decompose for every actor to get approximations of each value-introduced share. Marketing margin is the distinction between the value of a product or a group of merchandise at one level within the marketing system and the cost of an equivalent product or group of merchandise at some other level. According to (Smith, 1992), measuring this margin indicates how a whole lot has been paid for the processing and marketing offerings implemented to the product(s) at that specific degree inside the marketing technique.

According to OECD (Growth, 2006), in recent years, the seasoned-negative boom approach has turned out to be one of the key issues of developmental companies. The consciousness of the method lies within the merchandising of monetary potentials of the bad and disadvantaged organizations of people. According to (Berg et al., 2006), the principle goal is to permit them to react and take gain from the latest opportunities bobbing up due to the monetary boom and thereby overcome poverty. The promotion of value chains in agribusiness objectives to enhance the competitiveness of agriculture in country-wide and international markets and to generate more fees added within us or vicinity. The key criterion in this context is wide impact, i.E. Boom that blessings the rural terrible to the greatest feasible quantity or, as a minimum, does not worsen their role relative to other demographic companies. The pro-terrible increase is one of the most normally quoted targets of cost chain promotion. In recent years, the need to attach producers to markets has brought about the expertise that it is essential to verify and analyze markets earlier than engaging in upgrading activities with fee chain operators.

Thus, the fee chain method starts off evolving from the expertise of the client demand and works its manner again via distribution channels to the exceptional stages of manufacturing, processing, and advertising (Meyer-Stamer & Waltring, 2006).

2.2 Review of empirical studies

2.2.1 Value chain approach

There are a number of research that have hired the price chain approach to agricultural commodities. Used cost chain analysis to examine inter-united states' distributional outcomes of the global coffee sector with the aid of mapping enter-output family members and figuring out electricity asymmetries alongside the coffee value chain (Fitter & Kaplinksy*, 2001). Their look indicated that returns to product differentiation taking place within the face of globalization do no longer accrue to the espresso manufacturers. They also observed that energy within the coffee cost chain becomes asymmetrical.

At the uploading end of the chain, importers, roasters, and shops compete with every different for a percentage of fee chain rents but combine to make sure that few of the rents go back to the farmer or the producer us of a.

(USAID, 2005), Nepal value chain study conducted on off-season vegetables indicated that the subsector faces a few demanding situations, including unavailability of fine planting materials, lack of expertise among many of the manufacturers of the proper utilization of fertilizers and pesticides as well as terrible soil fertility control, lack of irrigation facilities, exertions scarcity, postharvest loss due the perishable nature of vegetables, constrained access to dependable market facts, unorganized marketplace center, restrained collection centers, and absence of right packaging and transportation facilities. The examination recommended quick-time period and long-term infrastructural and institutional innovation to lessen the above challenges.

(Raikes et al., 2000), also used a value chain evaluation to take a look at the effect of deregulation, new intake patterns, and evolving corporate techniques inside the international coffee chain at the espresso-exporting international locations inside the growing international. The study concluded that the espresso chain turned more and more turning into client-pushed, and the coffee farmers and the international manufacturing locations were dealing with a disaster relating to adjustments inside the governance structure and the institutional framework of the espresso fee chain. According to (Di Falco et al., 2010) a horticulture cost chain

examination performed in the Eastern components of Ethiopia recognized exceptional troubles on the chain.

The important constraints of marketing identified with the aid of the same look consist of a lack of markets to take in the production, low fee for the goods, a big wide variety of middlemen in the advertising and marketing gadget, loss of advertising institutions safeguarding farmers' interest and rights over their marketable produce, loss of coordination among manufacturers to boom their bargaining electricity, terrible product dealing with and packaging, imperfect pricing machine and lack of transparency in marketplace statistics communications.

Value chains have a look at carried out by mango through (Dendena & Corsi, 2014) indicated that the subsector faces some challenges. Among others: surprisingly disorganized and fragmented industry with vulnerable price chain linkages, lengthy and inefficient supply chains, inadequate records flows, and shortage of appropriate manufacturing are defined because of the foremost troubles. The observation encouraged institutional innovation to reduce the above challenges.

2.2.2 Determinants of marketable surplus

The examination of marketable surplus grew to become out to be very vital for agricultural-based nations because the transition of smallholder farmers closer to industrial production is decided by means of it. The transition of the small-scale area closer to commercial manufacturing will, in the end, be determined by way of the potential and willingness of manufacturers to offer a commodity (Abebe, 2009). Similarly, (Girma, 2009) claimed that the improvement of markets, alternatives, and the following marketplace delivers that signify commercialization is fundamental to monetary growth.

There are a number of experiential studies on elements affecting the marketable surplus of agricultural commodities. Several elements affect the marketable surplus of culmination through using OLS regressions. She found that marketable fruit delivery changed into laid low with; the schooling stage of the household head, amount of fruit produced, fruit manufacturing revel in, extension touch, lagged price, and distance to marketplace (Tadesse, 2011).

Heckman's two-level version to analyze the determinants of vegetable marketplace delivery is implemented by (Akalu, 2007). Accordingly, the study located out that the marketable supply

of greens has been notably suffering from own family size, distance from the most important street, variety of oxen owned, extension service, and lagged fee.

Marketable supply of agricultural products could be tormented by various factors inclusive of the size of land conserving, the output stage, own family length, marketplace access, rate, inputs, formal education, oxen quantity, accesses to extension and credit offerings, distance to market, time of selling, get right of entry to exertions and age (Wolday, 1994). In sum, empirical pieces of evidence indicate that the marketable delivery technique has come to be an essential framework for analyzing financial agents in the agricultural sector. In this observation, a try was made to become aware of elements affecting the marketable delivery of veggies.

2.2.3 Determinants of market channel choices

Regarding elements affecting the families' channel alternatives, special researchers used multinomial logit and probit for express advertising machines for exceptional agricultural commodities.

An observation by way of (Fertő & Szabó, 2002) identified variables influencing producers' selection for channel selections. The analysis turned into based totally on a survey amongst three supply channels of fruit and vegetable manufacturers in Csongrad, Hungary, in recognizing the choice of advertising channels which can be wholesalers, advertising and marketing cooperatives, and producers' agencies channels. A multinomial logit model was carried out to expose the determinants influencing these selections amongst diverse delivery channels. Farmer's decisions with respect to supply channels had been encouraged differently by means of transaction expenses, and producers' promotion to the wholesale market had been strongly and negatively tormented by the farmer's age, information charges, and negatively by way of the bargaining electricity and monitoring expenses. The opportunity for farmers to sell their products to advertising cooperatives is stimulated through the age and records prices definitely, while by way of the asset specificity and bargaining power negatively.

The educational stage of the operator, off-farm employment, very own approach to transportation, and the age of the operator had a nice impact wherein family size turned negatively related to supper advertising and marketing channel picks, as shown by (Rao & Qaim, 2011). In the second-degree 2nd level of the remedy model, off-farm employment and personal manner of transportation affected the earnings of vegetable growers undoubtedly.

Furthermore, the dummy variable for channel alternatives has been superb and enormous. This indicated that offering vegetables to supermarket channels rendered higher earnings gain over spot advertising channels.

On the other hand, ownership of farm animals negatively inspired profits of greens growers supplying traditional or spot advertising channels. (Jari & Fraser, 2009) recognized that marketplace information, knowledge of grades and requirements, contractual agreements, social capital, market infrastructure, institution participation, and tradition appreciably affect family advertising and marketing conduct. They take a look at using a multinomial regression version to analyze the factors that impact advertising alternatives amongst smallholder and emerging farmers.

(Xaba & Masuku, 2013) diagnosed that the age of the farmer, the quantity of infant corn produced, and the level of training had been huge predictors of the selection to sell veggies to the NAM Board market channel in preference to selling to other-wholesale marketplace channel. The age of the farmer, distance from the production location to the marketplace, membership in the farmer company, and advertising settlement had been large determinants of the selection to apply non-wholesale market channel over other- wholesale marketplace channels. The examine uses expressive and multinomial logistic regression analyses to research elements that affect marketplace channel picks.

(Girma & Abebaw, 2012) recognized that gender and educational popularity of the family heads together with household get entry to free resources, agricultural extension services, market data, non-farm earnings, adoption of contemporary livestock inputs, the extent of income, and time spent to reach the market have a statistically enormous effect on whether or not or not a farmer participates within the livestock marketplace and his/her preference of a marketplace channel. They take a look at using binary logit and multinomial logit to explore the styles and determinants of smallholder farm animals farmer's market participation and marketplace channel choice using micro-level survey information from Ethiopia.

(Akhter, 1973) conducted a take look at potato advertising and marketing in Comilla Sadar Upazila of Bangladesh, and he discovered some structural and functional functions of potato advertising. Sabur and (Sabur & Gangwar, 1984) performed an observation on the production and rate structure of potatoes in Bangladesh and showed the boom fee of potatoes in phrases of manufacturing, location, and productivity during the proliferation period. The study also

confirmed that the increased prices in terms of location, manufacturing, and productivity for the western districts were better than those for the northern districts.

(Sabur, 1986) performed a look at on marketed surplus of potatoes in two districts of Bangladesh and determined that manufacturing and marketed surplus of potatoes moved in equal path and land under potatoes become the maximum critical element determining the marketed surplus. He confirmed that the average manufacturing cost per hectare was Tk.29637.57, which was the medium bottom farmers, and internet returns and benefit price ratio had been calculated at Tk.30947.82 in keeping with hectare and 1: 2.25 respectively, which had been the very best for medium farmers in each of the regions. Regional Agricultural Research Station, Jamalpur, beneath the Farm Research Division of BARI, Joydebpur, carried out a study on "Improvement of current fanning gadget via a holistic method." They summarized the findings in a record (1992-93). They observed that the yield consistent with the hectare of HYV potato turned into nine. Twenty-five tonnes and value in line with hectare turned into Tk. 17,000.00. They observed that the net return depended largely on the harvest rate of potatoes.

(Islam, 1987) finished a take look at potato upkeep in bloodless storage in Bangladesh together with the marketing factors. He discovered that price spread in line with tonnes of potato appropriated through traders become higher in the case of cold stored potato than that of non-stored potato.

(Hoffmann-Wolf et al., 1990) performed a study on potato advertising and marketing in Bangladesh. His look expounded that the handiest few growers shop their potatoes in bloodless garage vegetation because of excessive garage prices. His take look revealed that communication devices ought to be advanced to transport potatoes from the manufacturing location to the terminal market to reinforce the financial condition of the potato growers. Storage facilities have to be stepped forward on the primary and secondary markets via organizing public as well as non-public bloodless garage vegetation at distinct factors of a potato advertising channel. His study emphasizes the development of a normal garage in a clinical manner in addition to the innovation of a low-price storage approach which would now not best make certain timely availability of first-rate seed but also better charge at reduced garage prices in the course of the 12 months by using enlarging storage period at farm level.

(Saklayen, 1990) investigated potato advertising in decided areas of the Munshiganj district. This takes a look was particularly based totally 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 discovered that the advertising cost consistent with the quintal of potato incurred was Tk. 43. 46 and Tk 44.36 for farmers of Munshiganj Sadar Upazila and Tongibari Upazila, respectively.

The advertising and marketing charges incurred, according to quintal potato, had been Tk. 60.95, Tk 56.87, Tk.133.60 and Tk. 37.81 for Bepari, Paiker, bloodless garage owners, and store of Munshiganj Bazar, respectively. The marketing costs incurred in step with quintal have been Tk 45.42, Tk sixty-one.21, Tk. 134.64 and Tk. 37.32 for Bepari, Paiker, bloodless storage proprietors, and retailers of Tangibari Bazar, respectively. The net margins in line with the quintal potato of Bepari, paiker, the cold storage owners and stores of Munshiganj bazaar were calculated at Tk. 21.73, Tk. 21.50, Tk. 19.57 and Tk. 23.28 respectively.

The net margin according to quintal potato of Bepari, Paiker, the cold garage proprietors and stores of Tongibari bazar has been calculated at Tk. 30.02, Tk. 26.91, Tk. 26.85 and Tk. 21.94 respectively.

(Kawsar, 2001) accomplished an examination entitled "An Economic Analysis of Diamant Potato Production in Some Selected Areas of Bangladesh." The study was specifically designed to investigate the socio-economic characteristics of farmers and estimate the charges and returns of diamant sorts of potato, and determine the factors affecting yield and returns. One hundred thirty-nine farmers have been purposively decided on from 5 Upazilas of five districts Bogra, Comilla, Munshigonj, Rangpur and Thakurgaon. Findings confirmed that Diamant potato production is worthwhile considering the chosen farm categories both in East and North Bengal. Per hectare, gross margin became the very best for Rangpur, whereas internet returns had been the very best for Munshigonj. Both gross margin and internet return had been higher for North Bengal. On the opposite hand, medium farmers obtained the highest quantity of gross margin and internet return.

(Hossain, 2004) investigated potato marketing in decided regions of the Bogra district. This look became mainly primarily based on the Sadar upazila of the Bogra district. The pattern covered 30 farmers and 30 intermediaries. Production price, yield, marketing cost, marketing

margin and internet margin of potato farmers and intermediaries have been calculated in this observation.

(Saiyem, 2007) investigated the potato advertising gadget and price conduct in selected areas of the Rangpur district. The samples consist of 60 pattern farmers and intermediaries. In this take, a look at production cost, yield, marketing fee, advertising margin, net margin and fee conduct of potato farmers and intermediaries was expected.

(Hajong, 2011) determined many intermediaries are concerned along with Faria, bepari, paikar, outlets and bloodless storage proprietors within the production and advertising machine of potatoes. The farmers distribute their manufacturing for family intake, present and sort fees to families, seed and most elements for promotion. Again a few potatoes were damaged and lost all through storage. Storing potatoes in cold storage flowers simply reduces the excessive losses of potatoes, but all farmers can't avail of the facility of bloodless storage because of several reasons, such as excessive cold garage price, the uncertainty of future market charges, economic insolvency, awful conversation and inadequate transport facilities and shortage of any provision in getting repayment for harm of potato inside the bloodless storage plant life.

The aforesaid opinions display that studies have been undertaken solely on the advertising and marketing aspect of potatoes. Systematic research observes records on the price chain evaluation of potato is meager in Bangladesh. So, the existing studies have been undertaken to make an extensive look to provide an understanding of the area of potato manufacturing and marketing. The findings of the take look at might assist farmers, fee chain actors and consumers in making the selection in manufacturing, trading and eating potatoes.

CHAPTER III

METHODOLOGY

3.1 Selection of study area

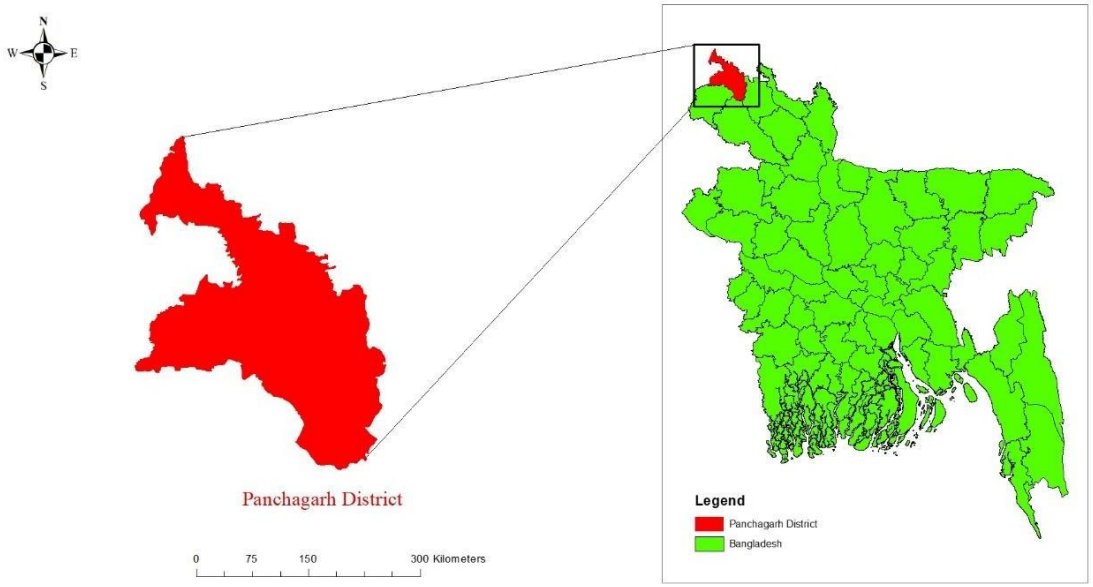

Figure 3.1: Study Area

The present take a look at was carried out in a few decided-on areas of the Panchagarh District. Panchagarh District is the leading area in admire of potato production in Bangladesh. Debiganj Upazila especially is the main potato-generating region of the Panchagarh District. The look location has a few favourable traits like topography, soil and climate condition for producing potatoes.

3.2 Period of study

The current study covered six months, from July 2022 - Jan 2023. Data was collected from November 2022 through January 2023, through an interview face-to-face with potato farmers, potato traders, and owners of cold storage using a structured survey schedule. To collect additional data, the researcher visited the region.

3.3 Selection of sample

Twenty-five potato farmers and sixty-five additional value chain players (potato trader, Faria, Bepari, retailer and wholesaler) and five owners of cold storage facilities were chosen in the study area, applying random sampling and the same way in a next manner.

3.3.1 Selection of potato growers

With the constraints of time and funds, the sample size for the potato farmer was set at 25. Of the 25 growers selected, 10 from Toria and 10 from Mirzapur and 5 from Dhamor village were chosen from the Atwary Upazila of Panchagarh district using a simple random sampling method employing a random number tables for the current study.

3.3.2 Value chain actor of potato

Sixty-five value chain actors of potatoes from two markets, Toria Bazar and Goalpara Bazar, were chosen in Sadar Upazila. Furthermore, two haunts, Atwary Bazar as well as Toria Bazar, were selected out of Atwary of Panchagarh district through the use of purposive sampling in the present study.

In the areas of study, potato producers and their intermediaries were regarded as part of the population in 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 facilities that comprise approximately 20 % of the total number of cold storage facilities in the area of study were chosen through a simple random sampling technique using the lottery method in this study. Five of the twenty-five plants in the Panchagarh district were chosen using simple random sampling techniques.

3.4 Data collection and analytical technique

The data were collected using an interview schedule with a tested interview schedule. The collected data were then tabulated, summarized, and analyzed to achieve the research objectives. Tabular method tools were employed to present the findings from the research. The profitability from potato cultivation was assessed using gross margin and total return as well as benefit-cost analysis. Additionally, multiple regression was employed to analyze the data. The moving average method was employed to study seasonal price fluctuations.

3.4.1 Gross return and net return of the farmer

Gross returns were calculated using the ratio of the output volume produced by an enterprise to its average price during the harvesting time (Dillon and Hardaker 1993). It was calculated as the sum of the amount of the main product and the amount of the quantity of product. This equation is utilized to calculate the gross return

$GR=\sum Qm.Pm$ Where:

GR= Gross return from potato,

Qm= Quantity of potato Pm=Avg. price of potato

The net return is calculated after subtracting the total cost (variable or fixed) from the gross profit. To determine the net profit of potato production, the following equation was applied in the current study:

Π= Gross return – (Variable cost + 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,
II. Land use cost
III. Interest on operating capital Marketing cost of potato

IV. License fee
V. Loading and unloading
VI. Power and electricity charge
VII. Telephone charge
VIII. Market toll
IX. Transportation
X. Grading
XI. Storage cost
XII. Personal expenses
XIII. Unofficial payment

3.4.2 Marketing margin and net margin of value chain actors

The margin of marketing and the net margin of various value chain actors were calculated with an equation:

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) Operating capital interests (Amount of operational capital Rate of interest (%) X Time required (in years)) 2
e) Cost of variable production of potatoes was considered operating capital.

The primary methods for assessing seasonal changes are:

a. Simple average method;
b. Ratio to Trend method;
c. Ratio to the moving average method and
d. Link method relative.

In this study, this method of moving average ratio was employed to analyze the fluctuation in the price of potatoes, considering the following variables.

a. It's an increase over the trend method.
b. It is the most reliable and well-known method, and is extensively used to estimate the seasonal variation because it eliminates both trends and the cyclical component from the indexes of seasonal variation.

3.5 Problems encountered in collecting data

The most important ways to measure seasonal changes are:

The respondent potato producers were present within the community; it wasn't simple to gather the required data. While collecting the data, the person conducting the study had to deal with several issues, as described below:

a. The education of respondents was a prerequisite to having precise information. Because the majority of respondents were not educated, they were wary of people from outside and, consequently, might be less cooperative.
b. The absence of written reports of incidents was recorded by some participants. The researcher was able to rely on their memory;
c. Respondents of all categories did not always remember the correct information, like the number of sales, revenue expenses, overall performance, etc. Thus, the long-term validity of information was a bit hazy;
d. The time of staff and shortages and lack of understanding of the marketing and processing issues of the potato was identified to be the main reason the necessary details were required to be gathered in the shortest time possible;
e. It was. Because the respondents were working at working, they weren't constantly at home. Gather data from regular visits were scheduled to collect information.
f. Owner of cold storage and the maximum value chain actor was not disclosing information regarding their tax and loan.

CHAPTER IV

RESULTS AND DISCUSSION

4.1 Socio-demographic profile of the respondents

The socio-demographic information is an essential aspect of the research and must be studied carefully. Socio-demographic profiles help to comprehend the age, education level as well as experience of farming/trading and the size of families of people you are interviewing with an eagle's eye. Because people differ between themselves in a variety of ways, the behaviour of a person is mostly dependent on their characteristics. The socio-demographic profile aids in understanding the behaviour or the characteristics of people surveyed.

4.1.1 Age of potato value chain actors

Table 4.1 illustrates the age of potatoes in the value chain. The farmer's period was divided into between 0-20, 21-30, 31-40, 41-50 and 51 above years. Most farmers were 21-30 years old, while only 8 % were in the 0-20 age group. The top 33.33% of Faria are in the 21-30 age range. The full 33.33% of repair, 40% of wholesalers, and 35% of retailers, are from the 31-40 years of age category. The lowest 6.67% of Faria and wholesalers, 5% retail were 50+ and 6.67% of repair are aged between 0 and 20 years old.

Table 4.1: Age of potato value chain actors

Age Category	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, 2023)

4.1.2 Educational background of actors in value chain

Table 4.2 shows the majority of 40% farmers and faria. 53.33 % wholesalers, 45% retail and 46.67 % of bepari students of higher secondary school. The lowest 8% of farmers are not literate. The rate of illiteracy in wholesalers, Faria, and retailer is at 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, 2023)

4.1.3 Family size of potato value chain actors

Table 4.3 illustrates that the majority of farmers (48%) a medium household size (6-8) member. Only 20% came from large families with more than 8 members. The highest percent of age of 53.33 % Faria, 46.67 % Bepari 53.33 % wholesalers, and 55% wholesalers came from small families with (1-5) members, respectively. The lowest 13.33 % of Faria and 20% of wholesalers, bepari and retailers came from large families with more than 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, 2023)

4.1.4 Experience of potato value chain actors

Table 4.4 illustrates the experiences of the potato value chain actors. The table below shows that the majority are 40% farmers, 46.67% bepari and 33.33 % of retailers with 10-20 years' experiences in potato farming, and 46.67 % faria and 45% retailer with 0-10 years of experience in the potato farming. The lowest level of experience for farmer, faria and wholesaler, bepari, as well as retailer, is 12%, 6.67%, 13.33%, 13.33%, and 5%, respectively, with more than 30 years of experience in 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, 2023)

4.2 Value addition of potato

One of the goals of this study is to determine the value that is added by value chain actors, specifically potato producers and various traders. The methods of value-added are primarily focused on improvement in the utility sector. The term "value added" refers to the gap between the cost of purchasing an item and the value of the materials used to create it is termed value added. This is the case for the contribution made by the factors that produce the goods, i.e. property, labour and capital items, to the increase in value of a product in the national accounts utilized in macroeconomics. This is in relation to the profit that is earned by the owners of these factors. Value added refers to the added value of a product in comparison to the price of the commodity utilized to make it from the initial step of manufacturing. The value added to products or services is directly derived from a specific procedure.

4.2.1 Actors involved in potato value chain

The term "marketing channel" is thought to be a chain of actors within which the exchange of products occurs between the manufacturer and the consumer. In the pursuit of every business's goals in marketing and goals, marketing networks play an important role. Because potato is a vital vegetable in Bangladesh and through those same channels, i.e., through certain market players like Faria wholesaler, bepari, producer and owner of cold stores, inventory was transferred from the sellers to the customers. The study revealed that potatoes moved from the point of development to the customer via certain participants in the study area, making a chain within the industry of potato.

Figure 4.1 shows that the potato in Panchagarh 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.

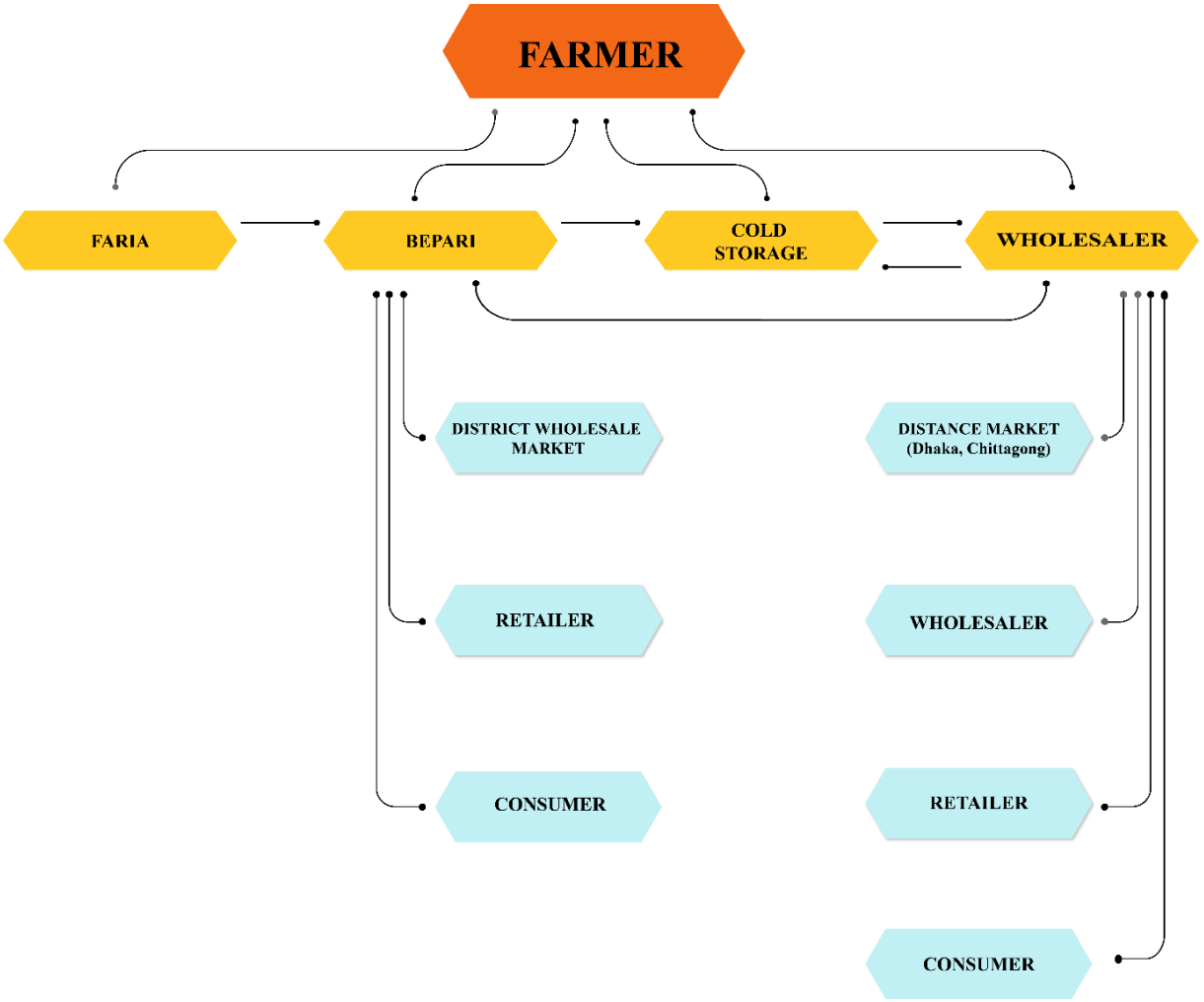

Figure 4.1: Value chain actors of potato in Panchagarh district and distant market

The study reveals that the sale of potatoes in Panchagarh has been transferred from the farms to consumers through five chains. Chain III is the longest chain of value. In this chain, the principal marketing actors were farmers, Faria, Bepari, wholesaler, distance wholesaler, and retailer, who added value to the channels for marketing. At every point of value-added activities they are the part of the profit.

4.3 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	68.10
	Seed cost	50.18
	Labor (family)	45.32
	Labor (hired)	85.23
	Organic manure	5.14
	Chemical fertilizer	65.35
	Weeding	70.10
	Insecticides spray	65.32
	Irrigation	75.56
	Other costs	5.33
	Total	535.63
Fixed Cost	Rent of land	250.35
	Interest on operating capital	8.85
	Total	259.2
Total production cost (TK./100Kg)		794.83
Marketing Cost	Grading and sorting	65.65
	Transport cost	50.23
	Loading and unloading	20.83
	Market toll	20.20
	Personal expense	25.00
	Others cost	21.28
	Total	203.19
Total cost		998.02
Cold storage		400.25

Source: (Field survey, 2023)

Table 4.5 discovered that the summation of the variable costs inputs was 535.63/100kg. Then the totalization of the fixed inputs resulted in a total fixed cost Tk. 259.2/100 kg. 100 kg of potatoes was Tk. 5.85 in interest charges on capital operating, and Tk.794.83 for 100 kilograms was the total production cost for potato. The cost of marketing for farmers was

comprised of the costs for grading and washing, and sorting transport, loading and unloading market tolls, personal expenses and unofficial payments. It was estimated that the marketing costs were Tk. 203.19 per 100 kg of potato. After incorporating the marketing expenses to the cost total was Tk. 998.02. The cost for cold storage per 100 kilograms of potatoes was Tk. 400.25.

Table 4.6 indicates that the gross return per 100kg potato is Tk. 1425.55 or Tk.14.26 per kg, respectively. The Variable cost of Tk. 5.35 per kg. Variable cost: Tk. 535.63 per 100 kilograms of potato. The total price was Tk. 9.98 per kg. The total expense was Tk. 998.02 per 100kg of potato cultivation. Tk. 9.98 per kilogram of potato cultivation, respectively. Gross margin was calculated by subtracting the total variable costs of gross returns. Gross margin per 100kg of potatoes was. 889.93 as well as Tk.8.89 per kilogram respectively. Net returns were calculated after subtracting the total expense from total return. The net return is Tk. 427.54 per 100kg of potato, and Tk.4.27 per kilogram of potato, respectively.

Table 4.6: Profitability of potato farmer

Particulars	**Tk. / 100 Kg**	**Tk. /Kg**
Gross return	1425.56	14.26
Variable cost	535.63	5.35
Total cost	998.02	9.98
Gross margin (Gross return – Variable cost)	889.93	8.89
Net return (Gross return –Total cost)	427.54	4.27

Source: (Field survey, 2023)

The table 4.7 shows various indicators such as the average farm gate price, market price, marketing cost, value addition, and value addition percentage, among others.

Firstly, the table indicates that the average farm gate price of potato is Tk. 1300.73 per 100 kg, while the market price is Tk. 1625.55 per 100 kg. This implies that there is a significant price difference between the point of production and the point of sale, which could be attributed to various factors such as transportation costs, storage costs, and middlemen margins, among others.

Secondly, the average marketing cost of potato is Tk. 175.28 per 100 kg or Tk. 1.75 per kg. This includes various costs incurred during the marketing process, such as transportation, packaging, grading, and handling, among others. It is important to note that marketing costs

vary across regions and could be influenced by various factors such as distance to the market, infrastructure, and market competition, among others.

Thirdly, the table shows that the value addition of potato is Tk. 270.82 per 100 kg or Tk. 2.70 per kg. This indicates the increase in the value of the product as it moves along the value chain. Value addition could be attributed to various factors such as processing, packaging, branding, and quality assurance, among others.

Lastly, the table shows that the value addition percentage of potato is 25.78%, which indicates the proportion of value added to the product relative to the initial value. This suggests that there is a significant opportunity for increasing value addition in the potato value chain, which could lead to increased profitability for all actors involved.

Overall, the data presented in the table provides important insights into the potato value chain in the selected areas, highlighting the various costs and value addition opportunities. This information could be useful for policymakers, investors, and other stakeholders in the agricultural sector in making informed decisions and improving the overall efficiency and profitability of the potato value chain.

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 (%)
1300.73	1625.55	175.28	1.75	270.82	2.70	25.78

Source: (Field survey, 2023)

4.4 Cost and margin analysis of Faria

Table 4.8: Daily transactions and value addition incurred by Faria

Particulars	Amount (kg)	Tk./Kg	Tk. / 100 Kg	Total
Average transaction (Per day)	1020	_	_	_
Average purchase price	_	13.50	1350.00	_
Average sales price	_	15.50	1550.00	15630.75
Value addition	_	1.50	150.00	_

Source: (Field survey, 2023)

From the table 4.8 data provides important insights into the potato value chain in the selected areas. The table presents four key particulars, including the amount (kg) of potatoes transacted on average per day, the purchase price per kg, the sales price per kg, and the value addition per kg.

The average transaction per day is 1020 kg. However, the table shows that the average sales price per kg is Tk. 15.50, resulting in a total revenue of Tk. 15,630.75 per day.

The value addition per kg of potatoes is Tk. 1.50, indicating the difference between the purchase price and the sales price. This value addition represents the added value created along the potato value chain, from production to consumption.

Overall, this table data provides valuable information for the value chain analysis of potato in the selected areas. The average transaction per day, purchase and sales prices, and value addition can help identify the key actors and activities in the potato value chain and understand the profitability and efficiency of the value chain.

4.5 Marketing cost incurred by Faria

The table 4.9 provides data on the average cost per kilogram of potato production in selected areas, broken down by cost item and the percentage of the total cost represented by each item. The purpose of this data is to inform a value chain analysis of the potato industry in the selected areas.

The table shows that the total average cost of producing one kilogram of potatoes is Tk. 0.37. The cost items are listed in order of highest to lowest percentage of the total cost. Market toll is the largest cost item, accounting for 67% of the total cost, followed by personal expenses at 16%, telephone charges at 11%, and other costs at 6%.

The high percentage of market toll suggests that the cost of accessing the market is a significant expense for potato producers in the selected areas. This information could inform strategies to reduce market toll costs, such as exploring alternative markets or negotiating lower toll rates.

The data on personal expenses and telephone charges could also be used to inform interventions aimed at reducing production costs for potato farmers. For example, if personal expenses are primarily related to transportation, efforts could be made to improve transportation infrastructure in the areas studied. Similarly, if telephone charges are primarily

related to communication with buyers, efforts could be made to establish more direct and cost-effective communication channels.

Overall, the data provided in the table is an essential input for understanding the cost structure of potato production in the selected areas and identifying opportunities for cost reduction and value chain optimization.

Table 4.9: Marketing cost incurred by Faria

Cost items	**Average cost (Tk./Kg)**	**percentage of total**
Personal expenses	0.06	16
Telephone charge	0.04	11
Market toll	0.25	67
Others cost	0.02	6
Total	0.37	100

Source: (Field survey, 2023)

4.6 Value addition and marketing margin of Faria

From Table 4.10 it was revealed that the average purchase price was Tk.1350.00 and sales price was Tk.1550.00 per 100 kg of potato. The average purchase price was Tk. 13.50 and sales price was Tk. 15.50 per kg of potato respectively. The amount of value addition was Tk.113.00 (marketing margin) per 100kg of potato and value addition was Tk. 1.13 per kg of potato. Among the value addition faria covered the 9.75% 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	1350.00	13.50	_
Sales price	1550.00	15.50	
Value addition (Purchase price–Sales price)	150.00	1.50	9.75
Marketing cost	37.00	0.37	_
Net marketing margin (Value addition – Marketing cost)	113.00	1.13	_

Source: (Field survey, 2023)

4.7 Cost and margin analysis of Bepari

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	_	15.55	1555	_
Average sales price	_	17.00	1700.00	51000.00
Value addition	_	1.45	145.00	_

Source: (Field survey, 2023)

According to the table 4.11, the average transaction per day is 3000 kg. However, the average purchase price is not mentioned, so we cannot infer the total cost of potato procurement. On the other hand, the average sales price is Tk. 17.00 per kg, which results in a total return of Tk. 51,000 per day (calculated by multiplying the average sales price with the average transaction per day).

The table also shows that the average price difference between purchase and sales, also known as value addition, is Tk. 1.45 per kg, resulting in a total value addition of Tk. 145 per day (calculated by multiplying the value addition per kg with the average transaction per day). This value addition indicates the profit margin for the intermediaries involved in the potato value chain.

In summary, the table provides useful information on the average transaction, purchase price, sales price, total return, and value addition in the potato value chain. Further analysis of this data can provide insights into the efficiency and profitability of the potato trading system in the selected areas.

4.8 Marketing cost of Bepari

The table 4.12 shows that the highest cost component in the value chain of potato is transportation, which contributes to 38% of the total cost. This indicates that transportation is a critical activity in the potato value chain and any improvement in this activity can lead to a significant reduction in the cost of the product.

Storage charge is the second-highest cost component, contributing to 30% of the total cost. This implies that the cost of storage significantly adds to the cost of potato. Therefore, there is

a need to identify ways to reduce the cost of storage, such as implementing more efficient storage methods.

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	0.20	10
Market toll	0.30	15
Transportation	0.75	38
Telephone charge	0.05	3
Unofficial payment	0.03	2
Storage charge	0.60	30
Personal expense	0.05	3
Total	1.98	100

Source: (Field survey, 2023)

Loading and unloading and market toll contribute to 10% and 15% of the total cost, respectively. These activities are essential to the potato value chain, but there is a need to ensure that the cost associated with these activities is minimized.

Telephone charge and personal expense contribute to 3% and 3% of the total cost, respectively. These activities are necessary, but their cost is relatively low compared to other activities in the value chain.

Rent of store and unofficial payment have a negligible cost, contributing to 0.00% and 2% of the total cost, respectively.

4.9 Value addition and marketing margin of Bepari

The table 4.13 presents the cost and value addition analysis of potato in some selected areas. The particulars mentioned in the table are purchase price, sales price, value addition, marketing cost, net marketing margin, and storing cost.

The purchase price of potato per 100 Kg is Tk. 1555.00, which translates to Tk. 15.55 per Kg. Similarly, the sales price of potato is Tk. 1700.00 per 100 Kg or Tk. 17.00 per Kg. The value addition for potato is calculated by subtracting the sales price from the purchase price, which gives a value of Tk. 225.00 per 100 Kg or Tk. 2.25 per Kg.

Further, the value addition percentage is calculated by dividing the value addition by the purchase price and multiplying by 100. The percentage value addition in this case is 15.70%. This percentage indicates the level of value addition achieved in the potato supply chain from the purchase of raw potato to its sale to the final customer.

In addition to the value addition, the table also provides information on marketing cost and net marketing margin. The marketing cost of potato is Tk. 198.00 per 100 Kg or Tk. 1.98 per Kg. The net marketing margin is calculated by subtracting the marketing cost from the value addition, which gives a net margin of Tk. 17.00 per 100 Kg or Tk. 0.17 per Kg.

Lastly, the storing cost per month is mentioned as Tk. 60.00 per 100 Kg or Tk. 0.06 per Kg. This cost represents the expenses incurred in storing the potato produce before it is sold in the market.

Overall, the table data provides insights into the costs and value addition in the potato supply chain in the selected areas, which can be used to evaluate the efficiency and profitability of the potato business.

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

Particulars	**Tk. / 100 Kg**	**Tk. / Kg**	**Value addition (%)**
Purchase price	1555.00	15.55	_
Sales price	1700.00	17.00	_
Value addition (Purchase price –Sales price)	225.00	2.25	25.70
Marketing cost	198.00	1.98	_
Net marketing margin (Value addition – Marketing cost)	17.00	0.17	_
Storing cost (Per month)	60.00	0.06	_

Source: (Field survey, 2023)

4.10 Cost and margin analysis of wholesaler

Table 4.14: Daily transactions and value addition incurred by wholesaler

Particulars	**Amount (kg)**	**Tk./Kg**	**Tk. / 100 Kg**	**Total return (Tk.)**
Average transaction (Perday)	7500	_	_	_
Average purchaseprice	_	17.20	1720.00	_
Average sales price	_	20.25	2025.00	151875.00
Value addition	_	3.05	305.00	_

Source: (Field survey, 2023)

According to the table 4.14 data, the average transaction amount per day is 7500 kg, while the average purchase price of potatoes is not provided. The average sales price, however, is 20.25 Tk./kg, which translates to a total return of 15,1875 Tk. per day.

Moreover, the value addition per 100 kg of potatoes is 305 Tk., indicating that each unit of the product is gaining value as it moves along the value chain. This value addition is critical in creating income and employment opportunities for actors in the value chain, as well as improving the overall efficiency of the sector.

The data in the table highlights some key economic factors in the potato sector, including the average sales price, value addition, and transaction amount. These factors can be used to identify areas for improvement in the value chain, such as increasing purchase prices for farmers or optimizing distribution channels to reduce transaction costs

4.11 Marketing cost for wholesaler

Table 4.15: Marketing cost incurred by wholesaler

Cost items	**Average cost (Tk./Kg)**	**percentage of total cost**
Loading and unloading	0.25	8.56
Transportation	0.75	25.68
Storage cost	0.62	21.23
Grading	0.50	17.12
Telephone charge	0.17	5.82
Unofficial payment	0.05	1.71
License cost	0.03	1.03
Market toll	0.25	8.56
Personal expense	0.20	6.85
Others	0.10	3.42
Total	2.92	100

Source: (Field survey, 2023)

The table 4.15 presented in this study shows a breakdown of the average cost per kilogram of potato production in the selected areas. The total average cost per kilogram of potato production is Tk. 2.49, with the highest cost component being transportation, accounting for 25.68% of the total cost. The next highest cost component is storage cost, accounting for 21.23% of the total cost. Grading, which is an important process for maintaining quality and ensuring marketability, accounts for 17.12% of the total cost.

Loading and unloading costs account for 8.56% of the total cost, while market toll and personal expenses account for 8.56% and 6.85% of the total cost, respectively. Telephone charges and unofficial payments account for 5.82% and 1.71% of the total cost, respectively. License cost and other costs account for 1.03% and 3.42% of the total cost, respectively.

4.12 Value addition and marketing margin of wholesaler

In this table 4.16, the data pertains to the value chain analysis of potatoes in some selected areas. The table presents information on the purchase and sales prices of potatoes, the value addition, marketing costs, net marketing margin, and storing costs per month.

The purchase price of potatoes is Tk. 1720.00 per 100 kg, which is equivalent to Tk. 17.20 per kg. The sales price is Tk. 2025.00 per 100 kg or Tk. 20.25 per kg. The difference between the purchase price and sales price is the value addition, which is Tk. 305.00 per 100 kg or Tk. 3.05 per kg. The value addition as a percentage of the purchase price is 17.45%.

Marketing costs per 100 kg of potatoes are Tk. 292.00 or Tk. 2.92 per kg. The net marketing margin is the difference between the value addition and marketing cost, which is Tk. 18.00 per 100 kg or Tk. 0.18 per kg.

Finally, the storing cost per month is Tk. 62.00 per 100 kg or Tk. 0.62 per kg. The information in this table can be used to analyze the value chain of potatoes in the selected areas, including identifying opportunities for value addition and improving efficiency in marketing and storing practices.

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

Particulars	**Tk./ 100 Kg**	**Tk. / Kg**	**Value addition (%)**
Purchase price	1720.00	17.20	_
Sales price	2025.00	20.25	_
Value addition (Purchase price –Sales price)	305.00	3.05	17.45
Marketing cost	292.00	2.92	_
Net marketing margin (Value addition – Marketing cost)	18.00	0.18	_
Storing cost (Per month)	62.00	0.62	_

Source: (Field survey, 2023)

4.13 Cost and margin analysis of retailer

The data table 4.17 presents information on the daily transactions and value addition incurred by retailers. The table contains four columns: particulars, amount, Tk./Kg, Tk. / 100 Kg, and Total return. The particulars column lists the items for which data is provided. The amount

column shows the quantity of potatoes sold in kilograms, while the Tk./Kg column indicates the purchase and sales price of potatoes per kilogram.

The Tk./100 Kg column shows the purchase and sales price of potatoes per hundred kilograms. The Total return column shows the total revenue generated by the retailers from potato sales. The table also provides information on the average transaction, purchase price, sales price, and value addition.

According to the table, the average transaction of potatoes by retailers is 120 kg per day. The average purchase price of potatoes is Tk. 20.00 per kilogram, while the average sales price is Tk. 22.25 per kilogram. The average total return from the sale of potatoes is Tk. 2,670 per day.

Furthermore, the table shows that the value addition by retailers is Tk. 225 per hundred kilograms of potatoes sold. The value addition is the difference between the sales price and the purchase price per hundred kilograms of potatoes.

The data table provides valuable insights into the daily transactions and value addition incurred by retailers in the potato sector. The information can help stakeholders in the potato value chain to identify areas where they can add more value to their products. The study recommends that retailers focus on improving their value addition by adopting innovative marketing and branding strategies. Furthermore, policymakers can use the study's findings to design policies that support the growth of the potato sector and promote value addition.

Table 4.17: Daily transactions and value addition incurred by retailer

Particulars	**Amount (kg)**	**Tk./Kg**	**Tk. / 100 Kg**	**Totalreturn (Tk.)**
Average transaction (Per day)	120	_	_	_
Average purchaseprice	_	20.00	2000.00	_
Average sales price	_	22.25	2225.00	2670.00
Value addition	_	2.25	225.00	_

Source: (Field survey, 2023)

4.14 Marketing cost of retailer

Table 4.18: Marketing cost incurred by retailer

Cost items	Average cost (Tk./Kg	percentage of total cost
Loading and unloading	0.15	10.71
Electricity charge	0.25	17.86
Telephone charge	0.15	10.71
License cost	0.25	17.86
Unofficial payment	0.05	3.57
Market toll	0.15	10.71
Personal expense	0.30	21.43
Others	0.10	7.14
Total	1.40	100

Source: (Field survey, 2023)

The table 4.18 provides information on the average marketing cost incurred by retailers for each kilogram of potatoes sold. The data is presented in terms of cost items, average cost per kilogram, and percentage of total cost. The total marketing cost incurred by the retailer per kilogram of potatoes sold is Tk. 1.40.

The cost items listed in the table include loading and unloading, electricity charge, telephone charge, license cost, unofficial payment, market toll, personal expense, and others. These items represent the various costs incurred by the retailer in the marketing of potatoes.

The highest percentage of total cost is incurred by license cost at 17.86%, followed by electricity charge at 17.86%, personal expense at 21.43%, loading and unloading at 10.71%, market toll at 10.71%, telephone charge at 10.71%, others at 7.14%, and unofficial payment at 3.57%.

4.15 Value addition and marketing margin of retailer

The table 4.19 provides information on the value addition and marketing margins of potato incurred by retailers in some selected areas. The data is presented in terms of Tk. / 100 Kg and Tk. / Kg for purchase price, sales price, marketing cost, and net marketing margin.

The purchase price of potato is Tk. 2000.00 per 100 Kg, which is equivalent to Tk. 20.00 per Kg. The sales price is Tk. 2225.00 per 100 Kg, or Tk. 22.25 per Kg. This results in a value

addition of Tk. 225.00 per 100 Kg, which is equivalent to Tk. 2.25 per Kg, representing a 12.97% increase in value from the purchase price.

The marketing cost incurred by retailers is Tk. 140.00 per 100 Kg, or Tk. 1.40 per Kg. The net marketing margin is calculated by subtracting the marketing cost from the value addition, resulting in a net marketing margin of Tk. 85.00 per 100 Kg, or Tk. .85 per Kg.

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

Particulars	**Tk. / 100 Kg**	**Tk. / Kg**	**Value addition (%)**
Purchase price	2000.00	20.00	_
Sales price	2225.00	22.25	_
Value addition (Purchase price –Sales price)	225.00	2.25	12.97
Marketing cost	140.00	1.40	_
Net marketing margin (Value addition – Marketing cost)	85.00	0.85	_

Source: (Field survey, 2023)

4.16 Cost and margin analysis of cold storage owner

Table 4.20: Cost and margin analysis of cold storage owner

Cost items (Per month)	**Tk./ Month**
Salary and wage	150000.00
Power and electricity	750500.25
Repair and maintenance	21500.00
License fee	800.60
Cold storage rent	175.50
Cold storage charge (100 Kg)	500.50
Machine charge	600.50
Others	3000.75

Source: (Field survey, 2023)

The table 4.20 data provides a breakdown of the monthly costs incurred by a cold storage owner, who is presumably involved in the potato value chain. The information presented can be used to perform a cost and margin analysis of the cold storage business, which is a crucial component of the potato value chain.

According to the table, the cold storage owner incurs a monthly salary and wage expense of Tk. 150000. This suggests that the business has a sizeable workforce that is likely responsible for managing the storage and handling of the potatoes. Additionally, the power and electricity expense are Tk. 750500.25 per month, which is a significant cost and suggests that the cold storage facility consumes a considerable amount of electricity.

Other expenses incurred by the cold storage owner include repair and maintenance, license fee, cold storage rent, cold storage charge (per 100 kg of potatoes), machine charge, and other miscellaneous expenses. These costs are relatively minor in comparison to the salary, power, and electricity expenses, but they still contribute to the overall cost structure of the cold storage business.

To calculate the profit margin of the cold storage owner, one would need to subtract the total cost of running the business from the revenue generated by storing and handling potatoes. This analysis could reveal insights into the efficiency and profitability of the cold storage business and help identify areas where cost savings or revenue optimization could be achieved.

4.17 Information of cold storage

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)
8566690	1st March	November	980	1100	1250

Source: (Field survey, 2023)

Table 4.21 provides information on cold storage for potatoes in the selected areas covered by the study. The table presents several key variables related to cold storage, including the average capacity, the month of storage, the month of release, and the price of potatoes at different stages of the value chain.

The average capacity of the cold storage facility is reported to be 8,566,690 kilograms. This information is critical in understanding the storage capacity of the facility and its ability to accommodate the potato supply in the selected areas.

The table also indicates that the potatoes are stored in the cold storage facility for a period of approximately eight months, from 1st March to November. This information is essential in understanding the timing of the potato supply and its storage in the selected areas.

Furthermore, the table reveals the prices of potatoes before harvesting, during harvesting, and during storage. The price before harvesting is reported to be Tk. 980 per 100 kg of potatoes, while the price during harvesting is Tk. 1100 per 100 kg of potatoes. The price during storage, on the other hand, is Tk. 1250 per 100 kg of potatoes.

The information presented in the table can be used to evaluate the effectiveness of the cold storage facility in the potato value chain. For example, the capacity of the facility can be compared to the supply of potatoes in the selected areas to determine whether it is sufficient to meet the demand. Additionally, the prices at different stages of the value chain can be used to identify areas of inefficiency and potential opportunities for improvement.

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	400.25
Bepari	2580000	_	March to September	_	450.00
Wholesaler	9488400	_	March to June	_	450.00

Source: (Field survey, 2023)

The table provided (Table 4.22) contains information about the storage practices of different value chain actors involved in the potato industry. The actors included in the table are farmers, beparis (middlemen), and wholesalers. The table shows the quantity of table potato and seed potato stored by each actor, the duration of storage, and the cost of storage per 100Kg.

The data reveals that farmers store a total of 1,455,520 Kg of table potatoes and 3,095,520 Kg of seed potatoes from March to November. The cost of storage for 100Kg is Tk. 400.25 for both table and seed potatoes. Bepari stores 2,580,000 Kg of table potatoes from March to

September, but there is no information available regarding seed potato storage. The cost of storage for 100Kg is also Tk. 450.00 for table potatoes. Wholesalers store the highest amount of table potatoes, which is 9,488,400 Kg, from March to June. There is no information available regarding seed potato storage. The cost of storage for 100Kg is Tk. 450.00 for table potatoes.

The Table: 4.23 presents the results of a study on the value addition, marketing cost, and net marketing margin of different market actors in the potato value chain. The value chain analysis is an essential tool to identify the value added by each actor in the supply chain and to understand the cost structure of marketing activities.

The table indicates that Faria, a market actor, adds a value of Tk. 1.45 per kg of potato and incurs a marketing cost of Tk. 0.37 per kg, resulting in a net marketing margin of Tk. 1.13 per kg. Bepari adds a higher value of Tk. 2.25 per kg of potato but has a higher marketing cost of Tk. 1.98 per kg, resulting in a lower net marketing margin of Tk. 0.43 per kg.

The wholesaler adds the highest value of Tk. 3.05 per kg of potato but also has the highest marketing cost of Tk. 2.49 per kg, resulting in a minimal net marketing margin of Tk. 0.17 per kg. The retailer adds a value of Tk. 2.25 per kg of potato and incurs a marketing cost of Tk. 1.40 per kg, resulting in a net marketing margin of Tk. 0.85 per kg.

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	1.45	0.37	1.13
Bepari	2.25	1.98	0.43
Wholesaler	3.05	2.49	0.17
Retailer	2.25	1.40	0.85

Source: (Field survey, 2023)

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

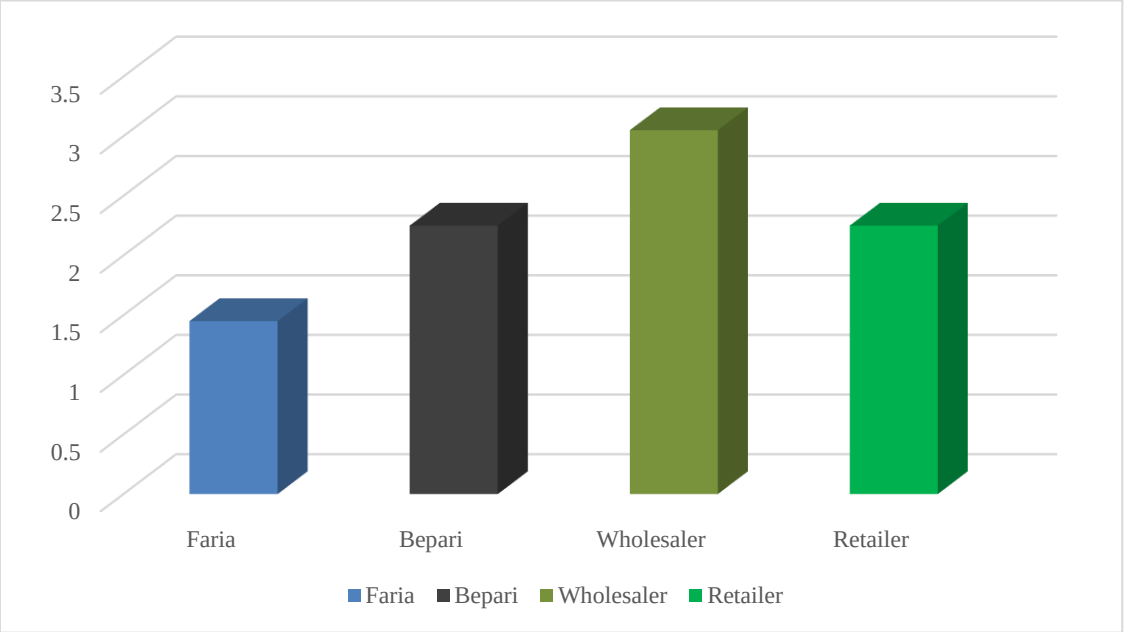

Figure 4.2: Value addition, marketing cost and net marketing margin of different market actors in potato marketing

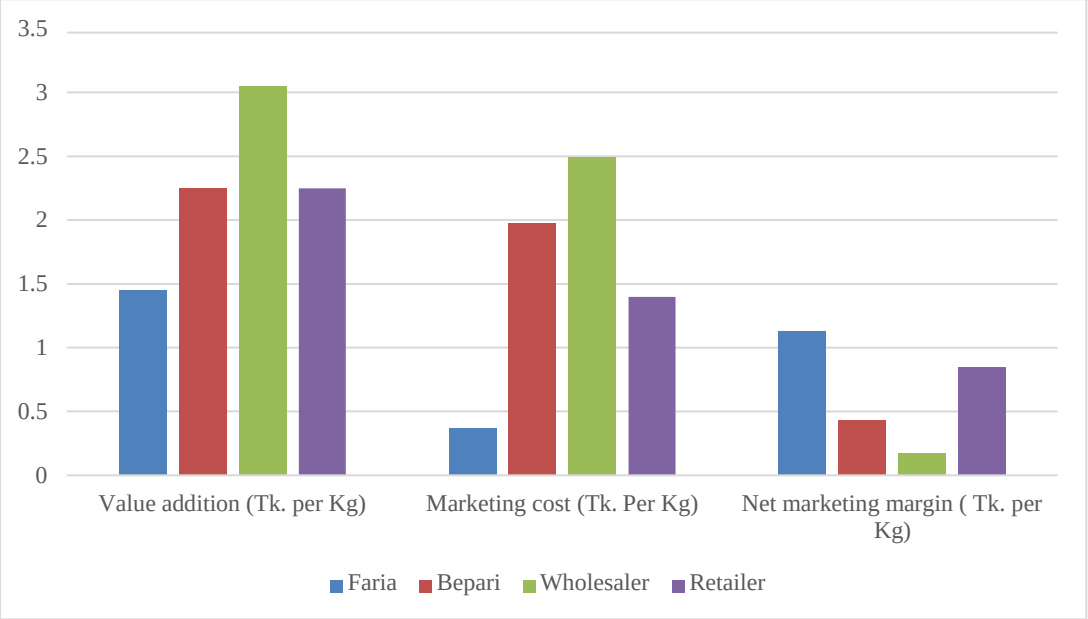

Figure 4.3: Share of different actors in value addition, marketing cost and net marketing margin of potato

In the diverse actors, wholesaler had the highest marketing costs, yet earned the least net marketing margin. On the other hand, faria had the lowest (in %) marketing expense, but earned the second highest net margin (near to the top market share (Figure 4.2).

Figure 4.4 illustrates the potato value chain that is in Bangladesh. In this flow chart all the actors involved in the value chain of potato have been identified by their respective shares. The center point here is the potato producer. Farmers sell potatoes at 1625.55 to 100kg after harvest. In this case, the farmers have included the highest value of 25.78 %. Faria Bepari wholesaler and Retailer also added 9.41%, 15.70%, 15.65%, and 10.97% of value, respectively.

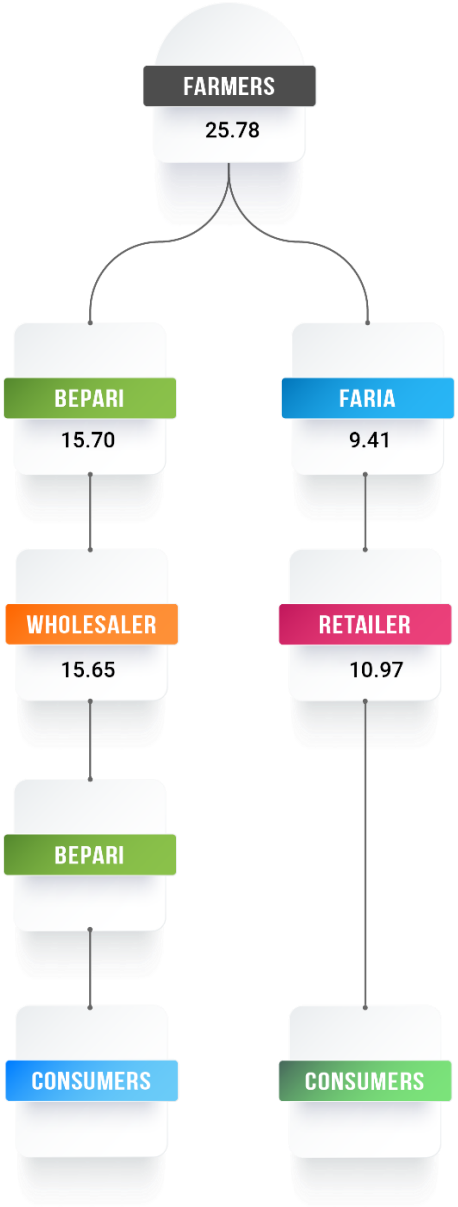

Figure 4.4: Value chain of potato

4.18 Seasonal price fluctuation of potato

The data presented in Table 4.24 shows the seasonal price variation of potato in Panchagarh district and Dhaka district. The table presents the seasonal price index for each month, which indicates the percentage variation in price compared to the average price for the year.

From the table, it can be observed that the seasonal price index for potato in Panchagarh district ranges from a minimum of 66.33 in February to a maximum of 135.80 in December, while the corresponding values for Dhaka district are 68.45 and 138.30, respectively. The mean seasonal price index for Panchagarh district is 10.52, which is significantly lower than the mean seasonal price index for Dhaka district, which is 100.85.

The range of seasonal price index variation for potato in Panchagarh district is 69.47, while for Dhaka district, it is 69.85. This suggests that the variation in seasonal prices is relatively similar in both districts. The standard deviation for Panchagarh district is 22.00, indicating that the data points are relatively dispersed, while for Dhaka district, it is 20.62, suggesting a slightly lower level of dispersion.

Table 4.24: Seasonal price variation of potato

Month	Seasonal price index in Panchagarh 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	110.06
October	115.72	114.27
November	124.45	120.98
December	135.80	138.30
Maximum value	135.80	138.30
Minimum value	66.33	68.45
Mean	10.52	100.85
Range	69.47	69.85
Standard	22.00	20.62

Source: (BBS, 2021)

Following diagram (**Figure 4.5)** was made according to the above table (**Table4.24**).

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

Month	Range of price variation at Panchagarh (%)		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	1010.71	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	189.98	102.35	246.29	72.97

Source: (BBS, 2021)

The table data presented in Table 4.25 provides information on the range of seasonal price variation of potato in two markets, Panchagarh, and Dhaka, over the course of twelve months. The data are presented as a percentage range of high and low prices, which indicates the degree of price variation in these markets during each month.

The table shows that the range of price variation at Dhaka is generally lower than that at Panchagarh. The highest range of price variation in Panchagarh occurs in December, where the high and low prices vary by 189.98% and 102.35%, respectively, while in Dhaka, the highest range of price variation occurs in April, with high and low prices varying by 246.29% and 72.97%, respectively.

Overall, the data suggest that potato prices in both markets are subject to seasonal variation, with the highest price variations occurring in December in Panchagarh and in April in Dhaka. This information could be useful for stakeholders in the potato value chain, including farmers, traders, and policymakers, in making informed decisions about production, marketing, and pricing strategies.

Following diagram (**Figure 4.6**) was made according to the above table (**Table4.25)**

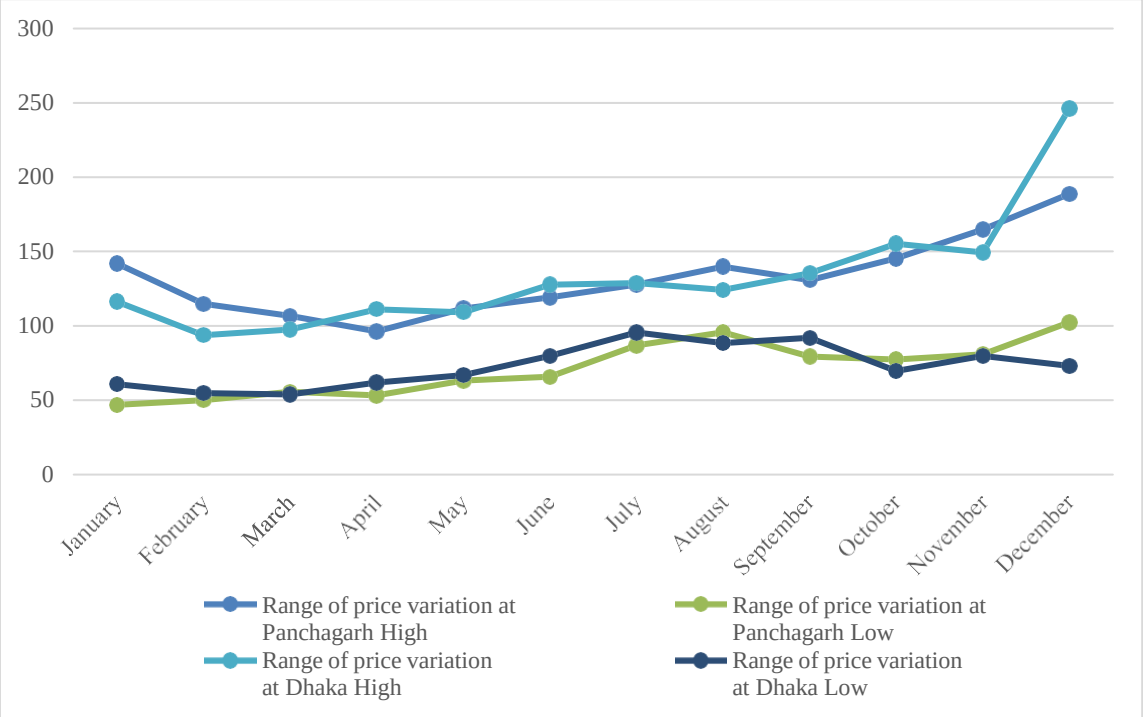

Figure 4.5: Range of seasonal price variation of potato between Panchagarh and Dhaka market

The prices of potatoes have been found to fluctuate during different seasons. The reason for these fluctuations could be due to:

a. The supply of potatoes decreases in November and December particularly in November; however demand remains constant and continues to grow.
b. The farmers also keep seed potatoes all through the season. The price of table potatoes is starting to rise.
c. The reason for the drop in prices for potatoes in February could be due to the supply of potatoes was greater due because of the season for harvest) as opposed to potato demand. Different winter vegetables are also accessible during this time, and the cost of potatoes is beginning to decrease gradually.
d. Storage costs are also a major contributor to the price 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;

Table 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, 2023)

The presented data in Table 5.1 provides insights into the various constraints faced by potato farmers in the selected areas analyzed as part of the value chain analysis. The table highlights

that the most prominent constraint faced by farmers is the prevalence of the sales of poor quality and adulterated inputs such as fertilizers and pesticides by the input supplier, which accounts for 16% of the total constraints faced by farmers. This issue can negatively affect the quality and yield of potato crops, resulting in lower profits for farmers.

Another significant constraint faced by potato farmers is the inadequate capital, accounting for 8% of the total constraints. This issue can limit farmers' ability to invest in high-quality inputs, technologies, and infrastructure, leading to lower yields and profitability. Moreover, the table indicates that lack of quality seeds and improved production techniques and inadequate knowledge and skills on soil, fertilizer, seeds, and disease and pest management are also significant constraints faced by farmers, each accounting for 8% of the total constraints.

The table further highlights that farmer face issues related to post-harvest handling, storage, and transportation, with inadequate knowledge on harvesting, post-harvest handling, storage, and transportation accounting for 8% of the total constraints. Additionally, higher cold storage charges and a shortage of marketing information also pose significant challenges for farmers, accounting for 12% of the total constraints.

5.1.1 Dominance of value chain actors

Value chain actors within the examine region were very small however they were well organized. The farmers were scattered but in a huge range. Fee chain players constantly controlled the marketing device and have played more influential in determining the price of potatoes. This is why the majority of manufacturers were forced to sell their potatoes at a reduced price because there was no method to reclaim the product out of the market due to higher costs for transportation and the risk of causing damage to the potato. Over 54% of the makers (out of 30 buyers) reported the issue as an issue.

5.2 Measures Suggested

Solving for the Problems The measures suggested by the producers for solving the above-mentioned problems are as follows:

- Institutional credit facilities must be available to potato farmers in order to increase the quantity of potatoes produced. The government should make this facility via Bangladesh Krishi Bank (BKB) as well as various commercial bank.

- An adequate amount of inputs including HYV seeds must be provided through the state at subsidized prices in the potato-producing regions.
- Transport facilities should be improved in the areas under study. Based on villages with priority, roads must be constructed at a minimum brick-bedded roads. These must be constructed in order that rickshaws or other motor vehicles are able to move smoothly. This will also aid in reducing transportation costs. Local government administrations could build these facilities.
- Low-cost storage facilities are required to be set up at secondary and primary marketplaces by a local government authority, to offer storage facilities to farmers.
- Farmers' organizations could be created to increase the bargaining capacity of farmers, enabling them to take on value chain actors and get an increase in the value of potatoes.

6.5 Problems Faced by Value Chain Actors

Table 5.2: Problems faced by actors in value chain

Problems	**Actors**
Inadequate good transport	82%
Inadequate capital	72%
Inadequate storage facilities	68%
Inadequate market facilities	70%
Inadequate marketing information	75%
High cold storage charge	56%

Source: (Field survey, 2023)

The data presented in Table 5.2 highlights the problems faced by actors in the potato value chain in selected areas. The table shows the percentage of actors who reported facing specific challenges in the potato value chain.

The most significant problem reported by actors is inadequate good transport, with 82% of actors reporting this challenge. This finding suggests that transportation infrastructure is insufficient to support the smooth flow of potatoes along the value chain, resulting in delays and losses.

The second most commonly reported problem is inadequate capital, with 72% of actors facing this issue. This indicates that actors in the potato value chain are not adequately funded, which could limit their ability to purchase equipment and inputs required for efficient production and processing.

Another critical problem reported is inadequate storage facilities, with 68% of actors indicating this challenge. This finding implies that actors in the potato value chain face difficulties in storing their potatoes, resulting in losses due to spoilage.

The study also found that 70% of actors reported inadequate market facilities. This finding suggests that actors face challenges in accessing markets for their potatoes, limiting their potential for profit-making.

Furthermore, 75% of actors reported inadequate marketing information, indicating a lack of information about market demand and pricing, which could lead to inefficiencies and reduced profitability.

Finally, 56% of actors reported high cold storage charges. This finding suggests that actors incur high costs when storing potatoes in cold storage facilities, which could impact their profitability.

Overall, the data in Table 5.2 underscores the significant challenges faced by actors in the potato value chain, which could limit their profitability and the growth potential of the potato industry in selected areas.

5.3 Measures Suggested for Improving Marketing of Potato

The problems mentioned in Table 5.2 always hindered potatoes' effective marketing and advertising. The cost chain actors who were aware of their problems provided some suggestions to improve the potato marketing machine.

The actors in the value chain wanted plenty of cash to conduct their business. They emphasized that the government needs to make provisions to provide a suitable and easy loan from institutions against the security they provide to their product.

The value chain players suggested specifically the improvement of transportation, along with the machine for verbal exchange in the take a look at the area. The availability of a wide range of transport options can also enhance advertising efficiency by reducing costs.

They warned that storage facilities must be increased in proportion to the decrease in the cost of maintenance by the Government.

The prices of potatoes in particular terminal markets need to be communicated via television, radio, and newspapers, which will lessen the ambiguity of charges. To make the device more accessible to various terminal markets, a significant effort should be taken to reduce the value of advertising.

CHAPTER VI

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 Summary

Potato is a major cash crop and a multi-purpose food source from Bangladesh. Both rich and poor people of Bangladesh utilize potatoes as food, as well as in the form of vegetables. This means that the potential to address the nation's ongoing food shortage is not to be ignored. The potato is grown for selling and as an income-generating crop. The most appealing aspects of this crop include large yields, high-quality and delicious food products. A large number of people are fascinated by potato processing and marketing. Within the supply chain for the marketing strategy, a number of actors like Faria, Bepari, wholesaler dealer and owner of cold storage are involved. They play an essential role in transferring potatoes to the buyers, however the current study focuses on a the value chain separately with a more pronounced cost, in which the players acted by utilizing their margins and costs as intermediaries. The study illuminated the following objectives.

- To assess the socio-demographic situation of actors in the value chain;
- To calculate the value of edition of potato by actors within the value chain
- To determine the seasonal price fluctuations of potatoes in the study region
- To understand the challenges in the potato market and offer some suggestions to improve marketing of potatoes in the targeted zone.

The study was restricted to a tiny area where the potato production was in a concentrated area. The study was restricted to three villages within the Panchagarh district of different Upazila. To collect data from potato farmers these villages were randomly chosen. The sample size for farmer was determined to be 25 farmers from four villages to make it easier. From the total of twenty-five farmers, there were 10 were from Toria 10 came from Mirzapur and five from Dhamor village located in Atwary Upazila. Also, data were collected from the various actors involved on the assessment of the value of marketing potato in the regions of study. The players involved in the promotion of potato were Faria, Bepari, wholesalers, owners of cold storage and retailers. There were 65 participants comprising 15 Faria 15 Bepari fifteen wholesalers of Atwary Upazila and 20 retailers from Panchagarh sadars from particular primary markets were picked to research.

In the current study five cold storage facilities that comprised about 20 % of the total amount of cold storage facilities located within the study area were selected using simple random sampling methods. Utilizing different interview scheduling and methods, the primary data was gathered from the farmers who were interviewed and other stakeholders. Secondary data was gathered from various journals, books, and other organizations like the Bangladeshi Department of Agricultural Marketing, online scans, and the government publications. To analyze data using descriptive and tabular methods were employed.

In light of the fact that potatoes are an important crop in Bangladesh it is believed that the product has went from the seller to the consumer through various modifications i.e. through market actors like Faria Bepari, Faria wholesalers and retailers as the potato has to travel across a distance from the point of manufacture to the consumer.

Within Atwary Upazila, potato are transported via five chains that go from the farms' hands to the homes of the consumers. The longest chains of publicity is the chain III. The main actors in this chain were manufacturers, Faria, Bepari, wholesaler, retailer and distant wholesaler who carried out activities of value enhancement and used a percentage of marketing as a potato.

Grading was done by actors and farmers typically based on visual estimation, based on the dimensions and consistency that the product was. The majority of actors and farmers are self-financed to operate and produce within the distribution chain. The price at the gate of the farm for potato paid to farmers per 100 kg was Tk. 1080.53 and the highest price per 100 kg of potato that retailers paid was Tk. 2000.00. The highest price for sales per 100 kg of potatoes as reported by retailers was Tk. 2225.00 as well as the lowest price of sales per the farmers' estimates was Tk. 1625.55. The interest on operating capital of a farmers was Tk. 5.85 per 100 kilograms of potato. Gross profit, margin gross, and net return to the farmer per 100kg of potatoes was. 1625.55, Tk. 1051.92 and Tk. 427.54, respectively.

The largest average potato transaction that wholesalers receive was 7500kg per day. The smallest average amount of potato purchased by retailers was 120 kilogram per day. The highest marketing cost paid by wholesalers was Tk. 292 per 100 g of potato. The lowest marketing cost paid through Faria per 100 g of potatoes was Tk.

25.00. The average costs for storage of 100 g of potato for wholesalers was Tk. 62.70 per month. The smallest costs for storage per 100 kg of potato for farmers was Tk. 51.40 per month.

The most value added by wholesalers for 100kgs of potatoes was. 264.00 of value added total and the lowest amount added by Faria per 100 kg of potatoes was Tk.150.00 of value addition total. In percentage form of value added, the highest value added by wholesalers was 17.45 % and the lowest value that was added by Faria was 9.41 % of total value added.

The seasonal price fluctuations of potatoes was more evident than of the other field crops. When the harvest season is at its peak prices are extremely low, but it can become too high prior to the time for planting. The frequent and unintentional price fluctuations resulted in fluctuations in the market and have higher risks for the production of potatoes as well as the industry of potatoes. There was a strongly relationship between the fluctuations in prices of potato prices in Panchagarh as well as those in the Dhaka market.

There were many issues that faced farmers during the production and distribution of the potato in both areas of study. Insufficient resources, a shortage of good quality potatoes as well as pest and disease attack insufficient inputs and low prices for potatoes transportation problems, a shortage in market infrastructure, a high shifts of cold storage facilities, a shortage of storage facilities, and the dominance of certain key players within the value chain are among the most significant issues they had to face.

The analysis revealed several major problems in the value chain that are faced by players. The lack of funds, the inability of credit with high interest rates poor communication facilities, sluggish prices, no storage facilities, high storage costs and inadequate marketing facilities were among the major challenges they had to face.

Owners of the cold store within the area of study faced a variety of problems in the administration of their business. Insufficient money and excessive interest charges on loans and uncertainty regarding how much electricity is available as well as taxes on income were all excessive for the major problems they faced. Therefore, the information regarding their tax and debt are not disclosed.

6.2 Conclusion

In order to ensure sustainability and growth of the sector's agricultural production, and also for the country's economy potatoes are vital. It is directly linked to the nation's employment growth as well as food security the education system and poverty reduction. In recent years potato has witnessed significant progress despite having little capability and capabilities. But the government hasn't enough recognized its contributions and its importance in the commercial sector. Initiatives related to technical and managerial skills input supplies as well as business and technology expertise and a few policy issues are essential to maximize the potential of this important crop. In the previous parts of the report an extensive examination and analysis of value chain and supply chains of potatoes is carried out and the constraints, as well as service offerings to overcome these obstacles and possible service providers are identified. Based on the results there are a few important business development and other services must be implemented to boost the development of potato-related industries in Bangladesh. An integrated public and private collaboration strategy is expected to bring significant modifications to this sub-sector.

6.3 Recommendation

There are many challenges with the potato production process and marketing. Here are some possibilities for solutions are discussed.

6.3.1 Improve agricultural practices:

- Encourage the adoption of modern farming techniques, such as precision agriculture, to enhance productivity and reduce resource wastage.
- Provide training and technical support to farmers on best practices in potato cultivation, including seed selection, pest and disease management, and irrigation methods.
- Promote the use of quality-certified seeds to ensure higher yields and disease resistance.

6.3.2 Strengthen farmer-producer linkages:

- Establish strong linkages between potato farmers and producer organizations to facilitate access to credit, inputs, and market information.

- Promote the formation of farmer cooperatives or associations to enable collective bargaining power and economies of scale in input procurement and marketing.
- Facilitate knowledge-sharing platforms and farmer field schools to disseminate information on market requirements, quality standards, and sustainable farming practices.

6.3.3 Enhance post-harvest handling and processing:

- Encourage the establishment of modern storage facilities, such as cold storage units and controlled atmosphere storage, to reduce post-harvest losses and ensure the availability of potatoes throughout the year.
- Invest in infrastructure and equipment for sorting, grading, and packaging to improve product quality and market competitiveness.
- Promote the development of small-scale processing units for value-added potato products, such as potato chips, flakes, and dehydrated products, to diversify the product range and capture higher-value markets.

6.3.4 Strengthen market linkages and market intelligence:

- Establish market information systems to provide timely and accurate data on potato prices, demand trends, and market opportunities.
- Encourage the formation of farmer-market linkages through contract farming arrangements or direct marketing initiatives.
- Facilitate the participation of potato producers in trade fairs, exhibitions, and business-to-business meetings to expand market access and foster relationships with potential buyers and exporters.

6.3.5 Promote research and development:

- Allocate resources to research and development initiatives focused on potato breeding, disease resistance, and crop management practices tailored to the local context.
- Collaborate with research institutions, universities, and international organizations to leverage their expertise in potato research and technology transfer.
- Encourage public-private partnerships to support innovation and commercialization of new potato varieties and technologies.

6.3.6 Strengthen policy support:

- Formulate and implement supportive policies and regulations that address the specific needs and challenges of the potato industry, such as providing subsidies for inputs, credit facilities, and insurance coverage.
- Conduct regular monitoring and evaluation of policy implementation to ensure effectiveness and identify areas for improvement.
- Foster collaboration among government agencies, private sector actors, and farmer organizations to create an enabling environment for the sustainable development of the potato value chain.

6.4 Findings

6.4.1 Production stage:

- The potato farmers in the selected areas of Panchagarh district predominantly follow traditional farming practices with limited use of modern techniques.
- There is a lack of awareness among farmers about improved seed varieties, leading to lower yields and susceptibility to diseases.
- Inadequate irrigation facilities and limited access to quality inputs hinder optimal potato production.

6.4.2 Processing stage:

- The potato processing industry in the region is underdeveloped, with a limited number of small-scale processing units.
- Insufficient post-harvest infrastructure, such as storage facilities, results in significant post-harvest losses.
- The absence of value-added processing activities limits the potential for higher-value potato products.

6.4.3 Marketing and distribution:

- Farmers face challenges in accessing markets due to limited market information and weak linkages with buyers and processors.
- Price fluctuations and lack of market intelligence lead to uncertainty in decision-making and inadequate price realization.

- Inefficient transportation and logistics systems contribute to post-harvest losses and increase marketing costs.

6.4.4 Policy and institutional support:

- Existing policies and regulations related to the potato sector lack specific provisions addressing the unique needs and challenges faced by potato farmers and processors.
- Limited coordination among government agencies, research institutions, and industry stakeholders hampers the effective implementation of supportive measures.
- Insufficient financial support and technical assistance hinder the adoption of modern farming practices and the development of the potato value chain.

6.4.5 Research and development:

- There is a lack of research and development initiatives focused on potato breeding, disease management, and sustainable farming practices tailored to the local context.
- Limited collaboration between research institutions and farmers restricts the transfer of knowledge and innovative technologies.
- The potential for developing improved potato varieties with higher yields and disease resistance remains largely untapped.

6.4.6 Environmental sustainability:

- Inefficient use of water resources and inadequate waste management practices contribute to environmental degradation.
- Pesticide misuse and improper disposal pose risks to human health and the ecosystem.
- The adoption of sustainable farming practices, such as integrated pest management and water conservation techniques, is limited.

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APPENDIX

Interview Schedule

Interview Schedule for Farmer

Serial No: ☐ Date: ☐

1. Area:

District:……Upazila:……...

Union/Pourashava…… Village/Road:……..

2. Family size…….....

3. Educational Qualification (put √ 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 √ mark):

☐ Yes ☐ No

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

7. What is the source of potato seeds? (Put √ 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)
Variable Cost	
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	
Fixed Cost	
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:

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:

Interview Schedule for Faria

Serial No: ☐ Date: ☐

6. Location of faria:

District:……Upazila:……...

Union/Pourashava…… Village/Road:……..

7. Educational qualification of faria (Put √ mark):

☐ Illiterate ☐ Primary ☐ Secondary ☐ Higher Secondary ☐ Above degree

8. When did you start your business?

9. Does the price vary for different sellers? (Put √ 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:

Interview Schedule for Bepari

Serial No: ☐ Date: ☐

10. Location of bepari:

District:……Upazila:……...

Union/Pourashava…… Village/Road:……..

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

☐ Illiterate ☐ Primary ☐ Secondary ☐ Higher Secondary ☐ Above degree

12. When did you start your business?

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

☐ Farmer ☐ Faria ☐ W.S ☐ Aratdar

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

Yes ☐ No ☐

15. 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	

16.Where do you sell your potato?

17.How do you set selling price?

a) Purchase + cost + fixed amount of profit

b) Price set by government

c) Market price

d) Others

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

Yes ☐ No ☐

19. How much times do you store potato?

20. What are the main problems of your business?

21. What are the solutions?

Signature: Date:

Interview Schedule for Wholesaler

Serial No: ☐ Date: ☐

22. Location of wholesaler:

District:……Upazila:……...

Union/Pourashava…… Village/Road:……..

23. Educational qualification of wholesaler (Put √ mark):

☐ Illiterate ☐ Primary ☐ Secondary ☐ Higher Secondary ☐ Above degree

24. When did you start your business?

25. From where do you buy potato? (Put √ mark): ☐ Farmer ☐ Faria ☐ AW.S ratdar

26. Does the price vary for different sellers? (Put √ mark): ☐ Yes ☐ No

27. 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	

28. Where do you sell your potato?

29. How do you set selling price?

a) Purchase + cost + fixed amount of profit

b) Price set by government

c) Market price

d) Others

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

Yes ☐ No ☐

31. How much times do you store potato?

32. What are the main problems of your business?

33. What are the solutions?

Signature: Date:

Interview Schedule for Retailer

Serial No: ☐ Date: ☐

34.Location of Retailer:

District: ……Upazila: ……...

Union/Pourashava…… Village/Road: ……..

35. Educational qualification: (Put√ mark):

☐ Illiterate ☐ Primary ☐ Secondary ☐ Higher Secondary ☐ Above degree

36. When did you start your business?

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

☐ Farmer ☐ Faria ☐ W.S ☐ Aratdar

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

Yes ☐ No ☐

39. 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	

40.Where do you sell your potato?

41.How do you set selling price?

a) Purchase + cost + fixed amount of profit

b) Price set by government

c) Market price

d) Others

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

Yes ☐ No ☐

43. How much times do you store potato?

44. What are the main problems of your business?

45. What are the solutions?

Signature: Date:

Interview Schedule for Retailer

Serial No: ☐ Date: ☐

46.Location of Retailer:

District: ……Upazila: ……...

Union/Pourashava…… Village/Road: ……..

47. Educational qualification: (Put√ mark):

☐ Illiterate ☐ Primary ☐ Secondary ☐ Higher Secondary ☐ Above degree

48. When did you start your business?

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

☐ Farmer ☐ Faria ☐ W.S ☐ Aratdar

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

Yes ☐ No ☐

51. 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	

52.Where do you sell your potato?

53.How do you set selling price?

e) Purchase + cost + fixed amount of profit

f) Price set by government

g) Market price

h) Others

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

Yes ☐ No ☐

55. How much times do you store potato?

56. What are the main problems of your business?

57. What are the solutions?

Signature: Date: