A STUDY ON MARKETING CHANNEL, PROFITABILITY AND STORAGE FACILITY OF POTATO IN RANGPUR DISTRICT

GOLAM TAHABUR

DEPARTMENT OF AGRIBUSINESS AND MARKETING

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

DHAKA - 1207

JUNE 2021

A STUDY ON MARKETING CHANNEL, PROFITABILITY AND STORAGE FACILITY OF POTATO IN RANGPUR DISTRICT

BY

GOLAM TAHABUR

Registration No: - 19-10094

A thesis

Submitted to the Department of Agribusiness & Marketing,

Sher-e-Bangla Agricultural University, Dhaka , in

partial fulfillment of the requirements

for the degree of

MASTER OF SCIENCE

IN

AGRIBUSINESS AND MARKETING

SEMESTER: JULY-DECEMBER, 2020

APPROVED BY:

_____	_____
Md. Abdul Latif	Dr. Sharmin Afrin
Professor	Associate professor
Department of Agricultural Statistics	Department of Agribusiness and
Sher-e- Bangla Agricultural University	Marketing
Supervisor	Sher-e- Bangla Agricultural University
	Co-supervisor

_____

Md. Rashidul Hasan

Chairman

Associate Professor

Department of Agribusiness and Marketing

Sher-e-Bangla Agricultural University

Dhaka-1207

i

CERTIFICATE

This is to certify that the thesis entitled"**A STUDY ON MARKETING CHANNEL, PROFITABILITY AND STORAGE FACILITY OF POTATO IN RANGPUR DISTRICT**" 'submitted to the faculty of Agribusiness Management, Sher-e-Bangla Agricultural University Dhaka, in partial fulfilment of the requirements for the degree of **Master of Science in Agribusiness and Marketing,** embodies the result of a piece of bona fide research work carried out by **GOLAM TAHABUR** Registration Number: **19-10094** 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 during this course of investigation has duly been acknowledged.

Date:

_____
Md. Abdul Latif
Supervisor & Professor
Dept. of Agricultural Statistics
Sher-e-Bangla Agricultural University
Dhaka-1207

Dedicated

To

My Parents

ACKNOWLEDGEMENT

ABSTRACT

Present study was carried with a view to examine the channels of potato market from farmers to consumers through various stages, determine the profitability of storing potato in cold storage, estimate marketing margin factors affecting marketing margin, identify the problems and suggest measures for its improvement. This study mainly based on 110 samples, randomly selected from the study areas in Rongpur District. The sample included 56 farmers, and 16 Beparies, 8 wholesalers/Arothers, and 20 retailers and 10 samples were selected from cold storage owners. Primary data were collected during the month of September to October 2021. Secondary data were collected from publications of different institutions including BBS. The study indicates that marketable surplus of potato of the growers is around 88 percent of the total production Various intermediaries participated in the potato marketing channels were Bepari, wholesaler, Aroldher (commission agent), retailer and cold storage owner. The study revealed that local marketing channel-1l consisted of Farmer - Bepari -Wholesaler Retailer- Consumer was the most efficient. Farmers' traditional method of storing potato appears to be more economic in short term storage (three months or less) and in long duration storage in cold storage (four to nine months) was more effective. Potato storage loss was higher traditional method. It was found that the storage loss were 6.8% and 4.37% for farmers and intermediaries in traditional method, respectively. In case of cold storage method the storage loss was 2.6% for both the farmers and intermediaries. The average net margins (profit) of Beparie, wholesalers, and retailers were Tk. 29.11, Tk. 23.59, and Tk. 64.45 per quintal which was 4.64%, 3.76% and 9.95% of total investment, respectively. Among the intermediaries marketing margin was the highest in retailers and the lowest in wholesalers. To identify the factors affecting marketing margin of intermediaries, thirteen variables included in the multiple linear model which transportation cost, storage cost, wastage/damage cost, loading and unloading cost, packaging cost, commission cost, market toll cost, personal expenses cost, other marketing cost, purchase price and sale price found statistically significant. The potato farmers and intermediaries in the study area faced various types of marketing problems like low price, price fluctuation. shortage of capital, high charge of cold storage, lack of marketing facility, lack of proper grading, lack of adequate marketing information, perish ability of potato etc. Increased credit facilities, improvement of transportation facilities, providing extension services, ensuring better and incentive price policy, establishment of processing industries and increased export by taking favorable export policy would be helpful to solve the problems.

TABLE OF CONTENTS

LIST OF TABLES   **Page**

CHAPTER I

INTRODUCTION

1.1 General description

Bangladesh is primarily an agricultural country dominated by crop production. Agriculture is the backbone of the economy of Bangladesh. She enjoys generally at sub-tropical monsoon climate. Bangladesh has been famous for growing large variety of tropical crops particularly rice, wheat, potato, jute, pulses, oilseeds, sugarcane and tobacco. Bangladesh is one of the most densely populated countries of the world with a population of nearly 169.3 million. The current population growth rate is about 1.37 percent per annum and over all male-female ratio is 102: 100 (BBS, 2020). The country covers an area of 147,570 sq. km. The available per capita cultivated land area is about 0.048 ha (BBS, 2019)

Although agriculture is the most important activity in the country, it does not produce enough food for the large population or earn sufficient foreign exchange to allow the import of other necessary items. Low productivity per unit area of cultivated land due to the use of traditional inputs and methods in the production system has been an important constraint on national food self-sufficiency (Hoque, 1978).

Hence, it is evident that Bangladesh needs the development of her agriculture sector, so that its population can lead better life. The area of Bangladesh is about 14 29 million hectares of which 66 percent is cultivated, 15 percent is utilized for forest and the rest 19 percent is covered by homesteads, rivers, tidal creeks, lakes, ponds, roads etc. (Ahmed, 1982). So, there is little scope left to increase agriculture Share Bangladesh agriculture plays a vital role in the growth and stability of the national economy. Bangladesh farming plays an imperative part within the development and soundness of the national economy. The overall performance of agricultural sector from 2015-16 to 2019-20 are displayed in Table 1.1

Table1.1 Contribution of different sub sectors of agriculture to GDP (Percent) at constant price (Base; 2005-06=100)

Year	Contribution of different sub sectors of agriculture to GDP(%)				
	Agriculture	Crops	Livestock	Fisheries	Forestry
2015-16	14.78	.88	3.56	6.11	5.12
2016-17	14.06	.96	3.54	6.23	5.60
2017-18	13.41	3.06	3.40	6.37	5.51
2018-19	13.65	1.96	3.31	6.21	8.34
2019-2020	13.35	3.47	3.19	6.02	7.36

Source; BBS 2015- 2020

Agriculture sector contributes 13.35 percent to the country's total GDP. At the present the crop sector alone contributes 22.58 percent to the total GDP and about 72 percent to the agricultural GDP. About 40 percent of the total labour force is employed in agriculture of which 27 percent is in the crop sector (Planning Commission, 2020). This sector not only employs most of the national labour force but also supplies food for human and animal consumption; raw materials for the industrial production, sustain the rural economy and natural balance.

1.2 Importance of potato

Bangladesh is recognized as a rice-eating nation; nevertheless, large quantities of potato are produced and consumed each year. In Bangladesh potato is gradually gaining popularity. So long, most of the people used to take potato (Alu) as a vegetable only. But today it is gradually becoming popular in other forms. Shingara, Alu Puree, Alu chop. Mashed potato, Potato chips had been popular delicacies for long in this country. But today, Alu Payesh, Alu Roti, Alu Luchee and various other innovative potato dishes are gaining popularity among the people. This has opened the avenue to small-scale kitchen processing of potatoes at domestic level.

Value added potato French fries can be produced from fresh potatoes for local elite markets as well as for export markets. Bangladesh potatoes have international demand

and other varieties in demand can be grown here. There exists scope for establishment of French fries production plants by local entrepreneurs as well as joint venture companies. Potato chips also have domestic and foreign markets. Many local companies produce potato chips. Potato chips have captured good markets even in remote areas of Bangladesh. Potatoes grown in Bangladesh are suitable for production of potato flakes.

Potato crops are created from crude potatoes which are more often than not utilized for planning of bread and solutions Potato crops are prepared to utilize". Potato chips have incredible worldwide request in created nations just like the UK, USA, Germany, Switzerland and Italy. Request for potato pieces in Italy alone has been anticipated at 25,000 MT per year. Potato pieces generation innovation is moderately basic and labor seriously. By and large, one kilo of potato crops is sold for USS 5 to US$ 6 (Khan, 2002). Potato is one of the critical sources of carbohydrates and it contains an calculable sum of vitamin B and C and a few other materials (Thompson and Kelly 1957), World per hectare supplement yields of potatoes, nice and wheat are appeared within the Table 1.2.

Table 1.2 Per hector nutrient yield of potato, rice and wheat

Food nutrients	Potato	Rice	Wheat
Fresh weight	14.82	1.73	1.98
Dry nutrient	3.71	1.48	1.48
Caloric (kilo-calorie)	14.33	5.68	6.42
Carbohydrate(kg)	3349.32	1039.10	1338.74
Protein (Kg)	237.12	113.62	222.30
Fat (Kg)	14.82	7.41	27.17
Minerals (Kg)	88.92	9.88	27.17
Calcium (gm)	1482.00	167.96	770.64
Phosphorus (gm)	5928.00	2494.70	5755.10
Iron (gm)	103.74	51.87	56.81
Vitamin A/Carotene(ml.gm)	3556.80	-	741.00
Vitamin. B(gm):			

a. Thiamin	14.82	3.71	8.40
b. Riboflavin	1.48	0.74	4.94
c. Niacin	177.84	74.10	83.98
Vitamin C(gm)	2519.40	-	-

Source; Ahmed and kamal (1994)

It is observed that potato is superior to rice or wheat particularly in terms of supplying Carbohydrates, Protein, Minerals, Calcium, Iron, Vitamin A or Carotene, Vitamin C etc.

1.3 Area, production and yield of potato in Bangladesh

The land and climatic conditions of Bangladesh are amicable to the production of potato. Potato is the third important crops in Bangladesh cultivated winter season (Elias et al. 1998). Area and production of potato during the period from 2015-16 to -2020-21 are appeared within the table 1.3.

Table 1.3 Area, yield and production of potato in Bangladesh 2015-2016 to 2019-2020

Year	Area ('000 ha)	Yield(ton/ha)	Production('000 ton)
2015-16	475488	19.476	9474098
2016-17	499725	20.443	10215957
2017-18	477400	20.411	9744412
2018-19	468375	20.614	9655082
2019-20	461317	20.822	9605624

Source; BBS 2019-20

Within the later a long time, potatoes have involved an imperative position in Bangladesh. Generation of potato has expanded significantly within the nation shape 2015-16 to 2019-2020. Area under potato has increased to 461.31 thousand ha in 2015-16 from 475.48 thousand hectares in 2019-20.The average yields per hectare for the country increased from 19.47tons to 20.82 tons during this period. The area, production and yields are not likely to increase or decrease uniform rates.

1.4 Problems of potato marketing in Bangladesh

Agricultural marketing is the crux of the problem of agricultural improvement in Bangladesh. Each country and each product have unique marketing problems. Marketing of perishable crop in Bangladesh like potato is affected by its nature, climatic conditions, availability of transportation facilities and size of market demand and the efficiency of information system

Agriculture marketing, till recently was not fully accepted as an element in agricultural development in Bangladesh. It occupies a fairly low place in agricultural development policies. Marketing has been defined as the performance of all business activities involved in the flow of food products and services from the point of initial agricultural production until they are in the hands of consumers (Kohls and Uhl. 1980). The movement of the products from the field to the consumer in adequate quantities and at a minimum incidental cost, and at a reasonable margin of profit to the traders, presupposes the existence of an efficient marketing system (Ahmed and Elias, 1988).

In recent year's seasonal variability in potato arrivals and prices has created serious marketing problems to its farmers, consumers, traders and policy makers in potato growing regions of the country. This seasonal and semi perishable nature of potatoes is reflected in gluts in harvest season and acute scarcity in off-season resulting uneconomic prices to its growers during harvest season and high prices to the consumers in off-season. The potato growers face more trouble in marketing than in production. Sale of potatoes at a reasonable price and at the desirable time is the major problem.

In view of the above problematic situation, potato needs a highly developed marketing system to make it available consumers throughout the year. But like the general inefficiency of the agricultural marketing system in Bangladesh, potato marketing is also found to be inefficient due to existence of the some problems concerning marketing functions.

1.5 Storage problems

Potato production has expanded quickly in Bangladesh over the past two decades, but proceeded development is compelled by post-harvest and promoting defects. Expansive and variable intra-seasonal cost developments show lacking potato capacity framework and destitute coordination between potato makers, showcasing specialists, and clients. Capacity includes time utility and makes a difference to bring around the efficient promoting of rural create. Regular supplies and the semi-perishable nature of potatoes cause savage cost change amid a year. For evenhanded dispersion of supplies and keeping up cost steadiness amid a year, the capacity of potatoes gets to be all the more vital (Chatha and Sidhu, 1980).

Potato storage in Bangladesh is likely to have a great impact on Agriculture regulating potato marketing specially during harvest and ensuring its steady supply to its reasonable price to the consumers during long run period. The seasonal character of potato arrivals coupled with non availability of storage facilities greatly influence the small farmer failure to retain them for future use/sale which leads to post harvest marketing glut of potatoes and compel them to sell at low price. As a whole, 86 percent of the total potatoes is sold during harvest (January to April) and the rest is sold after harvest. May December, (Sarker et al., 1992).

Khan and Khan (1999) say that, the cold capacity industry has thrived in Bangladesh exceptionally quickly. There are around 400 cold capacity plants in Bangladesh with a capacity to store approximately 0.74 million tones of potatoes each a long time, but capacity 0.97 million tones was made in 2019-20 (BBS, 2020). Add up to capacity of putting away potato within the existing cold capacity plants were not completely utilized due to a few reasons, such as tall cold capacity charge, troublesome communication and transport offices, physical condition of cold capacity plants and fixing with the agriculturists and dealers who store potato. Beneath utilization of capacity of cold capacity plants certainly increment the cold capacity costs (Rahman, 1993). Afsar (1997) detailed that about 40 percent of yearly yield of potato is kept in cold capacity up to 7-8 month.

Due existing capacity issues of potatoes in Bangladesh the cultivators are the most exceedingly bad sufferers. Subsequently, once they don't get sufficient financial pick up, they may not hold much excitement to go for potato development amid the taking after season coming about in a shortage into the potato advertise. The mediators included in potato showcasing too barely take any extraordinary care for potato capacity, since few of them have their possession or rented storage space within the secondary and dispersion markets as well as within the terminal markets.

1.6 Justification of the study

Marketing of potato is as vital as its generation. Since potato is a vital vegetable and is developed by the ranchers basically for cash profit from the point of seeing of getting reasonable cost, its range and generation are broadly impacted by its cost, which enormously There has been a critical increment within the production of potatoes within the nation amid the final 20 a long time A generally tall surrender beneath tall advantage taken a toll proportion of generation of the trim with the presentation of cutting edge advances have perhaps given an motivating force to the ranchers to extend the zone as well as generation of potatoes and thereby to raise the showcased excess of potatoes in Bangladesh which is able create more send out and more utilization. But the existing advertises foundation has fizzled to handle the expanding overflow of potatoes. This makes wide cost vacillations over time and space. A sharp cost decrease amid and quickly after gather has denied the potato agriculturists from getting a profitable showcase cost for their deliver depends on way better marketing offices. The producer are compelled to offer major portion of they created quickly after gathering at an awfully moo cost primarily since of not indeed brief capacity convenience being accessible to them and tall cold stockpiles charge. Due to existing capacity and showcasing issues of potato in Bangladesh, the maker is the most noticeably awful sufferer and once he does not get sufficient financial pick up, he may not hold much eagerness to go for potato development during the taking after season. Capacity is additionally critical from the perspective of customary supply all through the year. Another imperative component of promoting to be specific handling may too open modern openings of pay and work. Other than, post collect operations to be specific pressing, capacity and promoting make work

openings. The present study intends to find out some of the shortcomings of the storage and marketing of potatoes so that increasing production can be maintained. It is widely believed that potato growers do not get fair price due to the lack of economic and scientific storage, transportation facilities and lack of proper market information and urgent requirement of money immediately after the harvesting period by the farmers. Thus, there is a great need for an efficient storage and marketing system in order to sustain and accelerate potato production and thereby to promote agricultural growth in the country. Marketing efficiency implies lowering marketing cost and margins and passing the advantages to producers whose role is crucial for the benefit of ultimate consumers.

District Rangpur occupies a prominent place in potato production. It accounted for an area of 35300 hectare and recorded a production 350200 metric ton in the year 2019-2020 (BBS 2020). The present study has been designed examine the various features of potato marketing in Rangpur sadar Upazila with a view to assessing the marketing performance by analyzing marketing margins of intermediaries, net share of producers, marketing costs, profitability analysis of storing potato and the existing problems in potato storage and marketing. On the basis of findings of the study specific recommendations will be made to help the producers, consumers, intermediaries (traders) and policy makers in the formulation of viable policies regarding production and marketing of potatoes in Bangladesh.

1.7 Objectives of the study

The overall objective of the study is to analyze and appraise the existing state of production, preservation and marketing of potato in the study area, the specific objectives of the study are as follows:

a) To examine the existing marketing channels of potato in Rangpur district.

b) To determine the profitability of storing potato in traditional and cold storage method.

c) To estimate marketing margins of different market intermediaries.

d) To identify factors effecting marketing margin of intermediaries.

1.8 Limitations of the study

The limitations of the study include:

1. The study was restricted to one Upazilla where potato production was concentrated. Two unions under that Upazilla were selected purposively. The study might provide more meaningful results if it covered a number of Upazilla producing potatoes.

2. The second limitation was the limitations of time. Due to shortage time the study could not cover wide areas for collecting necessary information.

3. Thirdly, a very important limitation of the study was that for collecting necessary information the researcher had to depend solely on the memory of the potato growers and traders because they did not keep written records. It was, however, observed that growers and traders if interrogated systematically within the limits of their memory could recollect the correct answers to the questions put to them.

Moreover, during data collection some difficulties were faced in eliciting answer from a number of both potato traders and cold storage authorities. They at first hesitated providing actual information in the fear of enhanced income taxes and other consequence, which was especially true for the latter, and they feel disinterest because it could not help them immediately. However, they were ultimately convinced to report the facts.

CHAPTER II

REVIEW OF LITERATURE

Literature, which relates to the present study have been reviewed in this chapter with a view to understand the modus operandi, method and cause-effect relationship of past and present research work. This would help in narrowing down. the problem correctly and in selecting the most appropriate technique of analysis for meaningful representation of data. Such review of literature was not limited to works done in Bangladesh only but was extended to other countries for having a broader view.

In Bangladesh, considerable numbers of research studies were done on potato, which centered on estimation of production cost, gross return, gross margin and resource use efficiency. Very few studies have been conducted on storage and marketing which are mostly inadequate and reflected very past situation.

Sabur (1988) in his study made an attempt to examine the variation in distribution pattern and factors influencing marketed surplus of potato in two selected areas of Bangladesh. In the study marketed surplus was used in two different ways. Gross marketed surplus was defined as the actual quantity sold by the farmers either on cash or through barter system. On the other hand, net-marketed surplus was defined as the Gross Marketed Surplus minus the "Buy back". The study reveals that on an average 89 per cent of potatoes produced are sold off, out of which 71 per cent during harvest time and the residual (18 per cent) at a latter period. Small farmers sell relatively higher portion of their produce during harvest time compared to other groups of farmers..

Rahman (1993) conducted a study in Munshingonj and Narayangonj to investigate the comparative cost and return as well as loss arising from storing potato under traditional as well as in cold storage. A fact that emerged is that gross return as well as net return was higher under cold storage system compared to traditional storage system. Although total cost of storing potato in cold storage plants was higher than the traditional method, the former is more profitable than the latter.

Sarker et al., (1992) conducted a study to analyze the economics of marketing potatoes by farmers in Sadar Upazila of Naogaon district. The study revealed that per farm sale was the highest (152 quintals) for large farms and the lowest (42 quintal) for small farms and the largest volume of sale (79%) was made at the market place. The major elements, which constitute the marketing cost, are transportation, storage and wastage. It emerged from the study that higher proportions of potatoes (36%) are kept at home for consumption while significant volumes of potatoes (33%) are used for seed purpose, which is stored in cold storage. The findings indicate an inverse relationship between farmer's net share and the length of marketing channel i. e. the larger the marketing channel the lower is the farmer's net share.

Naik and Patnaik (1989) studied marketing costs; margin and price spread of potato marketing in Orissa of India under three marketing situations. The first situation had three middlemen, the second situation had two middlemen and the third situation did not have any middleman. Marketing of potato in Orissa involves the participation of a number of middlemen between the producers and ultimate consumers. Consequently, the price paid by the latter decreases when it reaches to the producers. There is a substantial difference between the price paid by consumers and the price received by producers and a substantial part of it is appropriated by a large number of middlemen operating in the potato trade. The middlemen's share can be reduced by eliminating some of the intermediaries participating in the potato trade along with some of their services and bringing consumers closer to producers. The absence of any sort of control or regulation over the trade form Government rather provides free hand to traders. Thus, it suggested market regulation and Government control over trade. But it will create opportunities for corruption. This is against them of free market economy. Government can only intervene in case of market failures/market imperfections restricting competition.

Sing and Vasisht (1985) conducted a study, which examined the variation of the producer's share in the consumer's rupee among agricultural products. A measurement of the gross marketing margin was also made. The gross marketing margin, which includes the cost of marketing, is the difference between the retail price and the farm harvest price. The ratio of gross marketing margin to retail price gives the share of middlemen

including marketing costs in the consumer's rupee. The shire of producer in consumer's rupee is found out by subtracting the share of middlemen in the consumer's rupee from 1. In notation these values are expressed as

Gross marketing margin (M) = Retail price (Pr) - Farm harvest price (Ph)

Share of middleman in consumer taka $= \frac{Pr - Ph}{Pr}$

Share of producer in consumer's taka (Ps) = (1-Ms)

The percentage of gross marketing margin (M) to the farm harvest price which is nothing but the price paid by the wholesaler) is worked out as:

$$M = \frac{Pr - Ph}{Pr} \times 100$$

The present study will follow the above procedure to estimate marketing margin, producer's share in the consumer's taka etc.

Fungic et al. (2000) conducted a study which examined economics of potato storage in northern India Potato production has increased rapidly in India over the past four decades, but continued growth is constrained by post-harvest and marketing imperfections. Large and variable intra-seasonal price movements indicate inadequate potato storage system and poor coordination between potato producers, marketing agents, and users

Ahmed and Elias, (1988) conducted a study marketing of potato at trader's level in some selected areas of Bangladesh. The quantity of potatoes purchased by wholesalers was found to be higher than that of other traders. Transport methods varied according to locality and storage losses varied considerably between different types of traders.

Akhter et. al., (2001) conducted a survey on potato production in some selected areas of Bangladesh. This study investigated the production practices, input use, costs, returns, and constraints in potato (high yielding varieties) production in 5 locations in Bangladesh, viz., Rangpur, Bogra, Jessore, Munshigang, and Comilla. The results showed that potato production is highly profitable and it could provide cash money to

farmers. In terms of profitability, potato production was more attractive than any other winter vegetables. Per unit yield and gross return of potato were found higher than other competitive crops.

CHAPTER II

METHODOLOGY

Considering the limitation of time and resources, farm business survey method was followed in collecting necessary information for the study because this method is a less time consuming and less costly. The survey method is probably the most widely used formal method obtaining farm management data. It is also probably the most widely used. To conduct a successful survey requires careful planning and close attention to detail in implementation (Dillion and Hardeker 1980).

The survey was designed to collect and analyze field level data regarding socio-economic characteristics of the farmers, marketing system, marketing channel. profitability of storage, marketing margin, factors affecting marketing margin and marketing problem of farmers and different intermediaries of the potato, Keeping in the view the ultimate goals, available resources and various obstacles the following steps were followed for this study.

3.1 Selection of study area

The locations for the present study were selected purposively in Rangpur sadar Upazilla because of the fact that Rangpur region was one of the leading potato producing area of Bangladesh. During 2021, this accounted for about 14.52 percent of the total potato acreage and about 11.94 percent of total production of the country (BBS, 2020). On the basis of available information, two potato-producing unions, namely Dorshana and Shatgara under Rangpur Sadar Upazilla were selected purposively for data collection, because these two areas (unions) were the most intermissive potato growing areas of Rangpur Sadar Upazilla. Another reason implicit behind this selection was that the researcher had easy access to that area. Moreover, the transportation system of these two unions was relatively developed. In all four villages two from Dorshna and two villages from Shatgara union were purposively selected. These selected villages were Shiakpara, Ghagatpara of Dorshma Union, and Pikerpara, Nakerpara of Shatgara Union. Two important markets were selected for this study. One was the Rangpur Municipal market

and the other was the Lalbag hat. Besides, ten colds storage were chosen as a part of the study area.

3.2 Selection of sample and sampling technique

The potato farmers of the selected areas and the market intermediaries of the selected markets and cold storage were considered as the population for this study. A list of potato farmers of the selected areas was prepared through a preliminary census and the list was collected from Upazilla Agriculture Office. Simple random sampling technique was followed. Among the 56 farmers, 35 were small (up to 1.0 hectare), 14 medium (1.01 to 2.0 hectares) and 7 large (above 2.0 hectares). Considering the limitation of time and fund, the sample size for potato farmers was fixed at 56, taking 28 from each selected union and 14 from each selected village. Forty four potato traders (intermediaries) were purposively selected who were engaged in potato business in the year 2002. The sample size of the intermediaries included 16 Beparies, 8 wholesalers/Aroldhers, 20 Retailers. Out of twenty cold storages in Rangpur District required data was collected from ten cold storages. Simple random sampling technique was followed in selecting all the market intermediaries and cold storages. Thus the total 44 numbers of market intermediaries was selected

3.3 Preparation of survey schedule

Survey method was followed in collecting data for this study three sets of interview schedules were prepared for eliciting desired information from the farmers and the market intermediaries. Before finalizing the schedules, they were protested for judging suitability of schedules to the respondents. After pre testing, the survey schedule was modified and the questions of the schedule were rearranged according to the experience gathered in the pre testing.

3.4 Methods of collecting of data

Both primary and secondary data were used to fulfill the objectives of the study. The researcher himself conducted the survey and collected primary data by using the interview schedules during, the month of September and October in 2021. Potato farmers

were interviewed at their village homes, Intermediaries were interviewed on the schedule in the respective markets, business premises, and cold storage premises. Data relating to cold storage plants were collected from the cold storage owner or management personnel of the respective selected plants. To obtain accurate data from potato farmers and intermediaries, several informal visits were made by the researcher in the study area.

The collected data were checked and crosschecked for ensuring their reliability, accuracy and adequacy and thereby to make them meaningful for the present study. Since the researcher had to depend on the memory of the respondent's viz. farmers and intermediaries, some elements of bias may be expected in the collected data. However, in view of limited time and fund and also the smallness of the study area, the collected data may be considered as fairly accurate and reliable for this study. Secondary data were collected from publications of different institutions including BBS.

3.5 Analysis of data

Tabular techniques were mainly followed for analyzing the data by using software SPSS. Simple statistical tools like averages and percentages etc. were used to obtain the results of the study. Also regression analysis was done to analyze the affecting marketing margin.

3.5.1 Profitability of storage of potato

Profit from storing potato was calculated as the difference between average sale price which was prevailing for without storage sale and the actual average sale price received after storage. Net benefit was calculated by deducting the cost of storage, wastage/damage cost for storage and others marketing cost. Wastage/ damage cost was calculated the price of the (sale price) quantity of wastage or damage for per quintal potato stored.

3.5.2 Marketing margin

Marketing margin at a particular stage of product Blow may be defined as the difference between purchase and sale price of a commodity. According to Khols and Uhi (1980) marketing margin may be defined as the difference between what is paid by the

consumers and what the producers receive. On the other hand, marketing margin refers to the difference in the value of equivalent physical quantities of a given commodity between different stages of marketing. Marketing margin of each intermediary was estimated by deducting the purchase price of potato form sale price while the net profit component was estimated by deducting marketing cost from the share of marketing margin.

3.6 Factors affecting marketing margin

Different types of marketing costs generally affect the marketing margin of potato traders (Shahabuddin, 1987). Traders are spending for different costs, among which transportation and storage costs are prominent. The cost of transportation, storage, wastage/damage, loading and unloading, packaging, commission/Aroldheri, market toll, personal expenses, and other marketing cost therefore influences the marketing margin of potato traders. Finally the purchase price and sale price of potato is considered as a factor, which affects directly the marketing margin of traders There are also other factors that may affect the marketing margin of potato traders, which are not considered here.

The marketing margin of different marketing intermediaries is determined by technical characteristics of the marketing function. For determining the factors affecting marketing margin, a multiple linear regression model was estimated by ordinary least squares method as follows

$$NM = b_0 + b_1 TC + b_2 SC + b_3 WC + b_4 LC + b_5 PC + b_6 AC + b_7 MTC + b_8 PEC + b_9 OMC + b_{10} PP + b_{11} SP + b_{12} ED + b_{13} AG + U_i$$

Where,

NM=Net Margin of intermediaries

b_0= intercept

b_1=…………b_{13} Coefficient

TC =Transportation cost

SC =Storage cost

WC= Wastage/damage cost

LC= Loading and unloading cost

PC= Packaging cost

AC = Commission / Arotdheri

MTC = Market toll cost

PEC= Personal expense cost

OMC = others marketing cost

PP = Purchase price

SP = Sales price

ED = Education

AG = Age

U_i = Error term

There are thirteen variables considered for determining the factors affecting marketing margin and a multiple linear regression model was estimated.

CHAPTER IV

RESULTS AND DISCUSSION

4.1 Socio-economic characteristics of the potato farmers

The socio-economic background and characteristics of the farmer's influences the production and marketing behavior to a great extend .Therefore a description of the characteristics of farmer necessary for analyzing the main objective of the present study. Therefore, information regarding age distribution, level of literacy, family size and composition, educational status, occupation of the farmers, income level of farmers and land ownership pattern of sampled farmer was recorded for the study. A brief description of these characteristics is presented in this chapter. Socio-economic characteristics of potato farmer included their age, family size, educational status, occupation, annual income, and land ownership pattern.

4.1.1 Distribution of the farmers by age group.

The age structures of potato farmers were examined by classifying the farmers into three groups. The first group included the farmers of 20 to 35 years, the second group included the farmer of 36 to 50 years and the third group includes the farmers of above 50 years. The distribution of age of the farmers and the types of farmers are shown in Table 4.1. Highest percentages of potato growers were in age group 36 to 50 years and the lowest were in age of above 50 years. In all farm categories 39 percent were in 20 to 35 years, 41 percent is 36 to 50 years and 20 percent in the age of above 50 years.

Table 4.1 Age distribution of sample farmer bye age category.

Age category	Farm size						All farms	
	Small		Medium		Large			
	n	%	n	%	N	%	N	%
20 to 35 years	16	46	4	29	2	29	22	39
36 to 50 years	12	34	8	57	3	43	23	41
Above 50 years	7	20	2	14	2	29	11	20
Total	35	100	14	100	7	100	56	100

Source; Field survey, 2021

4.1.2. Education status of sample farmer

Education plays an important role in production of potato, because an educated farmer can apply modern technology in the production process. The educational status of the farmers is presented in table 4.2. To assess the standard of level of education the sampled farmer's level of education has been categorized into 1) illiterate 2) primary education 3) secondary education and 4) above secondary education

Table 4.2 Education status of sample farmer

Education level	Farm size						All farms	
	Small		Medium		Large			
	n	%	n	%	N	%	n	%
Illiterate	1	3	-	-	1	14	2	4
Primary	15	43	4	28	2	29	21	37
Secondary	11	31	6	43	2	29	19	34
And above secondary	8	23	4	29	2	28	14	25
Total	35	100	14	100	7	100	56	100

Source: Field survey, 2021

Among the all farmers group 4 percent farmers were illiterate, 37 percent farmers were primary education, 34 percent farmers were secondary education and 25 percent farmers were above secondary education level.

4.1.3. Distribution of family members according to gender and farm size

In this study, family has been as a group of persons living together and taking their meals from the same kitchen under the administration of the head of the family. It includes husband, wife, son, daughter, brother, sister, parents etc. The number of persons belonged to all families surveyed under different age groups were divided into three groups:

 i. Up to 14 years were considered as children

ii. 14+ male were considered as adult male, and;

iii. 14+ female were considered as adult female.

Table 4.3 Distribution of family members according to gender and farm size

Family composition	National Farm size						All farms	
	Small		Medium		Large			
	n	%	n	%	n	%	n	%
Adult male	51	30	24	30	16	34	91	31
Adult female	46	27	23	29	14	30	83	28
Children	73	43	33	41	17	36	123	41
Average number	4.85	100	5.72	100	6.02	100	297	100

Source: Field survey, 2021

In case of all groups of farmers around 31 percent of the family members were in the adult male category followed by adult female category and children that was 28 percent and 41 percent respectively. Highest percentage of family members was in the group of children in all groups (Table 4.3).

4.1.4 Occupation of farmers

Agriculture is the main source of occupation of the vast majority, people of the selected area. Most of the people were farmers, whose main source of income and livelihood is agriculture. A very few number of people were engaged in other occupations like business, services. Table 4.4 shows that around 84 percent of farmers were engaged in agriculture as their main occupation and about 7 percentages of were engaged in business and 9 percent of farmers were engaged in service.

Table 4.4 Occupation of the potato growers

Major occupation	Farm size						All farms	
	Small		Medium		Large			
	n	%	n	%	n	%	n	%
Agriculture	28	80	12	86	7	100	47	84
Business	3	9	1	7	-	-	4	7
Service	4	11	1	7	-	-	5	9

Source; Field survey, 2021

4.1.5. Annual income of potato growers

Annual income of a family includes the earning of all the members of the family in a year from all income-generating activities performed by them. The average annual income was estimated to be Tk.66091, Tk.112407 and Tk.205614 respectively for small, medium and large farmers (Table 4.5). Average annual income was highest for large farmers followed by medium and small farmers. Table 4.5 also reveals that agriculture was the main source of income for all the farm size groups. The small farmers earned Tk.45433, the medium farmers earned Tk.90228 and the large farmers earned Tk.1844042 of their income from agriculture, whereas these groups of farmers earned Tk.20658, Tk.22179 and Tk. 21572 of income from livestock, fisheries, business, services, and others respectively.

Table 4.5 Annual income and sources of income by different farm size

Source of income	Farm size						All farms	
	Small		Medium		Large			
	Mean	S.E of Mean	Mean	S .E of Mean	Mean	S .E of Mean	Mean	S .E of Mean
Potato	21365	1808	45321	6977	82257	12529	34966	3735
Other crops	24068	1731	44907	4149	101785	15093	38992	4115
Livestock	2285	441	4392	2594	2714	1755	2866	727
Fisheries	142	142	428	358	-	-	196	125
Business	9714	3381	8214	3747	18857	9580	10482	2586
Service	7085	3099	8928	6205	-	-	6660	2472
Others	1482	773	214	214	-	-	964	491
Total income	66091	5597	112407	10739	205614	15871	95110	7812

Source; Field survey, 2021

The findings reveal that the small farmers as compared to medium and large farmers were less dependent on agriculture.

4.1.6 Land ownership patterns of the sample farmers

According to Yang (1965), Farm size is measured by the entire land area operated by the operator. It is computed by adding the area of land owned and the area rented in from others and subtracting the area rented-out to others. It included both the homestead area and the area used for wood, pasture, and crops. For this study, farm size is measured in terms of total cultivated area of the farmers, viz. owned plus rented-in and lease-in minus rented out and lease-out land. For better understanding of the farm size distribution, the farms were classified in to three farm sizes viz. small, medium and large farms. Small farms were those who cultivated 1.00 ha of land, medium farms were those who cultivated 1.01 to 2.0 ha and those who cultivated more than 2.00 ha of land were identified as large farms (Mondal, 1979 and Jaim, 1982).

Table 4.6 indicated that different types of land use by the potato farmers which were own cultivated, rented in, lease in, rented out, lease out, and homestead land.

Table 4.6 Land ownership patterns of the sample farmers by farm size

Land ownership pattern	Farm size						All farms	
	Small		Medium		Large			
	Mode	S.E of Mean	Mode	S.E of Mean	Mode	S.E of Mean	Mode	S.E of Mean
Own cultivated land	0.52	0.05	1.33	0.24	2.02	0.53	0.91	0.12
Rented in	0.06	0.02	0.01	0.01	0.10	0.07	0.06	0.02
Lease in	0.09	0.03	0.27	0.10	0.87	0.29	0.24	0.06
Rented out	0.03	0.02	0.17	0.11	0.12	0.12	0.08	0.03
Lease out	0.01	0.01	0.03	0.03	0.00	0.00	0.01	0.01
Average cultivated land	0.63	0.05	1.41	0.31	2.87	0.39	1.10	0.15
Homestead land	0.06	0.01	0.09	0.02	0.11	0.02	0.07	0.01
Total land holding	0.69	0.06	1.50	0.33	2.98	0.38	1.17	0.15

Source; Field survey, 2021

Cultivated land is the most important one form different type of land used. Average cultivated land was 1.10 hectare. Cultivated land was highest for large farmers, which were 2.87 hectare, followed by the medium farmers 1.41 hectare and small farmers 0.63 hectares.

4.2 Marketing of potato by farmers

4.2.1 Area, production and yield of potatoes by farm groups

The average cultivated area under potato of three categories of farms was 36 percent, 32 percent and 32 percent by small, medium, and large farmers. On an average, area under potato cultivation for the sample farmers was found to be 0.69 hectare per farm during the crop year 2001-2002 (Table 4.7)

Table 4.7 Distribution of area, production and yield of potato

Farm size	Potato cultivation total in Hector			Average production in Quintal			Yield (quintal/ha)
	Mean	S.E of Mean	%	Mean	S.E of Mean	%	
Small	0.39	0.03	36	85.44	6.94	34	219.26
medium	0.89	0.14	32	208.87	39.58	34	234.49
Large	1.77	0.26	32	405.23	68.28	32	228.94
All	0.69	0.08	100	156.27	8.28	100	228.74

Source; Field survey, 2021

Average of potatoes by all the selected farmers was 156.27 quintals while the average production of potato by the small, medium, and large farmers were 85.44 quintals (34%), 208.87 quintals (34%) and 405.23 quintals (32%) respectively (Table 4.7). Yield of potatoes expressed in terms of ton per hectare tended to be highest for the medium farmers 23.45 metric ton followed by large 22.89 metric ton and small farmers 21.93 metric ton. The findings thus reveal that the medium farmers emerged as the most efficient farmers I term of productivity.

4.2.2 Variety used by the farmers

Farmers preferred cardinal variety and diamond variety then other variety in the study area. In case of all farmer 66 percent, 29 percent, and 5 percent preferred cardinal,

diamond, and others varieties during the year 2019-2020 Others varieties includes bogra guti, shilbilati, jhau etc.

Table 4.8 Variety used by the farmers according to the farm size

Variety used	Types of farmers			All type (%)
	Small (%)	Medium (%)	Large(%)	
Cardinal	65	74	58	66
Diamond	28	22	37	29
Others	7	4	5	5
Total	100	100	100	100

Source; Field survey, 2021

4.2.3 Disposal pattern of potatoes according to farm size

Farmers in the study area disposed of their total potatoes in the year of 2021 in six different ways such as sale, consumption, used as seed, damage/loss, and share paid for rented in land and other uses which include wage, gift. Among these, quantity of potatoes sold as a whole, constituted the major disposal, which accounted for about 88.1 percent of the total production. The small, medium and large farmers sold large portion of their potatoes, which were 86.7%, 90%, and 88.1% of total quantity produced respectively (Table 4.9). It is observed that only 22 percent of the total production was consumed by all farm families including, other major disposals of potatoes were their use as seed and wastage or damage, which accounted for 6.7 percent and 1.7 percent respectively. The table also shows that 0.3 percent of the total production was disposed of as other uses, 1 percent as share of the rented in land paid to the land owners by small farmers. They survey reveals that selling of potatoes was the major disposal followed by the use for seed purpose.

Table 4.9 Disposal patterns of potatoes according to farm size

Disposal patter (quintal)	Farm size						All farms	
	Small		Medium		Large			
	Sum	%	Sum	%	Sum	%	Sum	%
Consumption (own)	95.9	3.2	57	2	37.87	1.3	190.7	2.2
Sold	2593	86.7	2632.4	90	2490.6	87.8	7716	88.1
Seed	193.2	6.5	189.7	6.4	203.8	7.2	586.7	6.7
Other uses	12.8	0.4	5	0.2	5.9	0.2	23.7	0.3
Wastage/or damage	39.9	1.3	31.7	1.1	73.4	2.5	144.9	1.7
Share payment for rented land	55.4	1.9	8.4	0.3	25.2	0.9	89	1
Total production	2990	100	2924.2	100	2836.6	100	8751	100

Source; Field survey, 2021

4.2.4 Place of sale

Normally, the farmers sell their potatoes at the farm gate/village and in the markets (primary and secondary). The place of sale usually affects the price received the farmers: Sales in village are likely to fetch a lower price compared to sale in the market were competition between buyers is likely to be more. Village sales include sales in the field as well as at home. Likewise, market sales include sales in the cold storage premises and in the market place. Normally, the farmers sell their potatoes at the farm gate/village and in the markets (primary and secondary). The place of sale usually affects the price received the farmers. Sales in village are likely to fetch a lower price compared to sale in the market were competition between buyers is likely to be more, Village sales include sales in the field as well as at home. Likewise, market sales include sales in the cold storage premises and in the market place.

sales percent (%)
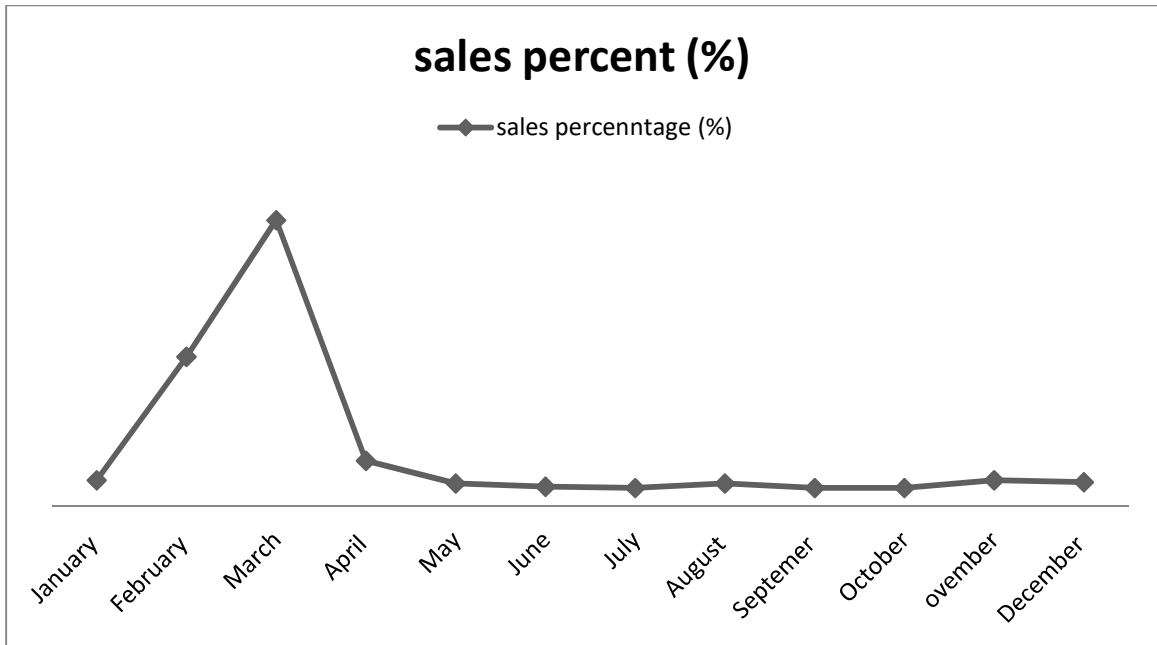
Figure1. Monthly sale of potatoes by small farmers (Source ; field survey data 2021)

Sales percent (%)
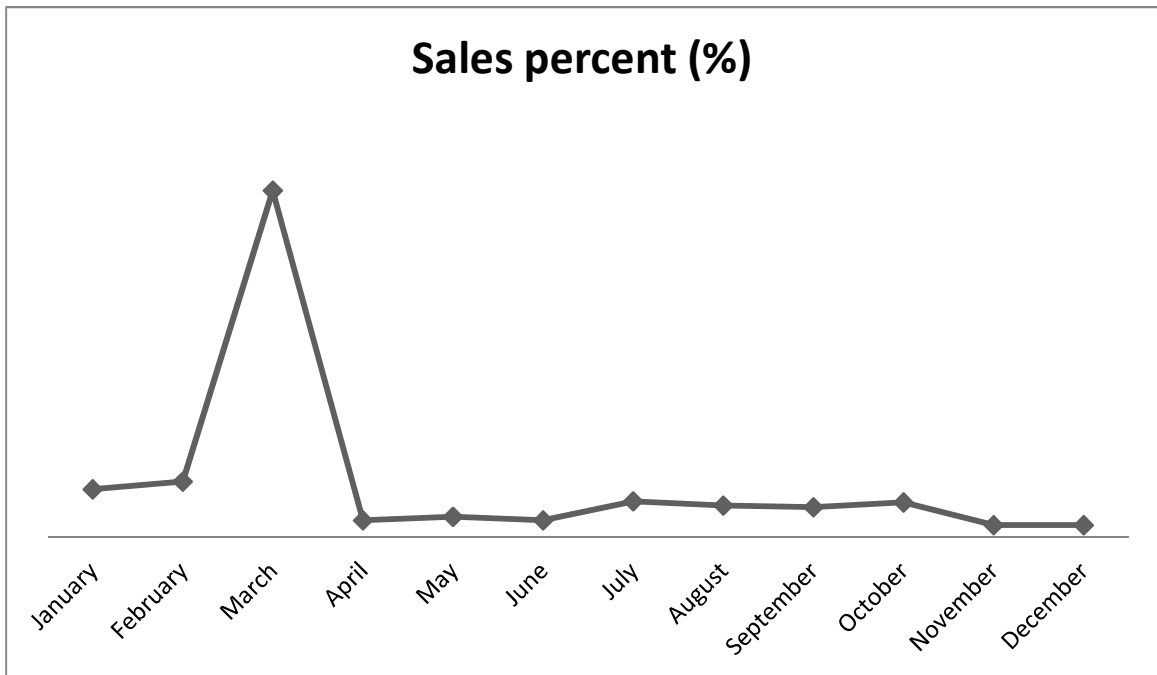
Figure 2 . Monthly sales of potatoes by medium farmers (Source; field survey data 2021)
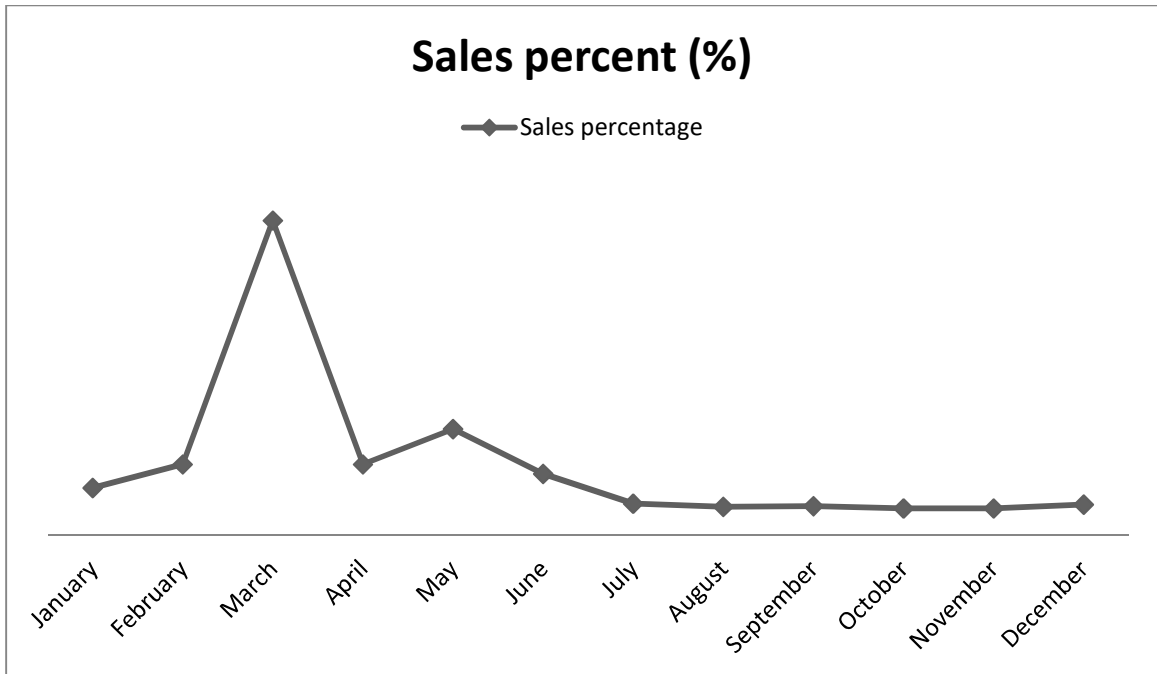
Figure 3.Monthly sales of potatoes by large farmers (Source; field survey data 2021)
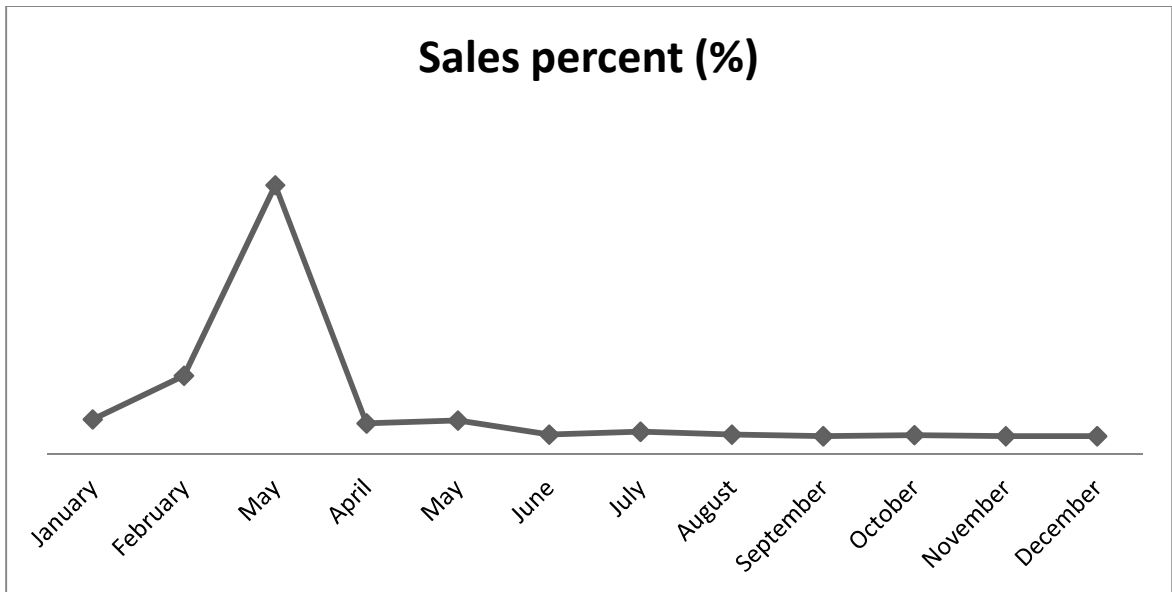
Figure 4 Monthly sales of potatoes by all farmers (Source; field survey 2021)

Table 4.10 Distribution of potatoes sold according to farm size and selling place

Farm size	Selling place					
	Farm gate		Outside the farm gate		All place	
	Quantity	%	Quantity	%	Quantity	%
Small	1671	65	922	35	2593	100
Medium	1429	54	1204	46	2632	100
Large	1070	43	1421	57	2491	100
All farms	4169	54	3547	46	7716	100

Source; Field survey, 2021

In the study area the village markets (Hats) operated twice a week. The day on which these markets met were fixed. Two unions are near to Pourashava that there were more than ten markets which operated daily.

As a whole, the farmers in the study area were found to sell 54 percent of their potatoes at the farm gate and the rest 46 percent in the nearby primary or secondary markets. Small farmers sold the highest potion i.e. 65 percent of their marketed surplus at the farm-gate whereas the portions of farm gate sale for medium and large farmers were 54 and 43 percent, respectively. The cause necessitating the small farmers to sell the highest quantity at the farm-gate may he loan payment, cash necessity quantity produced by them and also thus, the study supports the usual belief that the small farmers sustain a loss for their higher proportion of sale of potatoes at the farm gate during the harvest period at the existing lower price.

4.2.5 Season wise selling pattern and price of potato at farm level

Selling of potatoes by farmers is commensurate with harvesting. For studying the temporal sale of potatoes the year has been spitted into two periods. The quantity of potatoes sold during January to April was considered as harvesting period sale when

majority of farmers sold their potatoes and quantity sold during May to December was considered as off-season sale when home stored and cold stored potatoes were sold.

Table 4.11 Season wise selling pattern of potato at farm level

| Farm Size | Quantity of sold (quintal) | | | | | | | All | |
| | Harvesting period | | | Off season | | | | | |
	Mean	%	Price/ (Tk./q)	Mean	%	Price/ (Tk./q)	Mean	%	Price/ (Tk./q)
Small	60	80	330.26	15	20	664.38	74	100	400.32
Medium	146	77	328.44	42	23	668.58	188	100	437.77
Large	230	65	334.64	97	35	649.84	355	100	465.97
Group total	102	74	330.59	142	26	661.02	138	100	423.34

Source; Farm survey, 2021

Table 4.11 depicts that the small farmers sold average quantity of 74 quintals of their surplus of which 60 quintals (80 percent) were sold during the harvesting period and the remaining 15 quintals (20 percent) were sold during off-season. Out of the average quantity sold of 188 about 146 quintals (77 percent) were sold during harvesting period and 42 quintals (23 percent) during off-season by medium farmers. The large farmers sold average quantity of 355 quintals of their surplus of which 230 quintals (65 percent) were sold during the harvesting period and the remaining 97 quintals (35 percent) were sold during off-season. This indicates that farmers were not able to sell more potatoes and reap the benefits of higher price for their marketed surplus in the off-season

4.2.6 Time of sale

Figures1, 2, 3, and 4 shows the monthly sale of potatoes by different farm size groups. The table and the figures reveal that the largest proportion of sale took place in the month of March 48 percent followed by February 14 percent and the lowest proportion in November or December 2 percent.

4.2.7 Types of potato buyers

An enquiry into the selling practice of farmers shows that the farmers sold their products to Beparie, other farmers, Wholesalers/ Arotdher ,Cold storage owners, Retailers and Consumers. Farmers in all group, on an average, sold 67.9 percent of their surplus to Beparies. Next to Beparies Wholesalers were the important middlemen to whom 19.2 percent of the farmers produce was sold. The farmers of all categories in the study area sold 7.7 percent to Cold storage owners, 2.1 percent to Retailers, and 2.1 percent to Consumers and only I percent of their surplus directly to other farmers (Table 4.12).

Table 4.12 Potato sold by farmers to different type of buyer according to farm

Farm size	Quantity sold by buyer(quintal)						All
	Bepari	Total Others farmers	Wholesaler/Arotdher	Cold storage owner	Retailer	Consumer	
	Total	Total	Total	Total	Total	Total	%
Small	1879	493	86	61	52	2593	100
Medium	1970	379	191	42	34	2632	100
Large	1394	610	319	51	76	2491	100
All	5243	1482	596	156	162	7716	100

Source; Field survey, 2021

4.2.8 Price received by farmers

The magnitude of prices received by different farm size groups under the study was dependent on time of sale, place of sale, types of buyer of potatoes and quantity of potatoes sold by them. All prices were weighted by the quantity sold for calculating average prices of potatoes. On an average, the large farmers followed by medium and

small farmers received the highest prices from markets were TK. 539.52 TK. 537.05, and TK. 509.44 per quintal compared to farm gate price of TK. 298.02 TK 305.39, and TK. 287.36 per quintal respectively. It was observed that the large farmer sold at lowest price at farm gate but at highest in market because of large amount of their sales in off season (Table 4.13)

Table 4.13 Average price loss by farmer for farm gate sales

Farm size	Average price of potato(Tk./quintal)				
	Farm gate	Market	Price difference(a)	Loss due to farm gate sale (b)	Average
Small	298.02	509.44	211.42	164.87	400.32
Medium	305.39	537.05	231.66	187.33	437.77
Large	287.36	539.52	252.16	174.41	465.97
Group total	298.29	524.57	226.28	171.02	423.34

Source; Field survey, 2021

Note; a) market price –farm gate price

   b) Price difference –marketing cost

4.2.9 Volume of transport

The volume of potatoes transported by different modes of transport in the study area is shown in Table 4.14. The average volume transported by all farm size groups was 97.05 quintals of which 35 percent was transported by bead/shoulder load, 35 percent by rickshaw/van, percent by pushcarts and 17 percent by truck.

Table 4.14 Average volume of potatoes transported by different mode of transport according to farm size

Farm size	Head shoulder	Rickshaw /van	Truck	All
	Average Quantity	%	Average Quantity	%
Small	28.17	53	25.42	47
Medium	40.64	32	69.93	50
Large	52.14	20	118.14	46
All	34.29	35	46.19	48

Source; Field survey, 2021

4.2.10 Average transport cost

Transport costs of the farmers to carry potatoes from farm-gate to market are presented in Table 4.15. The average transport cost incurred by all farmers for carrying potatoes was TK. 5.57 out of which head/shoulder load, rickshaw/van, and truck were Tk.78, Tk.4.37 and Tk. 48, respectively.

Table 4.15 Average transport cost in per quintal potatoes sold at farm level (Tk.)

Types of farmer	Head load	Rickshaw /van	Truck	All
Small	0.78	4.59	-	5.37
Medium	0.70	4.15	0.40	5.25
Large	0.69	4.36	1.15	6.2
All farmers	0.72	4.37	0.48	5.57

Source; Field survey, 2021

4.2.11 Transport cost

Transport costs of farmer to carry potatoes per kilometer per quintal from farm gate to market are presented in Table 4.16. The transport costs incurred by small farmers for carrying potatoes by using head/shoulder load, rickshaw, and truck were Tk. 13.5, Tk.3.68, and Tk.1.26, respectively.

Table 4.16 Transport cost per quintal per kilometer of farmers according to farm size.

Farm size	Transport cost per quintal per kilometer(Tk.)		
	Head load	Rickshaw /van	Truck
Small	13.50	3.68	1.26
Medium	10.20	3.15	0.94
Large	15.93	4.62	1.08
All farmers	13.04	3.66	1.09

Source; Field survey, 2021

The costs incurred by medium farmers for carrying potatoes by using head/shoulder load, rickshaw, and truck were Tk.10.20, Tk.3.15 and Tk. 0.94 respectively while the corresponding figures for large farmers were TK.15.93,Tk.4.62, and Tk.1.08 per quintal per kilometer, respectively. It was found that the average transport cost per quintal per kilometer for farmers was highest for using head/ shoulder load Tk.13.04 followed by rickshaw Tk.3.66 and transport cost was lowest for using truck.

4.2.12 Quantity and purpose of storage

All the sample farmers stored potatoes in varying quantities depending on purpose and space of storage. Table 4.17 depicts that larger volume of potatoes was stored at cold storages than in home i.e. 1775.27 quintal (61 percent of total storage) and 1106.12 quintals (39 percent of total storage) respectively, of total potatoes stored. The main purposes for storing potatoes were to sell at higher prices during off season and to use as seed. Necessity for cash of which would compelled farmers to sell a major portion of potatoes during the harvest time.

Table 4.17 Storage status of potato according to farm size (Quantity in quintal)

Farm size	Home storage			Cold storage				Total storage (quintal)
	Total quan-tity	Sold quan-tity	Loss	Total quan-tity	Seed quan-tity	Sold quan-tity	Total quan-tity	
Small	402.53 (100)	377.02 (93.9)	24.5 (6.1)	509.44 (100)	164.42 (32.2)	329.88 (64.75)	15.14 (2.97)	910.97
Medium	353.12 (100)	331.30 (93.8)	21.8 (6.2)	487.50 (100)	171.18 (35.1)	304.62 (62.5)	11.70 (2.4)	835.72
Large	351.47 (100)	323.40 (92)	28.07 (8)	778.33 (100)	203.80 (26.2)	555.81 (71.4)	18.72 (2.4)	1104.07
All	1106.1 (100)	1031.7 (93.2)	74.4 (6.8)	1190.3 (100)	539.40 (30.4)	1190.3 (67)	45.56 (2.6)	2850.76

Source; Field survey 2021

4.2.13 Average storage cost

The costs of storing potatoes at home and in cold storage are presented in Table 4.18. Cold storage cost is defined by the rate of storage charge. The costs of storing potatoes at home and in cold storage were Tk.10.75 and Tk. 203 per quintal respectively.

Table 4.18 Average cost of storage according to farm size

(Cost in taka per quintal)

Farm size	Home storage cost	Cold storage cost	All
Small	6.93	203	117
Medium	9.56	203	122
Large	12.56	202	143
All farms	10.75	203	129

The cost of keeping potatoes in cold storage was varying because cold storage charge varies from cold storage to cold storage and it was more or less same in all types of farm.

4.2.14 Source of finance

It was found that most of the farmers were self-financed and did not borrow money either for production or for marketing of potatoes. In all group farmers average fund per farmer was Tk.26241 of which Tk.14991, Tk. 1071, Tk.2785, Tk.250 and Tk. 1742 comes from own fund, fund from friends and relatives, fund from Bank, fund from NGOs and fund from money lender respectively (Table 4,19).

Table 4.19 source of finance of farmers

Types of farmers	Own fund		Fund From friends& relatives		Fund from bank		Fund from NGOs		Fund from money lender	
	Mean	S.E of Mean	Mean	S.E of Mean	Mean	S.E of Mean	Mean	S.E of Mean	Mean	S.E of Mean
Small	9014 (61)	1066	429 (3)	315	-	400 (2.7)	228	4885 (33)	1812	2094
Medium	19214 (66)	4571	1071 (4)	1071	2571 (9)	-	-	6071 (21)	3128	28928 (100)
Large	36428 (46)	5639	4285 (6)	4285	17143 (22)	-	-	20571 (26)	7325	78428 (100)
All group	14991 (57)	1907	1071 (4)	620	2785 (11)	250 (1)	144	7142 (27)	1742	26241 (100)

Source; Field survey, 2021

Besides own fund funds from money lender founded prominent. In study area potato farmer borrowed fund from money lender by advanced sale of their potatoes at lower

price which varied from Tk.180 to Tk.220 per sack (one sack equal to 84 kg).Table 4.19 shows that about 57% farmers were self finance.

4.2.15 Source of marketing information

Market information is a facilitative marketing function required for an efficiently operating marketing system. Accurate and timely market information facilitates farmers in deciding about price, time and place of sale of their produce (Kohls and Uhl, 1980).

In the study area, market visit, neighbors, traders, and others (which include radio newspapers, telephone massage etc.) were the main sources of market information. But traditionally these sources were not such effective at farm-level. All the sampled farmers received market information through market visits. They also received market information through other media of which neighbors and traders constituted a major source (Table 4.20).

Table 4.20 Source of market information for potato farmers according to farm size

Farm	Source of market information			
	Market visit	neighbor	Traders	Others
Small	80	100	75	25
Medium	95	100	85	30
Large	75	90	85	35
All farms	83.33	96.66	81.66	30

Source; Field survey, 2021

4.3 Socioeconomic characteristics of intermediaries

Socio-economic characteristics of intermediaries i.e. age group, educational status, occupation, source of fund etc, of the selected potato traders are discussed below:

4.3.1 Age distribution of potato intermediaries

Distribution of intermediaries according to age is given in table 4.21. It shows that the highest proportions of the intermediaries are in age group of 36-50 years and lowest proportions are in above 50 years age group. It is observed that Retailers and Beparies were relatively young.

Table 4.21 Age distributions of intermediaries

Traders type	Age category						All	
	20 to 35		36 to 50		Above			
	n	%	n	%	n	%	n	%
Bepari	4	25	10	63	2	12	16	100
Whole seller	1	12	5	63	2	25	8	100
Retailer	11	55	9	45	-	-	20	100
Group total	16	36	24	55	4	9	44	100

Source; Field survey, 2021

On the average, 36 percent of the total intermediaries belonged to the age group of 20 to 35 years while 55 percent belonged to the age group of 36 to 50 years and 9 percent belonged to the age group of above 50 years age group.

4.3.2 Level of literacy of intermediaries

Table 4.22 represents the percents of educational status of the potato intermediaries in the study areas. The selected intermediaries were grouped into four categories according to their level of education.

Table 4.22 Level of literacy of intermediaries

Education category	Traders type						All	
	Retailer		Bepari		Wholesaler			
	N	%	N	%	N	%	N	%
Illiterate	3	15	1	6	-	-	4	9
Primary	8	40	3	19	-	-	11	25
Secondary	9	45	6	38	5	63	20	46
Above secondary	-	-	6	37	3	37	9	20
Group total	20	100	16	100	8	100	44	100

Source; Field survey, 2021

Table 4.22 shows that regarding literacy, 25 percent of intermediaries got education up to primary level and 46 percent had education up to secondary level. Only 20 percent had education above secondary level while 9 percent of traders were illiterate in study area.

4.3.3. Distribution of family members of intermediaries

In this study, family member of intermediaries were divided into three groups:

a. Up to 14 years were considered as children:

b. 14 male were considered as adult male, and;

c. 14 female were considered as adult female.

Table 4.23 Distribution of family members according to gender and farm size

Family number	Traders type						Group total	
	Retailer		Bepari		Wholesaler			
	N	%	N	%	N	%	N	%
Male	30	30	34	33	16	33	80	32
Female	24	24	29	29	12	25	65	26
Children	47	46	39	38	21	42	107	42

In case of all groups of farmers around 32 percent of the family members were in the adult male category followed by adult female category and children that was 26 percent and 42 percent, respectively. Highest percentage of family members was in the group of children group in all groups (Table 4.23).

4.3.4 Annual income of intermediaries

The average annual incomes of retailers, Beparies, and wholesalers from different sources were Tk.55130, Tk.119018, and Tk.20603, respectively. These income figures however appear too little deflated because the intermediaries were reluctant to divulge accurate information of income for fear of income tax.

Table 4.24 Annual incomes (Tk.) of intermediaries

Source of income	Traders type						All	
	Retailer		Bepari		Wholesaler			
	Mean	S.E of Mean	Mean	S.E of Mean	Mean	S.E of Mean	Mean	S.E of Mean
Potato	17640	2252	74375	22853	161875	24347	64495	12204
Other traders	30375	3202	15250	4676	15000	6813	22079	2746
Agriculture	5100	1454	24812	5143	68750	47666	23841	9125
Others	500	500	5100	2458	00	00	2082	969
Total income	55130	3534	119018	27386	199375	20603	104588	13260

Source; Field survey, 2021

Table 4.24 indicates that on an average retailer earned TK.17640 of their income from potato trade while Bepari and wholesaler earned TK.74375, and TK 161875of their income from potato trade, respectively. On an average, all intermediaries earned TK. 64495 of their income from potato trade.

4.4 Potato marketing by intermediaries

4.4.1 Volume and source of potatoes purchase

The average annual purchase of potatoes by Beparies, wholesalers, cold storage owners, and retailers were 5897 quintals, 18000 quintals, 8716quintals, and 309 quintals, respectively during the year of 2002. The average purchase of potatoes by all intermediaries was 6142 quintals (Table 4.25).

Table 4.25 Annual average volume and source of potatoes purchase of intermediaries

Traders type	Farmers		Beparies		Cold storage owners		Wholesalers /Arotdhers		Group total	
	Mean	%	Mean	%	mean	%	Mean	%	Mean	%
Bepari	3107	53	1259	21	1374	23	158	3	5897	100
Wholesaler	7250	40	6750	38	4000	22	0	0	18000	100
Cold storage owner	1344	18	1840	32	0	0	4427	50	8716	100
Retailer	39	12	46	15	0	0	224	73	309	100
All	2258	38	1731	31	1000	16	949	15	6142	100

Source; Field survey, 2021

The intermediaries purchased their potatoes mainly from four sources: (1) Farmers, (ii) Beparies, (iii) Cold storage owners, and (iv)Wholesalers/Arothers. Table 4.25 reveals that out of the total purchase, the Beparies, cold storage owners. wholesalers and retailers purchased about 53 percent, 40 percent, 18 percent and 12 percent respectively from farmers. While purchasing from the Beparies, the corresponding figures for them were about 21 percent, 38 percent, 32 percent and 15 percent respectively. Form the cold storage owner, Beparies and wholesalers purchase 23 percent and 22 percent. The retailer purchase 73 percent from the wholesalers/Arotdhers. On an average, the intermediaries

purchase, 38 percent, 31 percent, 16 percent, and 15 percent from farmers, Beparies, cold storage owner, and wholesalers/Arotdhers respectively. It was found that majority of the intermediaries' purchase potatoes from more than one source.

4.4.2 Places of potatoes purchase

The study reveals that the intermediaries purchased potatoes from the farmer's house (farm gate), village markets (Hats), assembly or wholesale markets, cold storage plants and business premises. The major places of purchase by the Beparies were 42 percent farm gate, 47 percent cold storage premises, 8 percent village markets, and 3 percent. Cold storage owner purchased 15 percent farm gate, 26 percent cold storage premises, 9 percent village markets, and 50 percent form wholesale markets.

Table 5.6 also shows that the wholesalers carried their major operating system at their business premises. They purchased most of their potatoes 65 percent at their own business premises. The retailers purchased mostly from assembly/wholesale markets 52 percent followed by 17 percent form cold storage premises, 8 percent form village markets, and 7 percent form farm gate.

Table 4.26 Places of potatoes purchase

Traders type	Place of purchase										All place
	Farmers home /farm gate		Village market		Wholesale market		Cold storage premises		Business premises		
	Mean	%	Mean	%	Mean	%	Mean	%	Mean	%	
Bepari	2461	42	450	8	158	3	2828	47	-	-	5897
Whole saler	1375	8	875	5	-	-	4000	22	1175	65	1800
Cold storage owner	1264	15	840	9	4268	50	2224	26	-	-	8716
Retailer	21	7	26	8	210	68	52	17	-	-	309
All	1198	19	428	7	933	15	1861	30	1722	28	6142

Source; Field survey, 2021

In all, more than 30 percent of the total quantity of potatoes was purchased at cold storage premises business premises followed by business premises 28 percent farmers home 19 percent, assembly/wholesale markets 15 percent, and village markets 7 percent (Table 4.26).

4.4.3 Volume of sale

Table 4.27 reveals that total quantity of potatoes sold during the reporting year by Beparies, cold storage owners, wholesaler and retailers were 94356, 84776, 143766 and 6157 quintals respectively. On the average, the corresponding sales figures for those intermediaries were 5897, 8478, 17971 and 308 quintals respectively. The total sale of potatoes by all intermediaries was 329054 and the average sale was 6094 quintal per intermediary

Table 4.27 Volume of sales by intermediaries

(Quantity per quintal)

Intermediaries	Wholesaler		Cold storage owner		Beparies		Retailer /(through arodthers)		Cosumers		Total	
	Total	%	Total	%	Total	%	Total	%	Total	%	total	%
Baparies	38606 (2413)	41	18499 (1157)	20	26637	28	10704	11	-	-	94446 5897	100
Cold storage owners	46371 (4637)	54	-	-	27550 (2755)	33	10855 (1085)	13	-	-	84776 8478	100
Wholesalers	-	-	17252 (2157)	12	-	-	126514 15814	88	-	-	143766 17971	100
Retailers	-	-	-	-	-	-	-	-	61577 (308)	100	6157 (308)	100
All	84977 (1574)	26	35751 (662)	11	54187 (1003)	16	148073 (2742)	45	61577 (114)	2	329145 (6095)	100

Source; Field survey, 2021

Table 4.27 also shows the Beparies sold 41 percent, 20 percent, 28 percent and 11 percent to the wholesalers, cold storage owners, Beparies and to the retailers, respectively. Cold storage owners sold their potatoes to the wholesaler 54 percent, Beparies 33 percent and to the retailers 13 percent. The wholesalers/Aroldhers sold their quantity of to the retailers (88 percent) and cold storage owners (12 percent) respectively. Retailers sold their total quantity to consumers. In all, the intermediaries sold about 26 percent, 11 percent 16 percent, 45 percent and 2 percent of total sales to the wholesalers, cold storage owners, Beparies, retailers and to the consumers

4.4.4 Time of sale

Table 4.28 shows percentage of the monthly sale of potatoes at the intermediary level.

Table 4.28 Monthly sales of potatoes by intermediaries

Month	Types of traders				All
	Retailer	Bepari	Wholesaler	Cold storage owner	
January	5.7	0.4	2.8	-	1.4
February	7.6	5.5	6.3	-	4.4
March	9.8	17.9	12.8	-	10.9
April	7.4	10.2	6.7	-	6.0
May	8.0	6.6	6.5	-	4.8
June	8.5	3.2	8.3	-	4.7
July	9.1	7.6	8.8	10.3	8.9
August	9.4	11.8	11.3	18.4	13.2
September	9.6	12.4	10.5	28.1	15.6
October	9.2	11.2	10.8	27.2	15.2
November	8.4	10.3	10.1	12.5	10.8
December	7.3	2.8	5.2	3.4	4.1

Source; Field survey, 2021

The table reveals that Beparies and wholesalers sold maximum quantity of potatoes in the month of March while cold storage owners and retailers sold the maximum quantity in the months of September and October.

4.4.5 Disposal of potatoes in markets

In the study area, intermediaries were found to sell their potatoes both in local and outside markets. Local markets are situated within 10 kilometers radius of the business center of intermediaries while outside markets are situated at distance places.

Table 4.29 Disposal pattern of potatoes of different intermediaries

| Intermediaries | Disposal of potatoes | | | | All | |
| | Local markets | | Outside markets | | | |
	Quantity	%	Quantity	%	Quantity	%
Beparies	57465	61	36765	39	94335	100
Cold storage owners	69546	82	15231	18	84776	100
Wholesalers	100636	70	43129	30	143765	100
Retailers	6179	100	-	-	6179	100
All	143580	55	115825	45	259405	100

Source; Field survey, 2021

The Beparies, cold storage owners and wholesalers were found to sell about 61 percent, 82 percent and 70 percent respectively of the total quantity in the local markets, and about 39 percent, 18 percent and 30 percent respectively at the outside markets (Table 4.29). Table 4.29 also shows that retailers sold their entire volume in the local markets. Out of total quantity 55% potato sold in local markets and 45% potato sold in outside the local markets.

4.4.6 Average purchase price and sale price of potatoes

The average purchase prices of potato of the Beparies, cold storage owners, wholesalers and retailers were Tk.584, Tk.363, Tk.582, and Tk.620 per quintal, respectively (Table 4.30).

Table 4.30 average purchase price and sale price of potatoes (price in taka/quintal)

Traders type	Average purchase price of potato	Average sale price of potato
Beparies	584	656
Cold storage owners	363	706
Wholesalers	582	651
Retailers	620	713
All	580	683

Source; Field survey, 2021

On the other hand, the sales prices of potatoes for Beparies, cold storage i owners, wholesalers and retailers were Tk. 656, Tk. 706, Tk. 651, and Tk. 713 per quintal respectively. On an average, the intermediaries purchased at Tk. 580 and sold at Tk. 683 per quintal in the study area. It has been observed that most of the intermediaries in the study area made cash payment during the purchase and sale of potatoes.

4.4.7 Mode of transport used by intermediaries

Head/shoulder loads, rickshaws/van and trucks were general means of transportation used by the intermediaries in the study area. The modes of transport used by different intermediaries have been summarized in Table 4.31. The Bepaires used rickshaws/vans and truck as the main means for transporting their potatoes to the buying and selling centers. The Beparies transported about 31 percent of their total quantity by rickshaws/vans and 60 percent by trucks. They also used head/shoulder load (9 percent) for transporting their potatoes. The cold storage owners mostly used rickshaws/vans and

trucks for carrying potatoes from the buying centers to the plant premises and from plant premises to selling centers.

Table 4.31 Mode of transport used by intermediaries

Traders type	Head/shoulder (quintal)		Rickshaw / Van (quintal)		Truck (quintal)	
	Mean	%	Mean	%	Mean	%
Beparies	373.19	9	1334.75	31	2557.44	60
Cold storage owners	316.00	3	4362.00	42	5646.00	55
Wholesalers	1011.25	9	2537.50	24	7250.00	67
Retailers	184.66	46	216.87	54	-	-
All	387.00	8	1660.00	34	2878.00	58

Source; Field survey, 2021

Wholesalers transported their major part of their potatoes mostly by using trucks (67 percent) and rickshaws/vans (24 percent) and head/shoulder (9 percent) load for carrying potatoes.

Retailer used rickshaws/vans (54 percent) and head/shoulder (46 percent) load for carrying potatoes.

4.4.8 Transport cost of intermediaries

Transportation cost for using head/shoulder loads, rickshaws/vans, and trucks ns were Tk. 18.93, Tk. 2.91 and Tk. 0.46 per quintal per kilometer respectively for the Beparies while the corresponding figures for wholesalers were Tk. 14,86, Tk. 2.38, und Tk. 0.13 per quintal per kilometer respectively (Table 4.32). The transportation cost incurred by cold storage owners for using head/shoulder loads, rickshaws/vans, and trucks were Tk. 13.99, Tk. 2.31 and Tk. 0.97 per quintal per kilometer.

The retailers spent Tk. 17.20 and Tk. 2.36 per quintal per kilometer for using head/shoulder load, rickshaws respectively. It may be observed that transportation cost

for all the intermediaries was the highest for using head/shoulder loads (Tk. 16.64 per quintal per kilometer) and the lowest for trucks (Tk. 0.43 per quintal per kilometer).

Table 4.32 Transport cost of intermediaries

Intermediaries	Transport cost per quintal per kilogram		
	Head /shoulder	Rickshaw	Truck
Beparies	18.93	2.91	0.46
Cold storage owners	13.99	2.31	0.97
Wholesalers	14.86	2.38	0.13
Retailers	17.20	2.36	-
All (Average)	16.64	2.54	0.43

Source; Field survey, 2021

4.4.9 Storage of potatoes by intermediaries

The storage function is primarily concerned with making goods available at the desired time. Proper storage facilities are essential in order to minimize qualitative and quantitative losses in agricultural commodities. The intermediaries stored potatoes in varying quantities in two methods, traditional home storage method and cold storage. Stored potatoes by traditional method were those stored only for a few days in their living rooms or shops of the intermediaries. On the other hand, cold stored potatoes were those stored in cold storages for a long period and sold later on.

Table 4.33 Quantity and average period of potato storage in different methods by the intermediaries

Intermediaries	Methods of storage						Total
	Home storage			Cold storage			
	%of Interme-diaries	Total Quantity (quintal)	Storage Periods (days)	%of Interme-diaries	Total Quantity (quintal)	Storage Periods (days)	
Beparies	31	569	45	69	2394	163	4463
Cold storage owners	-	-	-	40	86960	160	86960
Wholesalers	38	2000	30	100	7500	178	9500
Retailers	20	235	70	-	-	-	235
All	22	2804	-	43	98354	-	101158

Source; Field survey, 2021

It is observed that 31 percent Beparies stored potatoes by traditional method i.e. such as on earthen floor or on the floor with sand for a very short period (on an average 45 days only). Sixty nine percent Beparies stored in cold storage plants for 4 to 9 months (average 163 days) on payment of the cold storage charges. Forty percent cold storage owners of the study area stored potatoes in their own plant premises from April to November (average 160 days) while twenty percent retailers stored their dwelling rooms as well as on the wooden floor with sand for on average 70 days (traditional method). All the wholesalers stored potatoes the cold storage for 4 to 9 months (average 178 days) and thirty-eight percent wholesalers also stored by traditional method on an average 40 days. In all types sample intermediaries stored 2804 quintal potatoes in traditional methods and 98354 quintal in cold storage method (Table 4.33).

4.4.10 Extent of quantity damages/ loss for storing potatoes

An attempt was made estimate the extent of damages at intermediary level for potatoes stored by traditional and cold storage methods. The quantity damage both in cases of traditional storage and cold storage methods occurred due to shrinkage of tubers causing loss in weight, sprouting, disease infection and physiological disorders. These types of shortfall were reported by the intermediaries as normal damage. On the other hand, uncertain damage of potatoes in cold storage plants was caused by rotten of tubers due to several reasons such as machinery breakdown and power supply disruption.

Table 4.34 reveals that 2.54 percent of the total purchased potatoes for all the intermediaries were damaged for storing, of which 4.37 percent damaged by traditional method and 2.5 percent was for potatoes in cold storage. Total damages for Beparies, cold storage owners, wholesalers and retailers were respectively about 2.84 percent, 2.51 percent, 2.67 percent and 9.46 percent of their purchased quantity.

Table 4.34 extend of quality damage /loss for storing potatoes

(Quantity in quintal)

Intermediaries	Damage/loss for storage					
	Traditional method		Cold storage method		Total storage loss	
	Quantity	%	Quantity	%	Quantity	%
Beparies	26	4.65	100	2.58	126	2.84
Cold storage owners	-	-	2138	2.51	2184	2.51
Wholesalers	74	3.7	180	2.4	254	2.67
Retailers	22	9.46	-	-	22	9.46
All (Average)	123	4.37	2464	2.5	2587	2.56

Source; Field survey, 2021

Highest percentage of damage was found in retailers because they stored potatoes only in traditional method and stored potato long time then others intermediaries use in traditional method. The study also found that storage loss was higher in traditional method then cold storage method.

4.4.11 Storage cost

The cost of storing potatoes for Beparies by traditional method and cold storage method were Tk. 12.60 and Tk. 178.18 per quintal respectively. The cost of keeping potatoes in home storage and cold storage

for wholesalers was Tk.12.00 and Tk. 181.25, while the opportunity cost of storing potatoes if they rented it out for traders and farmers for cold storage owners was T 180 per quintal (Table 4.35).

Table 4.35 Storage cost for storing potatoes at intermediaries level

(Cash in taka)

Intermediaries	Storage cost per quintal	
	Traditional methods	Cold storage methods
Beparies	12.60	178.18
Cold storage owners	-	180.00
Wholesalers	12.00	181.25
Retailers	13.50	-

Source; Field survey, 2021

The study found that cold storage owners charged higher cold storage charge from farmer than traders; cold storage owner charged on an average near about Tk. 203 from farmers (Table 4.18) and near about Tk.180 from traders (Table 4.35).

53

4.4.12 Utilization pattern of cold storage facilities

The operational practices followed by cold storage indicate that in each year potatoes are normally stored during the period from February to April and released the same during the period from June to December. Quantities preserved and released of potatoes during different months of the year 2002 of ten cold storages in the study area are presented in Table 4.36. The major portion of potato preserved in the month of March was 83% and major portion of potato released in the months of October was 20% and November 21%.

Table 4.36 Quantity of potato preserved and released in cold storage plants in different months

(Quantity in metric ton)

Month	Quantity of preserved	% 0f preserved Quantity	Quantity Released	% of released quantity
January	-	-	-	
February	2680	2.21	-	
March	100997	83.34	-	
April	17508	14.45	-	
May	-	-	-	
June	-	-	10490	8.58
July	-	-	12121	10.09
August	-	-	14668	12.10
September	-	-	16618	13.71
October	-	-	24804	20.47
November	-	-	25864	21.34
December	-	-	16620	13.71
All	121185	100	121185	100

Source; Field survey, 2021

4.4.13 Financing of intermediaries

Various sources of finance of the market intermediaries are presented in Table 4.37. The market intermediaries were mostly found to be self financed. Majority of the Beparies (64 %) were self financed. Other important sources of finance for the Beparies were banks (23%) followed by friends and relatives (11%), and money lender (2%).

Table 4.37 Source of finance for intermediaries in potato marketing

Trader -s type	Own Source	Friends &relatives	Bank	NGOs	Money Lender	Total fund
Bepari	10032 (64)	17812 (11)	35625 (23)	-	3750 (2)	157500 (100)
Whole saler	33125 0 (56)	50000 (8)	216250 (36)	-	-	597500240 0 (100)
Retaile r	8900 (72)	1000 (8)	1400 (11)	1400 (11)	-	12400 (100)
Group total	100750 (59.7)	16022 (9.3)	636 (.37)	636 (.37)	1363 (.37)	171545 (100)

Source; Field survey, 2021

Majority of the wholesalers were also (56%) were self financed. Other sources of finance for the wholesalers were banks (36%) and friends and relatives (8%). In case of retailers 72% were self financed (Table 4.37).

4.4.14 Market information

Major sources of market information of the intermediaries were market visit, other potato traders, newspapers, telephone and others which were radio, television, personal prediction etc. Hundred percent of all intermediaries reported that market visits were the major sources of their market information while 98 percent of them reported that they received information from fellow traders. About 35 percent of them reported that they

received information from newspapers, 58 percent received information by using telephone, and 30 percent from other sources (Table 4.38).

Table 4.38 Sources of market information of intermediaries

Intermediaries	Source of information				
	Market visit	Fellow traders	Newspapers	Telephone	Others
Beparies	100	90	20	30	20
Cold storage owners	100	100	60	100	40
Wholesalers	100	100	50	100	40
Retailers	100	100	10	-	20
All	100	98	35	58	30

Source; Field survey, 2021

4.4.15 Marketing cost of farmers

Marketing cost represents the cost of performing various marketing functions which are needed to transfer a commodity from the place of production to the ultimate consumers (Mannan, 1975). In the present chapter marketing costs for different items at farmers level as well as at intermediary level have been worked out. Although the costs of marketing differ highly at different levels, an average situation for each of the intermediary and farmers levels has been discussed based on the survey results. Major items of marketing cost of farmers of all groups were loading and unloading assorting/grading, market tolls, sweeper, subscription/charity, transportation, storage, damage/wastage, personal expenses (e.g. light refreshment, rickshaw/bus fair etc.) and other (i.e. weighing, cleaning, fanning) etc. (Table 4.39).

It is observed that the total average marketing cost of all the sampled farmers was Tk. 66.61 per quintal of potatoes. However, this cost varied from one farm size to another. For small farmers, the marketing cost was Tk. 46.55 per quintal, for medium, the cost was Tk.44.33 per quintal and for the large farmers the marketing cost was Tk. 77.75. It is then clear from the study that the marketing cost increased with the increase in farm

sizes, which was probably due to the fact that compared to small and medium farmers the large farmers were prone to sell more in the markets rather than at the farm yards and sell after storage.

Table 4.39 Marketing cost of farmer according to farm size

Cost items	Types of farmers						All	
	Small		Medium		Large			
	Mean	%	Mean	%	Mean	%	Mean	%
Assorting cost	1.97	4.23	2.35	5.31	3.76	4.83	2.29	4.14
Packing cost	3.74	8.03	3.80	8.59	6.07	7.80	4.04	7.30
Loading cost	1.18	2.54	1.57	3.55	1.71	2.20	1.35	2.44
Market toll	0.41	0.88	0.34	0.54	0.80	1.02	0.44	0.79
Commission	0.79	1.70	1.57	3.55	1.54	1.98	1.46	2.64
Personal ex. Cost	1.25	2.70	0.73	1.65	1.37	1.76	1.13	2.05
Others cost	0.61	1.31	0.51	1.15	1.00	1.28	0.63	1.14
Transport	5.37	11.53	5.25	11.86	6.2	7.97	5.75	10.40
Wastage /damage	4.40	9.45	3.56	8.11	8.65	11.16	5.47	9.90
Storage	26.83	57.63	24.65	55.70	46.65	60.00	32.70	59.20
Total	46.55	100	44.33	100	77.75	100	55.26	100

Source; Field survey, 2021

It is also revealed from Table 5.1% that storage cost was the highest comprising 59.2 percent of total average cost followed by transportation cost (10.40 percent) and damage/wastage (9.90 percent) for all farm size groups of the study area.

4.4.16 Marketing cost of intermediaries

Marketing cost of potatoes refers to the various expenses incurred by different intermediaries for movement of the product through the marketing channel. Different items of costs such as loading and unloading, assorting/grading, packaging, market tolls (tax), sweeper charge, subscription/charity, commission/ Aratdheri charge, transportation, storage, damage/wastages, personal expenses (e. g. entertainment, tips, rickshaw/bus fair etc.) and others cost (e.g. weighting charge, electricity charge, stationery item like paper, pin, pad, forms, ink for maintaining records, etc.) were incurred by the intermediaries involved in potato marketing. The item wise breakdowns of the marketing cost incurred by different intermediaries in the potato marketing channel are presented in Table 4.40.

Table 4.40 Marketing cost of intermediaries

Cost items	Types of intermediaries							
	Retailers		Beparies		Wholesalers		Cold storage owners	
	Mean	%	Mean	%	Mean	%	Mean	%
Loading and unloading	1.72	6.14	1.45	3.35	2.73	6.11	8.97	3.35
Assorting /grading	0.77	2.74	1.98	4.57	2.05	4.59	4.68	1.75
Packaging	1.07	3.81	2.14	4.94	2.36	5.28	30.39	11.43
Market toll	2.01	7.17	0.51	1.17	1.19	2.66	1.19	0.44
Sweeper	0.38	1.35	0.14	0.32	0.10	0.22	0.20	0.07
Commission / Arotdheri	-	-	4.36	10.07	-	-	7.00	2.61
Subscription cost	0.22	0.78	0.49	1.13	1.90	4.25	-	-
Damage/wastage	8.31	29.64	9.19	21.23	7.83	17.53	17.72	6.62
Personal expenses	4.97	17.73	2.48	5.73	1.81	4.05	1.00	0.37
Storage	0.17	0.60	8.31	19.20	9.16	20.54	180.0	67.34
Transport	6.23	22.28	10.88	25.20	11.79	26.40	14.12	5.28
Others	2.18	7.77	1.34	3.09	3.74	8.37	2.00	0.74
Total	28.03	100	43.27	100	44.66	100	267.27	200

Source; Field survey, 2021

Marketing cost was the highest for the cold storage owners and lowest for the wholesalers amounting to Tk. 267 and Tk. 28 per quintal respectively. The marketing costs or Beparis and wholesalers were TK. 43 and Tk. 45 per quintal respectively. The highest marketing cost for the cold storage owners was mostly due to the stored inter amount of potato

which they purchased. The storage cost of cold storage owners accounted for 67.34 percent of their total marketing cost and packaging cost 11.37 percent because gunny bag required for storing potato; and on other hand, the lowest rickshaw/bus fair etc.) and others cost (e.g. weighting charge, electricity charge, stationery item like paper, pin, pad, forms, ink for maintaining records, etc.) were incurred by the intermediaries involved in potato marketing. The item wise breakdowns of the marketing cost incurred by different intermediaries in the potato marketing channel are presented in Table 4.40.

4.5 Marketing channel of potatoes

4.5.1 Marketing system and marketing channel of potato

This section is mainly concerned with the different component of potato marketing system such as marketing channels, market intermediaries and their marketing functions. An attempt has been made to analyze the marketing functions performed by potato intermediaries, which meets the second objective of the study.

4.5.2 Marketing system

Marketing system may be thought of as the connecting link between specialized producers and consumers (Kohls and Uhl, 1980). Increase in output of food would be meaningless, if the producer cannot transfer the product to the consumer at a price, which represents a fair remuneration to the producer, and within the consumer's ability to pay. A marketing system includes all activities involved in the flow of goods from the point of initial production to the consumer. It includes the exchange activities associated with transferring property right to commodities, physically purchasing and allocating resources, handling products, disseminating information to participants and marketing institutional arrangements for facilitating these activities (Amir and Kinpscheer, 1989). In Bangladesh agriculture is the principal economic activity, this factor becomes even more important. An efficiently organized agricultural marketing system not only facilitates proper and smooth disposal of what the farmer produces but also acts as a catalyst to stimulate increased production. So, an efficient marketing system is essential for the producers as well as the intermediaries. It is composed of marketing channel and marketing functions of different intermediaries.

4.5.3 Marketing Channels

Marketing channels are the alternative routes of product flows from producers to consumers (Kohls and Uhl, 1980). The chain of intermediaries through which the transaction of goods takes place between producer and consumer is known as a marketing channel. It refers to the sequential arrangement of various marketing intermediaries involved in the movement of product from producers to ultimate consumers (Rashid, 1969). In the channel of potato marketing in Bangladesh, the product moves from the producer-intermediaries to ultimate consumers through a number of market intermediaries

4.5.4 Marketing channel of potatoes

The process of potato marketing starts from the producer sellers (farmers) and is continued through the channel till the product reaches the consumers or final users. Under direct marketing channel the farmers sell potatoes directly to consumers, while under indirect marketing channel, a number of intermediaries get involved in the transaction process, such as, Beparies, cold storage owners, wholesalers and retailers who perform the marketing functions of buying and selling, assembling, assorting/grading, storing and transporting etc. The market intermediaries play a critically important role in potato marketing in Bangladesh by bridging the gap between the farmers and final consumers. Some of the typical models of marketing channels as observed in the study areas (Figure 5) are discussed below:

a. Farmer → Bepari→ Cold storage owner→ Wholesaler→Retailer→ consumer

b. Farmer →Bepari→Wholesaler→Retailer→ Consumer

c. Farmer → Bepari (directly/through Arotdhers,) → Retailer→ Consumer

d. Farmer → Cold storage owner (through Arothers) →Retailer → Consumer

e. Farmer →Wholesaler →Retailer →Consumer

f. Farmer →Retailer → Consumer

g. Farmer→ Consumer

The study revealed that local marketing channel b) is more efficient channel.

A brief description of these two participated as sellers in the potato marketing channel in the study area is given bellow

```
                        ┌──────────────────┐
                        │     Farmers      │
                        └──────────────────┘
                                │
                                ▼
                    ┌──────────────────────┐
                    │ Beparies (Home and   │
                    │ assembly market)     │
                    │ assembly             │
                    └──────────────────────┘
                                │
                                ▼
                    ┌──────────────────────┐
                    │  Cold storage owners │
                    └──────────────────────┘
                                │
                                ▼
   ┌──────────────┐   ┌──────────────────────┐
   │ Distributing │   │ Wholesalers/ Arotdhers│
   │ Beparies     │   │ (Wholesale market)   │
   └──────────────┘   └──────────────────────┘
                                │
                                ▼
                    ┌──────────────────────┐
                    │      Retailers       │
                    └──────────────────────┘
                                │
                                ▼
                    ┌──────────────────────┐
                    │      Consumers       │
                    └──────────────────────┘
```
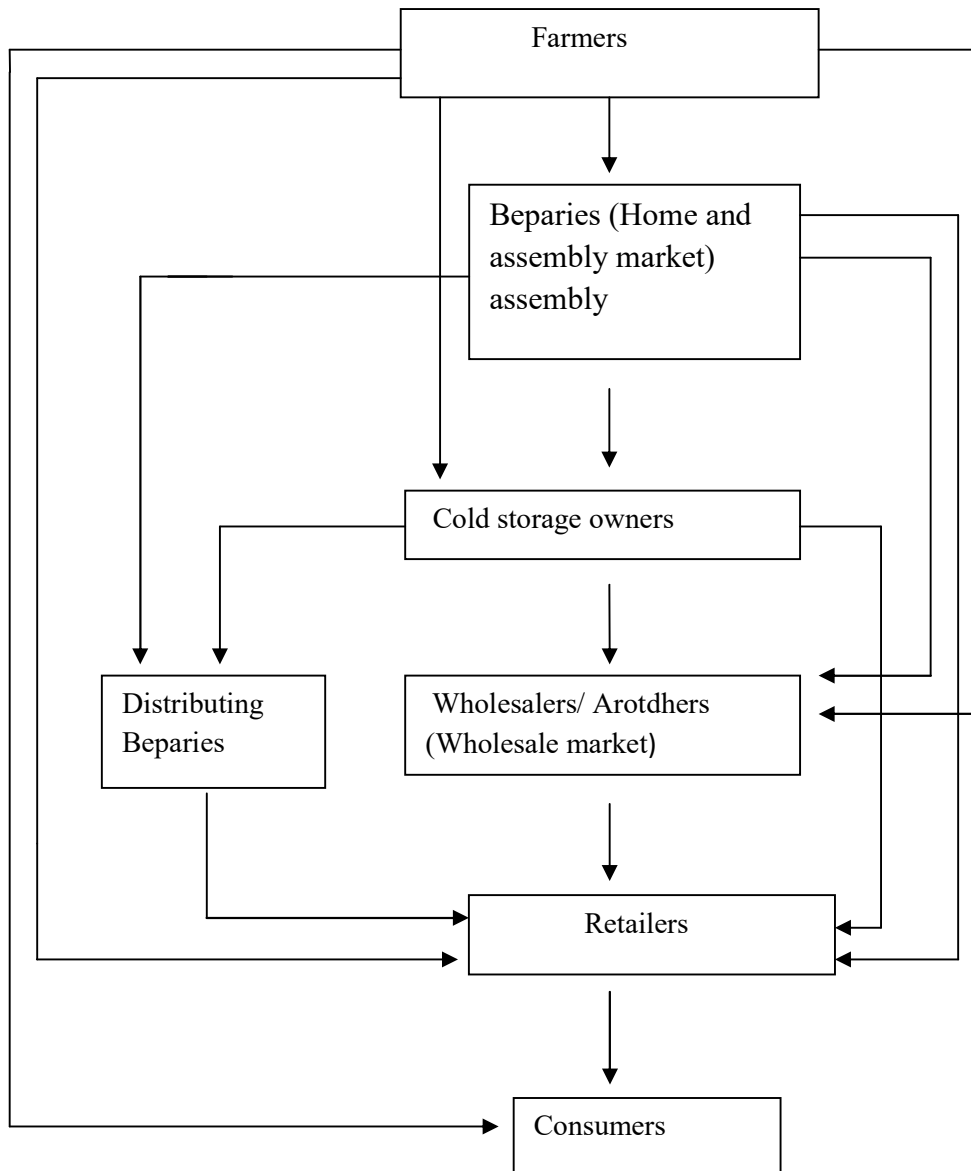
Figure 5 marketing channels of potatoes in Rangpur Sadar Upazilla

4.5.5 Farmers

Potato marketing channel started from farmers, the producer-sellers, and various intermediaries formed linkage in the channel, Potato farmers generally sold their produce to all the intermediaries either at the farmyards or in the markets and Cold storage premises. The farmers also sold some quantity of potatoes grown around the consuming centers directly to the consumers in the local markets. Farmers sold potatoes to the cold storage owners at higher prices as compared to the prevailing market prices. Farmers sold their marketable surplus 67.9% to Bepari, 19.2% to wholesalers, 7.7% to cold storage owner, 2.1% to retailers to and 3.1% to consumers (Table 4.12).

4.5.6 Beparies

The Beparies were itinerants and non-licensed petty traders. They handled a comparably smaller volume of potatoes and possessed no fixed business premises. The Beparies were the first link in the channel of distribution of potatoes in the study areas. The seasonal Beparies were mainly farmers or people from the potato producing areas. Assembling Beparies were those who performed the function of concentration of potatoes. They bought potato directly from the farmers and also from -cum-Beparies, either at the farmyards or from different naral markets; transported the same to the assembling or consuming centers and sold to distributing Beparies, cold storage owners, wholesalers or retailers through Arotdhers on payment of Aroidheri commission. Sometimes they also brought potatoes from the growing areas on behalf of outside Beparies and cold storage owners on receiving commission. Beparies who did the function of distribution were termed as distributing Beparies. They bought potatoes from farmer-cum-Beparies, cold storage owners and sometimes from assembling Beparies and sold to Wholesalers, Cold storage owners and Retailers directly or through Aroidhers. Their volume of business was larger than that of the assembling Beparies and possessed more capital. They were independently organized and hired both salaried and casual labor. Beparies were purchased 67.9% potatoes from farmers (Table 4.12) and sold 41% to wholesalers, 20% to cold storage owners, 28% to Beparies, and 11% to retailers (Table 4.27).

4.5.7 Cold storage owner

The cold storage owners possessed cold storage plants for potato storage and rendered storage facilities to the potato traders and farmers on receipt of storage charges. They also bought potatoes from farmers, Beparies, and Wholesalers stored the same in their plants and sold to the distributing Beparies or wholesalers. The cold storage owners were purchased 21.3% potatoes (7.7% from farmers and 13.6% form Beparies) and sold 11% to wholesalers, 7% to Beparies, and 2.8% to retailers (Table 4.12 and 4,27)

4.5.8 Arotdhers

The Aroldhers were the commission agents who had fixed establishment in the markets and did the functions of negotiating transactions between buyers and sellers in exchange of commission. The Arotdhers played an important role in the potato marketing channel in respect of the services they rendered to the Beparies, cold storage owners, retailers and indirectly to the consumers and the producers. A substantial portion of the potatoes supplied in the important distributing and consuming markets reached the retailers and the consumers through Arothers.

4.5.9 Wholesalers

They were big merchants and licensed traders having fixed business premises wholesale markets and they did business with large volume of transactions. They bought potatoes from farmers, Beparies and cold storage owners and sold to the retailers. They acted as the sales agents and stockholders for other potato traders. They had storage facilities. Sometime they also acted as Arotdhers. The wholesalers/ Arotdhers were purchased 58.5% potatoes of which 19.2% from farmers, 27.8% from Beparies, and 11.5% from cold storage owners. The wholesalers/ Arotdhers were sold their potato to the retailers (Table 4.12 and 4.27).

4.5.10 Retailers

The retailers were the last link in marketing channel of potatoes. Buy potato form Aroldhers or Wholesalers, Beparies or directly form farmers and all these to the consumers. They were the specialized sellers directly connected with the consumers. Most of the retailers are independently organized and have permanent shops in the market. Most of the retailers are independently organized and have permanent shops in the market. The retailers were purchased 96.9% potato of which 58,5% from wholesalers / Arotdhers, 33.6% from Beparies, 2.8% from colds storage owners and 21% from farmers (Table 4.12 and 4.27).

4.6 Profitability analysis of storing potato

Storage is essential to add time utility for many products and also for form dility to be used as raw material later on for finished products. Farm products are stored to make them available throughout the year to balance periods of plenty and periods of scarcity and sometimes to utilize them better. Farmers store potatoes mainly for earning more benefits and to for seed purpose. Types of storage used by the farmers were traditional method and cold storage plants. The survey shows that be duration of potato storing varied from 15 days to 8 months following harvest depending upon the economic condition of the farmers. It was found that larger volume of potatoes was stored at cold storage than in home storage (i.e. 39% and 61% respectively). In the study area 25 percent farmers were stored potato in traditional methods mainly for carn more benefit and 57 percent farmers out of total respondent stored potato in cold storage plant mainly to meet their seed requirement and to earn more profit. The study found that traditional method was effective for storage in short duration and in long duration storage in cold storage was more effective. In traditional method farmer stored potato 15 to 90 days and in cold storage method they store potato for 4 to 8 months. Traders also stored potato both traditional method and cold storage plants. The study found that in study area retailers stored potato by using traditional methods only mainly due to capital problem. The cold storage owner stored potato in their cold storage plants. By storing potato cold storage owner got benefit in two ways. They got profit by receiving storing benefit and also receiving storage charge. It also helps to fulfill the storage capacity of their plants.

4.6.1 Profitability of storing potatoes in traditional method at Farm level

Small, medium, and large farmers received Tk. 101, Tk.111 and Tk. 86 net benefits by storing per quintal potato from traditional method storage. For calculating profit at farm level in traditional method gross benefit was calculated as the difference between average sale price which was prevailing for without storage sale and the actual average sale price received by the farmers after home storage. Net benefit was calculated by deducting the cost of home storage, wastage/damage cost for traditional storage and others marketing cost. Wastage/ damage cost was calculated the price of the (sale price) quantity of wastage or damage for per quintal potato stored by traditional method.

Table 4.41 profitability of storing potatoes in traditional method

Types of farmer	Sale price without storage (A)	Sale price after storage (B)	Storage cost (C)	Storage Loss (D)	Other marketing Cost (E)	Net benefit B-(A+C+D+E)
Small	320.15	472.22	6.93	28.82	15.32	100.89
Medium	323.54	490.12	9.56	30.28	16.12	110.62
Large	334.64	495.18	12.15	39.52	22.45	86.42
All	323.67	485.80	10.75	33.70	17.09	100.59

Source; Field survey, 2021

Table 4.41 shows that medium farmers got highest benefit for storing potato in traditional method followed by small and large farmers. In all farms Tk.101 benefit was earned by storing one quintal potato in traditional method.

4.6.2 Profitability of storing potato in cold storage at farm level

Table 4.42 shows small, medium, and large farmers received Tk. 144, Tk. 143 and Tk. 104 net benefit by storing per quintal potatoes from cold storage.

Table 4.42 Profitability of storing potatoes in cold storage

(Taka per quintal)

Types of farmers	Sale price without storage	Sale price after storage	Storage cost	Storage Loss	Other marketing Cost	Net benefit
Small	320.15	703.58	203	20.88	15.32	144.23
Medium	323.54	702.90	203	16.85	16.12	143.39
Large	334.64	679.71	202	16.35	22.45	104.27
All	323.67	695.71	203	22.45	17.09	134.10

Source; Field survey, 2021

Small farmers got the highest benefit for storing potato in cold storage followed by medium and large farmers. In all farms was earned Tk. 134 benefit by storing per quintal potatoes in cold storage. Therefore, the study also revealed farmers got more benefit by storing potato in cold storage than in traditional storage.

4.6.3 Profitability of storing potato of intermediaries in traditional method

Like farmers intermediaries stored potatoes to earn more profit. In traditional method potatoes were stored only for a few days in their living rooms or shops of the intermediaries. The study found that Beparies, wholesalers, and retailers earned Tk. 103, Tk. 100, and Tk. 108 net profit from storing potato by traditional method. Average sale price, storage loss and other marketing cost was higher in case of intermediaries than farmers (Table 4.42 and Table 4.43).

Table 4.43 Profitability of storing potato of intermediaries in traditional method

Intermediaries	Purchase Price	Sale Price	Storage Cost	Storage Loss	Other Marketing cost	Net benefit
Beparies	316.40	534.00	12.60	30.90	25.77	103.33
Wholesalers	356.67	516.67	13.50	19.12	27.67	99.71
Retailers	363.75	557.50	13.50	52.53	19.55	1087.17
All	360.60	536.05	13.20	34.18	34.18	103.73

Source; Field survey, 2021

On an average intermediary earned Tk. 103.73 profit by storing per quintal potatoes. Cold storage owners did not store potato in traditional method. Storage cost in traditional method was much lower than cold storage but storage damage was higher in traditional methods than cold storage. Traditional storage/home storage is feasible only for short duration storage.

4.6.4 Profitability of storing potato of intermediaries in cold storage

The study found that Beparies, cold storage owners, and wholesalers earned Tk.139.04. Tk.76.48, and Tk.122.16 net profit from storing potato by cold storage (Table 4.44). In calculating store benefit of cold storage owners cold storage rent also consider as opportunity cost of storage.

Table 4.44 Profitability of storing potato in cold storage of intermediaries

(Taka per quintal)

Intermediaries	Purchase Price	Sale Price	Storage Cost	Storage Loss	Other Marketing cost	Net benefit
Beparies	353.45	740.91	178.18	17.47	52.77	139.04
Cold storage Owers	362.50	706.25	180.00	17.72	69.55	76.48
Wholesalers	357.88	733.13	181.25	17.17	54.67	122.16
All	357.94	726.76	179.81	17.41	59.00	112.60

Source; Field survey, 2021

Average sale price, storage cost, and other marketing cost were higher in case of cold storage than traditional storage but storage loss in cold storage was lower than traditional storage. Storage cost of storing potato of intermediaries was lower than farmers because some of the cold storage authority charged higher rent in case of farmer than the traders Average storage charge for farmers was 13.203 (Table 4:42) and average storage charge for traders was Tk 180 (Table 4.44). Storage charges were varying storage to storage in the study area and storage charge depends upon the business policy of the cold storage owners. The sampled retailers did not storage cold storage mainly for shortages of capital and high risk involvements.

The study also revealed that traders earned more profit by storing potatoes in cold storage than traditional methods. The cold storage owners store potato to fulfill their plant capacity and at the same time to earn more profit.

4.7 Marketing margin of the intermediaries

The term marketing margin refers to the difference in value for equivalent physical quantities of a given commodity between different levels of market. In other words, it is the difference in the price paid and received by any marketing agency. Marketing margin consists of profit and remuneration for the distribution but the greater part usually

consists of payment for loading and unloading, market tolls, transport etc., that is marketing induces cost of marketing and profit or loss of all the intermediaries, in the entire marketing channel. These charges are expressed either in absolute monetary terms or as percentage of the value of a commodity. The term price spread is synonymously used with the marketing margin (Ahamed, 2002).

Gross margin and net margin of potato intermediaries is shown in Table 4.45. Beparies, wholesalers, and retailers purchased potato at Tk.583.58, Tk.582.43 and Tk.620.94 per quintal on an average and sold potato at Tk.655.96, Tk.650.68 andv.712.51 per quintal respectively. The average gross margin of Beparies, wholesalers, and retailers was Tk.72.38, Tk.68.25 and Tk92.48 per quintal respectively. The average marketing cost of Beparies, wholesalers, and retailers were Tk. 43.27.Tk. 44.66 and Tk.28.03 per quintal, respectively.

Table 4.45 Marketing margins (Tk. per quintal) of intermediaries

Intermediaries	Purchase priced (A)	Sale price (B)	Gross margin C=B-A	Marketing cost (D)	Net profit E=C-D	Return to investment
Beparies	583.58	655.96	72.38	43.27	29.11	4.64
Wholesalers	582.43	650.68	68.25	44.66	23.59	3.76
Retailers	620.03	712.51	92.48	28.03	64.45	9.95

Source; Field survey, 2021

The average net margin (profit) of Beparies, wholesalers, and retailers were Tk. 29.11, Tk. 23.59, and Tk. 64.45 per quintals which were 4.64 percent, 3.76 percent. And 9.95 percent of total investment, respectively. Thus, among the intermediaries net marketing margin was highest in retailers and lowest in wholesalers.

4.8 Factor affecting marketing margin

This section deals with the assessment and analysis of factors affecting marketing margin.

4.8.1 Estimation of different factors affecting marketing margin

The marketing margin of different marketing intermediaries is determined by technical characteristics of the marketing function. For determining the factors affecting marketing margin, a multiple linear regression model was estimated by ordinary least squares method. The estimated values of the coefficient and related statistics of the model are presented in Table 4.46.

Table 4.46 Estimates of coefficients of multiple linear regression models of factors affecting marketing margin of potato intermediaries

Variables	Estimated coefficient	Standard error
Constant	-3.108	2.707
Transportation cost (Tk./quintal)	-.864**	.111
Storage cost	-.991**	.033
Wastage /damage cost	1.004**	.008
Loading and unloading cost	-1.000**	.008
Packaging cost	-.960**	.024
Commission /Arotdheri cost	-.654**	.123
Market toll cost	-1.074**	.049
Personal expense cost	-1.026**	.049
Other marketing cost	-1.127**	.168
Purchase price	-1.253**	.142
Sale price	1.278**	.210
Education	-1.848E-.02	.033
Age	-1.819E-.02	.016

Note: ** indicate 5% level of significance

P value is 0.05 and R^2 is 0.93

There were thirteen variable included in the model of which transportation cost, storage cost, wastage/damage cost, loading and unloading cost, packaging cost,

commission/Arotdheri cost, market toll cost, personal expenses cost, other marketing cost, purchase price and sale price were statistically significant and age, education were statistically insignificant.

The model has good fitness as indicated by R-square. The coefficient of multiple determinations, R^2 was 0.93 for the model. This means that the explanatory variables in the model accounted 93 percent variation of the marketing margin.

The contribution of the selected factors on marketing margins of different model is discussed below:

A. Transportation cost (TC).

The coefficient of transportation cost of potato marketing for intermediaries was found significant at 5% level. The coefficient of transportation cost was indicating that, other factor remaining the same, for Tk. 1 increase in transportation cost the marketing margin would decrease by Tk. 0.86

B. Storage cost (SC)

The coefficient of storage cost of potato marketing for intermediaries was found significant at 5% level. The coefficient of storage cost was indicating that, other factor remaining the same, for ITK, increase in storage cost the marketing margin would decrease Tk. 0.99. So, the traders needed storage facility. If storage cost increases then the total marketing cost of intermediaries also increases and sale price will be high.

C. Wastage/damage cost (WC)

The coefficient of wastage/damage cost of potato marketing for intermediaries was found significant at 5% level. The coefficient of wastage/damage cost was indicating that, other factor remaining the same for 1Tk. increase in storage wastage/damage cost the marketing margin would decrease by Tk.1.04.

D. Loading and unloading cost (LC)

The coefficient of loading and unloading cost of potato marketing for intermediaries was found significant at 5% level. The coefficient of loading and unloading cost was indicating that, other factor remaining the same, for 1Tk. increase in storage loading and unloading cost the marketing margin would decrease by Tk.1.00.

E. Packaging cost (PC)

The coefficient of packaging cost of potato marketing for intermediaries was found significant at 5% level. The coefficient of loading and packaging cost was indicating that, other factor remaining the same, for 1Tk. increase in packaging cost the marketing margin would decrease by Tk.0.96.

F. Commission/Arotdheri (AC)

The coefficient of commission/Arotdheri cost of potato marketing for intermediaries was found significant at 5% level. The coefficient of commission/Aroldheri cost was indicating that, other factor remaining the same, for 1Tk. increase in storage commission/Arotdheri cost the marketing margin would decrease by Tk.0.65.

G. Market toll cost (MTC)

The coefficient of market toll cost of potato marketing for intermediaries was found significant at 5% level. The coefficient of market toll cost was indicating that, other factor remaining the same, for 1 Tk. increase in market toll cost the marketing margin would decrease by Tk.1.07.

H. Personal expenses cost (PEC)

The coefficient of personal expenses cost of potato marketing for intermediaries was found significant at 5% level. The coefficient of personal expenses cost was indicating that, other factor remaining the same, for 1 Tk. increase in personal expenses cost the marketing would margin decrease by Tk. 1.026.

I. Other marketing cost (OMC)

The coefficient of other marketing cost of potato marketing for intermediaries was found significant at 5% level. The coefficient of other marketing cost was indicating that, other factor remaining the same, for 1 Tk. increase in other marketing cost the marketing margin would decrease by Tk. 1.13.

J. Sale price (SP)

The coefficient of sales price was found positive at 5% level for each model. It implies that sales price has positive impact on marketing margin of potato and is consistent to real situation. The coefficient of Sale price was indicating that, other factor remaining the same, for 1 Tk. increase in sale price the marketing margin would increase by Tk. 1.28.

K. Purchase price (PP)

The coefficient of purchase price was found significant at 5% level for each model. It implies that purchase price has negative impact on marketing margin of potato and is consistent to real situation. The coefficient of purchase price was indicating that, other factor remaining the same, for 1Tk. increase in increase on purchase price the marketing margin would decrease by Tk.1.25.

4.9 Problem of potato marketing

The problems faced by potato farmers and the intermediaries and their suggested measures have been discussed in this chapter.

4.9.1 Problems faced by the farmers during storage and marketing of potato

The potato farmers were asked to state whether they faced any problems in marketing their potatoes. The problems as reported by them have been presented in Table 4.47. All the sampled farmers (100 percent) reported that low price was the major problem in the potato marketing. Farmers reported that they did not get fair price what they expect particularly in harvesting time. This is not only marketing problem but also major production problem also. Demand of potato and price of potato in harvesting time can be increased by establishing potato processing industry. Eighty nine percent farmers

reported that financial disability and pressing need for cash money also forced them to sell their surplus immediately after harvest at lower price causing a glut in the potato market. Moreover, eighty eight percent farmers and eighty four farmers respectively mentioned that high charges of the existing cold storage plants and high risk involved for storing potato due to price fluctuation. Thirty percent farmers reported lack of marketing facility. There was no shed to protect the farmers and their produce from rain or sunshine and the growers had to sit in the open field. Lack of scientific process of sorting and grading and non-availability of institutional credit were also reported as the problems of marketing potatoes in the study area.

Table 4.47 Distribution of the problems faced by potato farmers during storage and marketing

Reported problems	Rank order				Rank Order
	Small	Medium	Large	All	
Low price of potatoes	100	100	100	100	1st
Financial disability and cash needs	90	86	86	89	2nd
High cold storage charge	90	86	71	88	3rd
Risk and uncertain in storing potato due to price fluctuation	90	71	28	84	4th
Lack of market facility	30	35	28	30	5th
Lack of adequate storage facility	25	29	28	25	6th
Lack of adequate market information	21	21	28	21	7th
Lack of transport facility	15	21	28	17	8th
Uncertainty of compensation for potatoes damage in cold storage	15	21	14	16	9th

Source; Field survey, 2021

Twenty five percent farmers stated that owing to inadequate storage facilities particularly for home storage they were compelled to sell potatoes immediately after harvest, which

deprived them of getting reasonable price of potatoes. Price of potato depend on supply and demand of potato and others vegetable and weather condition. Twenty one percent farmers reported that they failed to have perfect knowledge of the potato market due to lack of adequate sources of market information. Seventeen percent farmers reported that due to had communication system and lack of transportation facilities they could not take advantage of the reporting farmers had to sell a major quantity of their produce at farm-yards. Sixteen percent farmers reported uncertainty of getting compensation for potatoes damaged in cold storage. They reported some of them lost their capital after storing price due to low price prevails in off season. Among the problems, low price of potato during harvesting period was identified by the farmers as the acute problem.

4.9.2 Measures suggested by farmers to solve their problems

The following measures were suggested by the farmers for solving the above problem

1. Better and incentive prices for potatoes should be assured for the potato growers. In this regard, the Government should resort to support price programme for potato farmers. Government can help private entrepreneurs to establish potato processing industry such as potato flacks industry, potato chips industry etc which helps to increase the demand of potato.

2. Transportation facilities should be improved to facilitate the marketing process. Priority should be given to the development of such roads which link villages to the main roads and markets.

3. Cold storage facilities should be increased with lower charge of preservation, and a strict provision for compensation for potatoes damaged in cold storages should be made.

4. Institutional credit facilities should be made available to the potato farmers for increasing production of potatoes

5. By dissemination of market information, the farmers should be helped in getting fair price of their produce.

4.9.3 Problems faced by intermediaries in storage and marketing of potato

The intermediaries were asked to mention the problems they faced in potato business especially relating to marketing. The problems that were reported by them are presented in Table 4.48,

High cold storage charge appeared to be a major problem in the potato business as reported by (81 percent) of all intermediaries followed by shortage of operating capital (78 percent), price fluctuation and low price of potatoes (71 percent),Among the problems, high cold storage charge of potato was identified by the intermediaries as the acute problem.

Table 4.48 Problems faced by the intermediaries in storage and marketing of potato

Problems	Intermediaries					Rank order
	Beparies	Cold storage owners	Whole salers	Retailers	All	
High cold storage charge	100	-	100	100	81	1st
Shortage of operating capital	100	10	63	100	78	2nd
Price fluctuation and low price of Potatoes	100	100	100	30	71	3rd
Perishability of potatoes	50	60	50	60	56	4th
Lack of proper grading	50	100	63	30	54	5th
Lack of adequate storage facility	25	-	50	60	37	6th
Lack of adequate market information	50	20	2	30	33	7th
Poor communication and inadequate transportation	44	30	63	-	28	8th
High marketing cost	25	30	25	30	27	9th
No provision of compensation for potatoes damage in cold storage	25	-	25	-	11	10th

Source; Field survey, 2021

4.9.4 Measures suggested by the intermediaries

The intermediaries who identified their own problems also provided some suggestions for overall improvement of the existing potato marketing system. The following measure should be taken:

1. Government should improve transport and storage facilities in primary and secondary markets. Development of market infrastructure like road communication and transport media will be helpful to decrease marketing cost, thus marketing efficiency will increase.

2. Cold storage charges should be reduced to desirable levels safe-guarding the interests of the intermediaries, growers and the cold storage owners. In order to encourage the storing of potatoes there should be provision for adequate and cheaper loans against the security of the produce.

3. Government can help private entrepreneurs to establish potato processing industry such as potato flacks industry, potato chips industry etc which helps to increase the demand of potato.

4. Insurance facility should be increased to minimize risk by taking proper Government initiatives.

5. Department of Agricultural Marketing and Export Promotion Bureau may be entrusted with more and specific responsibilities of disseminating market and price information to the potato farmers and intermediaries.

6. Other remedial measures included improvement of physical facilities in the market place, proper grading of potatoes, and dissemination of market information, introduction of standard units of weights and measures that would greatly facilitate the marketing operation.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Without the support of an efficient marketing system, objectives of price stability, rapid economic growth and equitable distribution of goods and services cannot be achieved. A study of the agricultural marketing system is necessary for understanding of the complexities involved and the identification of bottlenecks with a view to providing efficient services in the transfer of farm products and inputs from producers to consumers.

Present study was carried out to find out the channels of potato market from consumers to grower through various stages, to find the profitability of storing potato estimate marketing margin and affecting marketing margin in cold storage, and identify the nature of market and prospects of potato faced by the farmers and intermediaries in Rangpur District. Two potato-producing unions, namely Dorshana and Shatgara under Rangpur Sadar Upazilla were purposively selected for collection of required data from the potato farmers. Two important markets as Rangpur Municipal Market and Lalbag Hat were selected for this purpose. The sample size for the study was 56 farmers which were selected by using simple random sampling technique. From the sample, 28 was selected from each union and 14 from each selected villages of which 35 were small (up to 1.0 hectare), 14 medium (1.01 to 2.0 hectares) and 7 large (above 2.0 hectares). Forty four potato traders (intermediaries) were purposively selected who were engaged in potato business in the year 2002. The sample size of the intermediaries included 16 Beparies, 8 wholesalers/Arotdhers, 20 Retailers. Out of twenty cold storages required data was collected from 10 cold storages owners that have been chosen by following simple random sampling technique. Tabular technique was followed for analyzing the data by using software SPSS Simple statistical tools like averages and percentages, etc. were used to obtain the results of the study.

The age structures of potato farmers of the study area were found 39 percent in the age group of 20 to 35 years, 41 percent in 36 to 50 years and 20 percent in the age of above

50 years. It was found that percent farmers were illiterate, 37 percent farmers were primary education, 34 percent farmers were secondary education and 25 percent farmers were above secondary education level. Agriculture is the main source of occupation of the vast majority, people of the selected area. In the study area most of the people were farmers, whose main source of income and livelihood is agriculture. A very few number of people were engaged in other occupations like business, services. 184 percent of farmers were engaged in agriculture as their main occupation and about 7 percentages of farmers were engaged in business and 9 percent of farmers were engaged in service.

On an average, area under potato cultivation for the sample farmers was found to be 0.69 hectare per farm during year 2001-2002. Yield of potatoes found to be the highest for the medium farmers 23.44 metric ton/ha followed by large 22.89 metric ton/ha and small farmers 21.93 metric ton/ha and all farm average in yield was 22.74 metric ton. The findings thus reveal that the medium farmers emerged as the most efficient farmers in terms of productivity. Farmers preferred cardinal variety and diamond variety then other variety in the study area. In case of all farmer 66 percent, 29 percent, and 5 percent preferred cardinal, diamond, and others varieties respectively. Others varieties includes bogra guti, shilbilati, jhau etc. Farmers in the study area disposed of their total potatoes in six different ways such as sale, consumption, used as seed, damage/loss and share paid for rented in land and other uses such as wage, and gift. Among these, quantity of potatoes sold as a whole, constituted the major disposal, which accounted for about 88.74 percent of the total production. As a whole, the farmers in the study area were found to sell 54 percent of their potatoes at the farm gate and the rest 46 percent in the near by primary or secondary markets. Out of total quantity sold by the farmers, 74 percent was sold during harvest period and 26 percent was sold during off-season. The farmers sold their potatoes to different intermediaries, viz. Beparies, cold storage owners, wholesalers and retailers. There were about 67.9 percents of their marketed surplus sold to Beparies. Price received from the markets was always higher compared to farm gate prices. The differences between farm gate price and market price was about Tk.226.28 per quintal of potatoes. The most common mode of transport used by the potato farmers in the study area was head/shoulder load, transport by rickshaw) van and track. This study indicated that economic status of the farmers had no significant influence on using mode of

transport for potatoes Transport cost was the highest (k.13.04) for head/shoulder load and was lowest for truck (Tk:1.09) per quintal per kilometer. It was found that most of the potato farmers were self-financed (57 percent) for production as well as marketing. The major sources of market information for the farmers were market visit, neighbors, and fellow traders.

The intermediaries were also classified into three age groups, as like 20 to 25 years, 36 to 50 years and above 50 years. On an average, 36 percent of the total intermediaries belonged to the age group of 20 to 35 years while 55 percent belonged to the age group of 36 to 50 years and 9 percent belonged to the age group of above 50 years age group. Educational level of the intermediaries were such that about 25 percent of intermediaries got education up to primary level and 46 percent had education up to secondary level. Only 20 percent received above secondary level of education while 9 percent of traders were illiterate in the study area.

The intermediaries purchased their potatoes mainly from four sources: (1) Potito farmers, (2) Beparies, (3) Cold storage owners, and (4) wholesalers/Arothers. They purchased potatoes from farmyard as well as village markets or assembly/wholesale markets. The average annual purchase of potatoes by Beparies, wholesalers, cold storage owners, and retailers were 5897 quintals, 18000 quintals, 8716 quintals, and 309 quintals respectively and average purchase of potatoes by all intermediaries was 6142 quintals.

The months in which relatively large volume of potatoes was sold by the Beparies and wholesalers in the month of March while cold storage owners and retailers sold maximum quantity of potato in the months of September and October. Intermediaries in the study area transported most of their potatoes by head/shoulder load, rickshaws/van, and trucks. It was observed that transport cost for all the intermediaries was the highest for using head/shoulder loads (Tk.16.64 per quintal per kilometer) and the lowest for trucks (Tk. 0.43 per quintal per kilometer)

The market intermediaries were mostly found to be self financed. Major sources of market information of the intermediaries were market visit, information from other potato

traders, newspapers, telephone and others as radio, television, personal prediction etc. Hundred percent of all intermediaries reported that market visits were the major sources of their market information while 98 percent of them reported that they received information from fellow traders.

In the study area, seven channels are found important through which pass from producer consumers. These are 1) Farmer- Bepari-Cold storage owner-Wholesaler Retailer-Consumer, 2) Farmer- Bepari-Wholesaler-Retailer-Consumer, 3) Farmer Bepari (directly/through Arotdher)-Retailer-Consumer, 4) Farmer-Cold storage owner (through Arotdher)-Retailer-Consumer, 5) Farmer- Wholesaler-Retailer-Consumer, 6) Farmer-Retailer-Consumer, and 7) Farmer- Consumer. The study raveled that local. marketing channel 2) is more efficient channel which supplies potato to the major consuming population.

Two types of storage were used by the farmers namely traditional method and cold storage plants. The survey showed that the duration of potato storing varied from 7 days to 9 months following harvest depending upon the economic condition of the farmers. It was found that farmer's stored larger volume of potatoes was stored in cold storage than home storage (i.e. 61 percent and 39 percent respectively). In the study area 25 percent farmers were stored potato in traditional methods mainly for earning more benefit and 57 percent farmers' stored potato in cold storage plant mainly to meet their seed requirement and to earn more profit. The study found that traditional method was effective for storage for short duration and storage in cold storage was more effective long time storage. In traditional method farmer stored potato 15 to 90 days and in cold storage method they stored potato 4 to 8 months. The average cost of storing of potatoes of farmers at home and in cold storage were Tk. 10.75 and Tk. 203 per quintal respectively.

Traders also stored potato both in traditional method and cold storage plants and they also stored larger volume of potato in cold storage then traditional method. It was observed that 22 percent intermediaries stored potato in traditional method and 43 percent intermediaries' stored potato in cold storage. The study revealed that retailers stored potato by using traditional methods only mainly due to capital problem. The cold storage owner stored potato in their cold storage plants thus they can get benefit in two ways; by

receiving storage benefit from potato storage and also receiving storage charge. Its also help to fulfill the storage capacity of their plants. It was observed that average per quintal storage cost of intermediaries for traditional method was Tk. 13.50 and for cold storage was Tk.180.

In this study, cold storage was found to be technically feasible by reducing potato storage losses over traditional method. The study found that storage loss was higher in traditional method (4.37 percent) then cold storage method (2.56 percent) Farmers earned on average a benefit of Tk.100.59 and Tk.134.10 by storing p6er quintal potato in traditional method and cold storage respectively. On an average intermediaries earned profit of Tk. 103.73 by storing potatoes in traditional methods and Tk.112.60 by storing potatoes in cold storage per quintal.

The average net margin (profit) of Beparies, wholesalers, and retailers were Tk. 29.11, Tk.23.59, and Tk.64.45 per quintals which were 4.64 percent, 3.76 percent, and 9.95 percent of total investment respectively. Among the intermediaries, net marketing margin was the highest for retailers and the lowest for wholesalers.

In the study area transportation cost, storage cost, wastage/damage cost. loading and unloading cost, packaging cost, commission/Arotdheri cost, market toll cost, personal expenses cost, other marketing cost, purchase price and sale price considered as the factor affecting marketing margin of intermediaries. A multiple linear regression model was used to estimate the influence of different factors. The coefficient of multiple determination R^2 was 0.99 for the model which indicated that the explanatory variables in the model explained 99 percent variation of the marketing margin. The estimated coefficient of transportation cost, storage cost, wastage/damage cost, loading and unloading cost, packaging cost, commission/Arotdheri cost, market toll cost, personal expenses cost, other marketing cost, purchase price and sale price were statistically significant at 1% level and age, education were statistically not significant.

The potato farmers and intermediaries in the study area faced various type of marketing problems like low price, price fluctuation, shortage of capital, high cold storage charge, lack of marketing facility, lack of proper grading, lack of adequate marketing

information, and perishability of potato. High cold storage charge followed by shortage of operating capital; and price fluctuation and low price of potato were the major problems of potato storage and marketing.

5.2 Conclusion

On the basis of the findings of the study, following conclusions were drawn:

1. Price potato is lowest in the month of February and March due to peak season of potato as well as due to availability of winter vegetable in abundant quantity. Potato price is highest in the month of October, November, and December. Farmers' benefit can be ensured by increasing the ability of farmer to sale potato in off season.

2. Farmers and intermediaries stored potatoes in traditional storage method and cold storage method. The study found that traditional method was effective for short duration and cold storage was more effective for long duration storage. Potato storage loss was higher in traditional method. It was found that the storage loss were 6.8% and 4.37% for farmers and intermediaries in traditional method, respectively. In case of cold storage method the storage loss was 2.6% for both the farmers and intermediaries. Storage capacity of farmers and intermediaries should be increased by increasing financial ability of the farmer and intermediaries.

3. All the farmers can not avail the facility of cold storage due to high cold storage charge and financial insolvency. Moreover cold storage owners charge higher storage charges for farmers than the traders. Cold storage charge should be reduced by taking government initiatives.

4. The average profit of Beparies, wholesalers, and retailers were Tk.29.11, Tk. 23.59, and Tk.64.45 per quintals which were 4.64 percent, 3.76 percent, and 9.95 percent of total investment respectively. Among the intermediaries net marketing margin was highest in retailers and lowest in wholesalers.

5. The transportation cost, storage cost, wastage/damage cost, loading and unloading cost, packaging cost, commission/Arotdheri cost, market foll cost, personal expenses cost,

other marketing cost, purchase price and sale price consider as the factors which affect marketing margin.

6. The present transport, communication facilities, grading and packaging system are not satisfactory, these should be developed by taking different Government and private initiatives.

7 .The potato farmers and intermediaries in the study area faced various type of problems like low price, price fluctuation, shortage of capital, high cold storage charge, lack of marketing facility, lack of proper grading, lack of adequate marketing information, perishability of potato etc. Among the problems, low price of potato during harvesting period and high cold storage charge were identified by the farmers and the intermediaries respectively as the acute problems.

5.3 Recommendations

On the basis of findings of the study, some recommendations may be put forward for significant police implication with a view to improve the efficiency of storage and marketing of potato. Those are as follows:

1. The seasonal variation in prices is mainly due to the seasonal fluctuation in the arrival of potato in the market can be reduced by the initiatives of government and private entrepreneurs for constructing potato processing industries like potato flakes industry, and frozen france fry industry etc. which can be of great help in preventing violent seasonal variation in potato price.

2. Storage facilities should be improved at primary and secondary markets by establishing cold storage plants at different stages of potato marketing.

3. The net returns could be increased if the farmers sell their products directly to the retailers/consumers. It would be better if they would organize themselves into cooperative. As an organized body they would also acquire a better bargaining power for their products over the powerful middlemen who manipulate and control the price of potato in the marketing system.

4. If competition is created among the wholesalers through increasing the number of wholesaler who carry potato to the major consuming area and volume of their business, farmers will get more profit. This can be done with the easy availability of institutional credit facilities for those wholesalers.

5. Development market infrastructure like road communication and transport will be helpful to decrease marketing cost, thus marketing efficiency will increase. Link-road facilities from the growing village to the nearest markets have to be provided to help growers to dispose of their product. Also packaging facilities need to be improved.

6. Institutional credit may also be made available for short period under easy terms and conditions to the farmers for production and marketing of potatoes and to the intermediaries for handling more volume of potatoes. Insurance facilities should be extended down to the farm and primary markets and cold storage plants largely.

7. Department of Agricultural Marketing and Export Promotion Bureau may be entrusted with more and specific responsibilities of disseminating market and price information to the potato growers and intermediaries.

REFERENCES

Afsar, A. K. M. N. (1997). Food Security in Bangladesh Agricultural Marketing. 40 (2): 5-20.

Ahamed, F. (2002).Marketing and Consumption of Jackfruit in Some Selected Areas of Mymensingh and Gazipur Districts. Unpublished M.S.Thesis, Department of Agricultural Economics, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706.

Ahmed, J. and S. Elias. (1988). Marketing of Potato at Trader's Level in Some Selected Areas of Bangladesh. *Economic Affairs*, **33**(3): 183-188.

Ahmed, K.U. and B. M. Kamal (1994). Bidhatar Daan Alu, Banglow No. 2. Krishi Khamar Sarak, Farmgate, Dhaka

Akhter, S.M., and M. Asaduzzaman. (2001). Potato Production in Some Selected Areas of Bangladesh. TCRC. BARI, Joydebpur, Gazipur, Bangladesh.

BBS. (2015). The Yearbook of Agricultural Statistics of Bangladesh, 2015.Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

BBS. (2016). The Yearbook of Agricultural Statistics of Bangladesh, 1995.Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

BBS. (2017). The Yearbook of Agricultural Statistics of Bangladesh, 2017 Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

BBS. (2017). The Yearbook of Agricultural Statistics of Bangladesh, 1995. Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

BBS, (2018). The Yearbook of Agricultural Statistics of Bangladesh, 1995, Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

BBS. (2019). The Yearbook of Agricultural Statistics of Bangladesh, 1995. Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

BBS. (2020). The Yearbook of Agricultural Statistics of Bangladesh, 1995. Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka

Chatha, T.S. and D.S. Sidhu, (1980). Production and Marketing in the Punjab State.Ludhiana, Dept. of Economics and Sociology, Panjab University.

Dillion J.L. and J.B. Hardaker. 1980, Farm Management Research for Small Farmer Development, Agricultural Services, Bulletin **41**, FAO, Rome.

Elias. M. S. Hossain, A. B. S. Akhter, M. L. and Jakaria, M., (1998): Production Methodology of High Yielding Varieties of Potato, A leaflet of TCRC, BARI, Joydebpur, Gazipur.

Singh and D. Kumar. (2000). Economics of Potato Storage in Northern India. Quarterly Journal of International Agriculture. 39 (2): 131-148: 20.

GOB. (2020). Bangladesh Economic Review, Economic Division, Ministry Finance,Government of the People's Republic of Bangladesh, Dhaka.

Khan, M. R (2002). Value Added Agro-processing Opportunities in Bangladesh, Paper presented at the Asia Regional Conference held in Dhaka in 2-4 October 2002.

Khan, M.R. and J. A. Khan. (1999). Potato-Based Dietary Habits Observer Magazine. The Bangladesh Observer, April 16: 13.

Khatana, V.S., Karnic, K.S.. Ilangantileke, S.G., Vaman, 1..K.. Patil, M.G and Scott, GJ. 1997. Farmer's Storage Practice for Potatoes in Karnataka, India: Problems and

Prospects. International Potato Center Social Science Department Working Paper No. 1997-98. International Potato Center (CIP), Lima, Peru.

Kohls, R.L and J. N. Uhl. 1967. Marketing of Agricultural Products. Third Edition,The Macmillan Publishing Co. Inc., New York. Kohls, R.L. and J. N. Uhl. 1980. Marketing of Agricultural Products (Fifth edition).Macmillan Publishing Co., Inc. New York, 5-8.

Manda, M. A. S. (1979). An Economic Analysis of Resource Use with Respect to Farm size and Tenure in an Area of Bangladesh. Ph. D Thesis, University of London U.K.

Mannan, K. (1975). Seminar on Agricultural Marketing. Dhaka. 1 Edition, Royal Library.

Naik, D. and S.C. Patnaik. (1989). An Economic Analysis of Potato Marketing in Orissa. Journal of Indian Potato Association, 16 (1&2): 14-19,Planning Commission. 2000. Mid Term Review of the Fifth Year Plan, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

Rahman, M. M. 1993. Losses of Potato under Traditional Storage and Cold Storage A Comparative Economic Analysis. Unpublished Master's Thesis, Department of Cooperation and Marketing. Bangladesh Agricultural University, Mymensingh.

Rokhsana. A (2002). Early variety IPSA Bean Marketing System in some Selected Areas of Bangladesh. Unpublished M.S. Thesis, Department of Agricultural Economics, Bangabandhu Sheikh Mujibur Rahman Agricultural University. Gazipur-1706.

Sabur, S. A. (1988). Marketed Surplus Function for Potato in Selected Areas of Bangladesh. The Bangladesh Journal of Agricultural Economics, 11(2): 15 26.

Sarker, S.C., M. A. Akbar and M. A. Bashar. 1992. Marketing of Potatoes Farm Level in Kotwali Thana of Naogaon District. *Bangladesh journal of Agricultural Economics*, **15**(2): 103-110

Shahabuddin, Q. (1987). Factors Affecting Stocking Decisions of Rice Traders in DhakaCity-Findings of a Sample Survey. Bangladesh Journal of Agricultural Economics. X (**1)**: 50-62

Tittle: A STUDY ON MERKETING CHANNEL, PROFITABILITY AND STORAGE FACILITY OF POTATO IN RANGPUR DISTRICT

Department of Agribusiness and Marketing

Sher-e-Bangla Agricultural University, Dhaka-1207

Interview schedule for farmers

Sample No. …………………………. Date : ………………

1. Identification of potato growers
a) Name of the farmers/growers: ………………………….
b) Age ……………………………..
c) Education ……………
d) Major occupation ……………….
e) Farming experience …………….
f) Address   Village: ………………

                           Upazilla: ……………..

2. Family information :

    Total member ……….. Adult male …….. Adult female……….

     Children …………….Total earning member ……………..

3. Land ownership pattern (Decimal):

Own cultivated	Rented in	Lease in	Rented out	Lease out	Others	Total cultivated land	Home Stead

4. Source of income :

Source	Annual income (TK.)	Source	Annual income
Potato		Fisheries	
Rice		Fruit	

Wheat		Home gardening	
Pulse		Service	
Livestock		Business	
Poultry		Others(Specify)	

5. a. Total areas in potatoes cultivation (Last year)

SL. No.	Namely of variety	Area (Decimal)
1		
2		
3		
4		
Total		

b. plot size …………. (Dec.)   Variety : ………………………

6. Use of labor for potato cultivation (in plot 5.b)

Operations	Family (man days)	Hired (man days)	Wage rate (TK./man)
Land preparation			
Tuber planting			
Fertilizer & manure application			
Weed &earthling up			
Pesticides application			
Irrigation			
Drainage			
Harvesting			
Transport			
Others			

7.Use of Animal power or Mechanical power for cultivation (in plot 5.b.):

Operation	Animal power			Mechanical power	
	Owned (pair day)	Hired (pair day)	Waged rate/pair	Used hour	TK/Hour
Land preparation					
Irrigation					
Transport for post harvest					

8. Use of material inputs (in plot 5.b.):

Inputs	Home supplied (quantity)	Purchased (quantity)	Price (TK/kg)
1. Seed			
2. Urea			
3. TSP			
4.MP			
5. Organic fertilizer			
6.Pesticides			
7.Others			

M

9.production and yield of potatoes:

        a) yield in plot 5.b. : …………………………

        b) total production (Sack): ………………

        c) Price (sold price) (TK/sack) at harvest

10 .Disposal pattern of potatoes:

Disposal /pattern	Quantity (Sack)
a. Consumption	
b. Sold	
c. Seed	
d. Others	
e. Wastage or damage	
f. Share payment for rented land	
Total	

11. Monthly potatoes sale by farmer:

Month	Storage status (code)	Place of sale (Code)	Buyer (code)	Quantity (Sack)	Price received (TK./Sack)
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					

Storage status (code);   1=without storage, 2=after storage

Place of sale (Code) ;   1=farm gate,   2=local market   3=other place

Buyers code ; Potato ;   1=Bepari   2= others farmers;   3= wholesale / Arotdher

                                           4=cold storage owners;   5=Retailers; 6=consumer

12. Mode of transportation used:

Transport	Quantity (Sack)	Distance	Cost (TK,/Sack)
Head / shoulder load			
Bullock cart			
Kickshaw /Van			
Truck			
others			

13. Marketing cost

Cost items	Cost (TK./Sack)	Cost items	Cost (TK/Sack)
Loading and unloading		Subscription	
Assorting /Grading		Personal expenses	
Packaging		Sweeper	
Market tolls (tax)		Others	
Commission /Arotdheri		Total	

14. Types and purpose of storage

Types Of Storage use	Duration specify (d/m)	Quantity (Sack)	Storage cost(TK./Sack)	Purpose of storage				
				Consumption (Sack)	Used as seed (Sack)	Sold		
						Quantity (Sack)	Price (TK./Sack)	
Only home								
Only cold Storage								
Total								

Note: 1 sack= ……..kg

15. Source of fund for potato cultivator

Source	Amount (Tk.)	Interest
1.Own		
2.Friends and relatives		
3.Bank		
4.NGO's		
5.Money lender		
Total		

16. Source of marketing information

a. Market visit   d. Fellow traders

b. Neighbors　　　　　　　　　　e. News papers

c. Radio　　　　　　　　　　　　f. Others (specify)

17. Market problem

a) Low price	g) financial disability and
b) lack of transport facility	cash shortage
c) lack of adequate storage facility	h)Lack of marketing facilities
d) High cold storage charge	i) high market tolls
e) Risk and uncertainty in	j)Defective weighting system
storing potato due to price fluctuation	k)Others, if any say
f)Uncertainty of compensation for potato damaged in cold storage	

Thank you so much for your kind cooperation.

Date:

………………………………………….

Signature of the investigation

Department of Agribusiness and Marketing

Sher-e-Bangla Agricultural University, Dhaka-1207

Interview schedule for : Beparies, Wholesaler/Arodther and Retailer

Sample No. ………………………….   Date : ………………

1. Identification of respondent ;
a) Name: ………………………….
b) Age ……………………………..
c) Education ……………
d) Major occupation ……………….
e) Farming experience …………….
f) Address   Village: ………………

                          Upazilla: ……………..

2. Family information:

Total member ……….. Adult male …….. Adult female……….

Children ……………Total earning member ……………..

3. Initial investment: ……………………Tk.

4. Source of income:

Source	Annual income (TK.)	Source	Annual income
Potato trade		Agriculture	
Others trade		Others	
Total			

5. Buying place

Source	Total annual purchase (Sack)
Farmers	
Beparies	

Cold storages	
Wholesaler	
Total	

6. Buying place

Purchase place	Annual purchase (Sack)
Farmers home / farmgate	
Village market	
Wholesale market	
Cold storage premises	
Business premises	
Total	

7. Monthly purchase and sell information:

Month	Purchase Quantity (Sack)	Purchase Price (Tk)	Selling place	selling Quantity (Sack)	Selling Price (TK./Sack)
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					

December					

Selling place; 1=Business premises, 2=Outside the internal market, 3=cold storage

4=others

8. Why you preserve potato by Traditional methods?

a)

b)

9. Why you preserve potato by Cold storage?

a)

b)

10. Types and purpose of storage

Types of storage use	Duration Specify d/m	Quantity (Sack)	Storage Cost (Sack)	Storage loss (Sack)	Sold Quantity (Sack)
Traditional Method					
Cold storage					
Total					

11. Mode of transportation used:

Transport	Quantity (Sack)	Distance	Cost (TK,/Sack)
Head / shoulder load			
Bullock cart			
Kickshaw /Van			
Truck			
others			

12. Marketing cost

Cost items	Cost (TK./Sack)	Cost items	Cost (TK/Sack)
Loading and unloading		Subscription	
Assorting /Grading		Personal expenses	
Packaging		Sweeper	
Market tolls (tax)		Others	
Commission /Arotdheri		Total	

13. Source of fund

Source	Amount (Tk.)	Interest
1.Own		
2.Friends and relatives		
3.Bank		
4.NGO's		
5.Money lender		
Total		

14. Source of marketing information

a. Market visit   b. Neighbors   e. News papers

c. Radio   d. Newspapers   f. Others (specify)

15. Market problem

a) Low price	g) financial disability and
b) lack of transport facility	cash shortage
c) lack of adequate storage facility	h)Lack of marketing facilities
d) High cold storage charge	i) high market tolls
e) Risk and uncertainty in	j)Defective weighting system
storing potato due to price fluctuation	k)Others, if any say
	f)Uncertainty of compensation for
	potato damaged in cold storage

Thank you so much for your kind cooperation.

   Date:

                              ………………………………………….

                              Signature of the investigation