Price Variation in Vegetable Market: A Study on Effective Supply Chain Management in Bangladesh

Dissertation

submitted in partial fulfillment of the requirements for the Degree of Masters in Procurement and Supply Management

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DECLARATION

It is hereby declared that I am the sole author of this dissertation. It is also declared that this dissertation or any part of it has not been submitted elsewhere for the award of any degree or diploma.

Fall, 2014

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CERTIFICATE

This is my pleasure to certify that the dissertation entitled "Price Variation in Vegetable Market: A Study on Effective Supply Chain Management in Bangladesh" is the original work of Mohammad Anamul Hoque Bhuiyan that is completed under my direct guidance and supervision. So far I know, the dissertation is an individual achievement of the candidate's own efforts and it is not a conjoint work. I also certify that I have gone through the draft and final version of the dissertation and found satisfactory for submission to BRAC Institute of Governance and Development (BIGD), BRAC University which is a partial fulfillment of the requirements for the degree of Masters in Procurement and Supply Management.

Fall, 2014

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Mohammad Anamul Hoque Bhuiyan

Executive Summary

This report attempts to investigate the efficient marketing channel of vegetables. Appropriate marketing channels and market functionaries are important in the movement of vegetables from the producers to the consumers. The outputs of the present study are expected to fill up the information gap and thereby contribute greatly to find out efficient marketing options in order to formulate a meaningful national policy to improve the fragile marketing systems of vegetables in Bangladesh. To conduct this research both primary and secondary data have been used. For collecting primary data a group of 10 Producers, 10 Farias, 10 Aratdars, 10 Wholesalers, and 10 retailers have been selected as respondents of different categories of samples. No statistical formula has been used to determine the size of those samples. Rather personal judgment is used to determine the size of the sample. For the convenience of the study data on two cold storages have also been collected.

The main objectives of the study is to identify the factors for price variation, actors or intermediaries involved in the Supply Chain Management System of vegetables, net profit margins for each category of vegetables and to identify the problems and remedy of the existing Supply Chain.

In the present study two important vegetables (Potato and Brinjal) have been selected. Substantial amounts of secondary data on production and market prices of the selected vegetables have been collected. The collected data are analyzed and required tables and graphs have been prepared to present and discuss the results. An extensive primary survey has also conducted to study marketing channels, market actors, gross and net margins and marketing constrains.

After Conducting the Study the Following Findings have been found:

Many constraints have been identified in the existing marketing channels of vegetables. Almost all the channels are long with many middlemen. The other important constraints are mainly related to inadequate market infrastructures, paucity of uninterrupted electric supply in potato cold stores, unauthorized tolls and commission throughout the channels, restricted entry of vehicles into Dhaka city,

existence of syndicate/price control, hegemony of middlemen in the marketing channel, absence of modern marketing tools and equipment's, lack of market information, lack of knowledge and skills, lack of specialized training and above all political unrest of the country.

To Improve the Situations the Following Recommendations have been Prescribed:

Conduct Farmers Training: There are a number of constraints at the grower's end of the supply chain. The growers should be given training to overcome their problems. The Agriculture department should make immediate intervention so that growers / producers interests are safeguarded.

Research on Traditional Storage: Research can be done to optimize and improve traditional storage methods. Cold storage expansion is going to take time, and it might not be always cost effective and also might not be always in every farmer's interest. So, research on traditional storage technology should be strengthened.

Unusually High Marketing Margins of Retailers: The most striking result of the present study was that the net margin and percent value addition by the retailers of Dhaka city are consistently and unusually the highest among all the intermediaries regardless of the vegetables. Regular monitoring and more competition at retail level, especially in Dhaka city are required which would help significantly reduce vegetable prices at the retail levels.

Low Price Received by Farmers Due to Price Control by Organized Traders: Public perception is that there exists syndicate in market. Present study revealed that there are indirect price controls in supply chain. In some rural assemble markets, Bepari collectively show artificial reluctance to buy produce for a while to create panic, which ultimately force the farmers to sell produce at lower prices. Grower's organizations and cooperatives should be encouraged.

Relocation of Wholesale Markets: Results suggests that huge wastage have occurred due to restricted movement of trucks into Dhaka city. Currently, trucks are not allowed to enter into Dhaka after 6:00 AM. If a vehicle gets late due to some unforeseen reasons, the entire products are spoiled. So, relocation of large wholesale markets would be considered.

Improvement of Traffic Congestion: Traffic congestion is a national problem but the problem is much more serious for perishable agricultural products. Delay in the Ferry Ghat is another serious problem and needs to be resolved. Goods train for carrying bulk volume of vegetables could also be considered.

Improvement of Transport Vehicle: Transportation is the key to efficient marketing. Generally, open trucks without cooling facilities are used for long-distance transportation, and wastage becomes very high. So, trucks with cooling facilities should be used for long-distance transportation.

Introduction of 40-50 kg Net Bags for Potato Storage: There is strong demand from the potato cold stores to introduce 40-50 kg plastic net bags to facilitate handling and maintain quality of potato due to more ventilation. The presently used jute bags are hard to handle and are hazardous for the laborer in longer term. So, immediate introduction of 40-50 kg net bags in the potato cold stores would be considered.

Improvement of Power Supply: The most important problem in potato cold stores is the paucity of uninterrupted supply of electricity. Special attention should be given for potato sector so that electricity supply remains uninterrupted, especially during the loading period (March-May).

Introduction of Modern Loading and Unloading: In the peak season, there is rush in the market, where vehicles are loaded by manual labors and produce reaches the market after going through various marketing activities. Loading and unloading by manual labor is time consuming and costly. Forklifts can be introduced in the big wholesale markets to expedite the movement of perishables.

Introduction of Modern Weighing Machine: Still in Bangladesh, beam balances are used to weigh produce in the market. This method is also time consuming and may lead to have incorrect weight. More modern and sophisticated weight machine would be introduced to weigh big lot of produce. It saves time and cost of weighing.

Value Addition of Agro-Produce: Use of potatoes could be diversified to safeguard growers interest and to reduce wastage. Often growers do not receive reasonable price of their produce due to high production, less price and wastage. Various value added products like flakes, chips, fries, etc. could be produced for domestic market and export.

Contents

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Abbreviations and Acronyms

ASEAN	**A**ssociation of South East Asian Nations
BADC	**B**angladesh Agricultural Development Corporation
BARC	**B**angladesh Agricultural Research Council
BARI	**B**angladesh Agricultural Research Institute
BAU	**B**angladesh Agricultural University
BBS	**B**angladesh Bureau of Statistics
BCIP	**B**angladesh Country Investment Plan
BINA	**B**angladesh Institute of Nuclear Agriculture
BSTI	**B**angladesh Standard and Testing Institute
CPI	Consumers Price Index
CPD	**C**entre for Policy Dialogue
CSF	**C**old Storage Facilities
DAE	**D**epartment of Agricultural Extension
DAM	**D**epartment of Agricultural Marketing
EU	**E**uropean Union
FAO	**F**ood and Agricultural Organizations
FPMU	**F**ood Planning and Monitoring Unit
GAP	**G**ood Agricultural Practices
GHP	**G**ood Hygienic Practices
GMP	**G**ood Manufacturing Practices
GO	**G**overnment Organization
GoB	**G**overnment of Bangladesh
HACCP	**H**azard Analysis and Critical Control Points
HIES	**B**angladesh Household Income and Expenditure Survey
HYV	**H**igh Yielding Variety
ICT	**I**nformation and Communication Technology
ISO	**I**nternational Organization for Standardization
NCPHT	**N**ational Committee on Postharvest Technology and Value Addition Research in Agriculture
NFP	**N**ational Food Policy
NGO	**N**on Government Organization
NFPPoA	**N**ational Food Policy Plan of Action
PoA	**P**lan of Action
PRA	**P**articipatory Rural Appraisal
SMS	**S**hort Message Service
WHO	**W**orld Health Organization

CHAPTER 1

Introduction:

Vegetables are very important for human diet, especially for vitamins and minerals. However, the per capita consumption of fruits and vegetables in Bangladesh is only 211 gm/day against a minimum requirement of 400gm/day (FAO/WHO 2003; BBS 2013), which manifests a poor dietary status of the people in the country. Presently, Bangladesh produces around 10923 metric tons of vegetables (including potato) per year, respectively (BBS 2013). However, due to seasonal glut and absence of proper Supply Chain Management systems, bulk quantity of harvested produce gets wasted every year. Recently, it is reported that postharvest loss of fruits and vegetables in Bangladesh ranged from 23.6% to 43.5%, which accounts for an annual loss of thousands of crore taka. Hence attention should be given to the reduction of enormous postharvest losses of vegetables in Bangladesh. The changing demand in domestic and international markets for vegetables creates both challenges and opportunities. Therefore, efficient Supply Chain Management systems are of paramount importance to reduce postharvest loss and the risk and uncertainty in timely delivery of quality and safe produce at reasonable prices to the consumers.

Appropriate marketing channels and the market actors are important in timely delivery of vegetables from the producers to the consumers. But there is no proper systematic channel in the markets for which price of vegetables fluctuates. Different markets have different prices for the same vegetables. Price also differs significantly at different times on in the same day in the same market. For example in the evening price is differed from the morning price in the same market. There are no fixed price determination factors in vegetable markets. Variation in supply and demand is prime cause of price variation. Although ultimate price is determined through the bargaining between buyers and sellers. If demand is high and supply is low obviously the price will go up and vice-versa. It is also true for seasonal variation. But our main concern is how effective Supply Chain Management can reduce the fluctuation of price of vegetables and ensure the reasonable price for the producers of vegetables.

Different marketing channels have been identified by several authors. One of the most common channel is Growers-Bepari-Aratdar-Retailers-Consumers. The price of vegetables is apparently higher at the retailers' level. Most of the surveys shows that the price of vegetables are increased at the retailers level. The intermediaries are very often blamed to take the lion's share of profit.

In Bangladesh, the consumption of vegetables has been increasing rapidly in the recent years, as the economy grows and consumers diversify their diets. This trend is likely to continue in the future. Furthermore, domestic agricultural markets have undergone modernization (though not that significant) due to rapid urbanization, agro-industrialization, rise of super markets and trade liberalization and procurement system is gradually shifting from traditional wholesale markets toward vertically coordinated supply chains. At present, Bangladesh's agricultural marketing system is often accused in the popular press of being inefficient. In the case of vegetables, Aratdar, Bepari and wholesaler have been found to be critical players in the market. Their margin was between 17-18% of the retail value and their return on working capital was found to be exceptionally high (NFPCSP 2011).

Inefficient Supply Chain Management systems reduce demand from consumers and participation by farmers, who face significant challenges in seizing opportunities to participate in growing markets for vegetables. Marketing constraints include both high costs and risk. High marketing costs often stem from poor transportation networks (Hossain*et al*. 2006), lack of market information and sometimes from lack of competitiveness in the market. Production of vegetables can be very susceptible to pest outbreaks, and spoilage after harvest is an important problem due to highly perishable nature of most vegetables. These factors in turn can lead to highly unstable prices. If these constraints can be removed, farmers will earn more by specializing in crops for which they have a comparative advantage. Presently, the crying need is the generation of reliable up-to-date data on the actual costs and returns of the market intermediaries. The outputs of the reportwill fill up the information gap and indeed, contribute greatly to find out the most efficient marketing options in order to formulate a meaningful national policy to improve the fragile supply chain management systems of vegetables in Bangladesh.

Objective 1:

The first objective of the study is to identify the factors for price variation, actors or intermediaries involved in the Supply Chain Management System of vegetables.

Research questions

- What are the factors contributing to price fluctuation?
- What are the different types of Supply Chain Management System used in vegetables marketing?
- What types of different intermediaries are involved in the Supply Chain Management Systems of vegetables?
- How does the price fluctuates by the activities of these types of intermediaries?

Objective 2:

The second objective **is to** evaluate the performance of marketing system by calculating gross and net profit margins for each category of vegetables studied.

Research questions

- What are the costs of production and marketing of the selected vegetables?
- What are the profit margins earned by different types of intermediaries in Supply Chain?
- Do the intermediaries receive lion's share of the profit? If so, who gets the most?

Objective 3:

The third objective is to identify the problems and remedy of the existing Supply Chain.

Research questions

- What are the problems faced by different intermediaries and how can they be overcome?

CHAPTER 2

Literature review

2.1 Background

The situation of vegetables market in Bangladesh has containing poor marketing infrastructures and huge postharvest losses. Due to seasonal glut and absence of proper marketing system, bulk quantity of harvested produce gets wasted every year. The estimated postharvest loss of fruits and vegetables in Bangladesh ranged from 23.6 to 43.5%. Similar losses of fruits and vegetables have also been observed in other Asia-Pacific countries, for instance, 40% in India, 20-50% in Indonesia, 20-50% in Korea, 27-42% in the Philippines, 16-41% in Sri Lanka, 17-35% in Thailand, and 20-25% in Vietnam (Rolle 2006). The postharvest loss of fruits in the Sub-Saharan Africa is reported to be 50% (Mashau*et al.* 2012). In general the postharvest losses of fruits and vegetables in the developing countries are substantial (24%-40%) as compared to those of the developed countries (2-20%) (Sirivatanapa 2006). Global population is increasing faster than the growth in food supply and all the resources utilized to produce food are becoming increasingly scarce. Therefore, reducing postharvest losses of food must be an essential component in any strategy to make more food available without increasing the burden on the natural environment (Hudges*et al*. 2010). Hence, due attention should be given to reduce postharvest losses, maintain quality and safety in effective supply chain management and deliver produce at reasonable prices to the consumers. Vegetables are mainly produced by small and marginal holders but due to weak and fragmented supply chain, only a small percentage of the produce reaches the urban market (Minten*et al*. 2010). Appropriate marketing infrastructure is crucial for efficient marketing of vegetables in Bangladesh (GoB 2008; Khandaker*et al.* 2009; BCIP 2010).

2.2 Marketing Channel and Market Intermediaries

Marketing channel refers to the sequential arrangement of various marketing intermediaries involved in the movement of products from the producers to the consumers. In agricultural marketing, there is a lack of direct linkage between the producers and the consumers. After harvesting, the commodity passes through a number of middlemen and finally reaches the consumers. Marketing channel varies from commodity to commodity. Once a particular commodity is offered for sale by the producers, different types of buyers appear and engage in bargaining to purchase the produce. The first channel is dominated by village Faria, local Bepari, local Aratdar, and local wholesalers. The produce passes through another set of middlemen like Bepari, Aratdar, wholesalers and processors in the destination markets. Finally, the produce reaches the consumers through the hands of the retailers. This means, the production is to pass through various channels and every channel is to receive its reward for its services. In relation to vegetables marketing, a small proportion passes through local retailers directly from growers and a considerable proportion passes from Bepari via Aratdarthrough Paiker to the consumers (Hassan et al 2010). Ahmed *et al.* (1990) reported five important marketing channels of winter vegetables, which are Growers-Consumers;
Growers-Retailers-Consumers; Growers-Bepari-Aratdar-Retailers-Consumers; Growers-Agent-Exporter; and Growers-Aratdar-Exporter. Ahmed etal(1992) reported three principal marketing channels, namely local, regional and inter-regional. The local marketing is characterized by the intervention of fewer middlemen between producers and consumers. The regional channel consists of an extended chain of intermediaries. The inter-regional channels are the most lengthy in terms of number of traders involved and distance over which produce are transported. However market actors and marketing channels are influenced by production location, farm sizes and seasonality are not adequately investigated.

Myint (2003) reported different categories of market actors in fruits and vegetables supply chain in Myanmar. The market actors are farmers; primary collectors (village brokers); collectors; town wholesalers and large scale wholesalers; market wholesalers; market retailers; transport brokers; and exporters. In the case of potato, two different marketing channels (traditional and cold stored) were reported by

Hossain and Miah (2009). In the case of traditionally-stored potatoes, Bepari and Faria purchased potatoes from the growers.

The amount of potato purchased by Bepari was higher (60.9%) than Faria (36.2%). Bepari bought large amount of potatoes from the farmers and sold directly to the Paiker(38.9%), retailers (26.2%) and Aratdar‟‟(21.6%). Similarly, Faria bought potatoes directly from the farmers and mostly sold to the Bepari (25.8%) and small portion (10.4%) to the retailers through Aratdar. Paiker bought a major portion of potatoes directly from the Bepari (38.9%) and a very small from the farmers (2.1%). They also bought a good amount of potatoes (20.9%) from Faria and other Bepari through Aratdar. The Paiker sold their entire potatoes to the retailers. In the case of cold stored marketing, Bepari and Paikerbought potatoes from cold stores. The amount of potato purchased by Bepari was again higher (73.2%) than the Paiker (24.4%). Aratdar bought all potatoes from the Bepari and sold 42.1% to Paiker and 29.3% to the retailers. Paiker sold maximum amount (68.1%) to the retailers and very small portion (0.2%) to the consumers. However, Hossain and Miah(2009) did not calculate the marketing costs and margins of the producer and the intermediaries in potato supply chain. Although Hossain and Miah (2009) concluded that Aratdar buy and sell potatoes but the statement is confusing. This is also important to note that the Aratdar (commission agent) is actually do not buy or sell produce rather they act as facilitators and charge a certain percent of commission and the results of the present study would clarify the confusion. Hossain and Miah (2009) also calculated the disposal pattern of potato at the farm level. They reported that about 2.92% of the produced potatoes was used for home consumption, 0.52% was used for gift, 62.04% was sold during harvesting period, 12.73% was kept in cold stores as seed and 23.04% was stored as table potatoes and sold later (cold stores 19.70% and home stores 3.34%) when price became high. In a similar study, Rabbani*et al.* (2010) reported that most small potato growers sold their produce from the farm gate (78%) followed by from local assemble market (18%) and from cold stores (5%). On the other hand, the large potato growers mainly sold their produce from the farm gate (51%) followed by from cold stores (31%). Market syndicate and fewer traders in the potato supply chain (less bargaining option and more price control) are the major constraints in potato marketing. Hajong(2011) conducted a study on marketing and storage system of potato in selected areas of Rangpurdistrict and reported the presence of intermediaries such as Faria, Bepari, Paiker,

retailers and cold store owners in the marketing systems of potato. Hajong(2011)observed ten different types of marketing channels and the principal channels were farmer-consumers; farmers-Faria-Bepari-Paiker-retailer-consumers; and farmers-cold storage-Bepari-Paiker-retailers-consumers.

CPD (2007) reported six major marketing channels and six market intermediaries inpotato supply chain. The longest chain involved six nodal points, whereas the dominantchannel involved five agents. In both channels, production constituted the major component of the consumers expenditure (53%-62% of the retail value). The rest 40%-50% accrued to the various intermediaries including wholesalers and retailers, whose rate of return on working capital varied from 12% to 14%. Cold store owners also received considerable share (12%-14%) of the retail value. However, the author did not calculate the marketing costs and margins of the intermediaries involved in the marketing of traditionally-stored potatoes. The present study attempted to investigate the marketing costs and margins of the market intermediaries involved in both the traditionally-stored and cold-stored potato channels, especially from producing areas to Dhaka retail markets. Barman (2008) carried out a study about supermarket and conventional marketing channels of winter vegetables in Dhaka city. Results showed that producers of winter vegetables mainly sold their products to the wholesalers and supermarket collected their needed products from wholesalers and ultimately sold to the consumers in the supermarkets. On the other hand, in conventional market, wholesalers purchased their required amount from producers and sold to the retailers and then retailers sold to the consumers. Barman reported several marketing channels. For supermarkets, the marketing channels are producers-wholesalers-supermarket-consumers and producerssupermarket-consumers. For conventional marketing, the identified channels were producerswholesalers-retailers-consumers and producers-retailers-consumers.

2.3 Seasonality

Seasonality refers to the pattern of monthly or seasonal price variation of any commodity over a certain period of time. Hajong (2011) investigated the seasonal price variation of potato in Rangpur district from the year 2000-2010. Results showed that the price of potato was higher in the months of January and July-December.

Monalisa (2011) conducted a studyon seasonal price variation of chili in Jamalpur District. Results showed that the price of chili was higher in the months of September and October. Ferdous (2007) carried out a study on seasonality of brinjal for the period of 2002-2006 in some areas of Mymensingh district. Results revealed that the price of brinjal was higher in the months of September to November and lower in the months of December to January. Myint (2003) reported the seasonality of tomato in Myanmar, and showed that high price at the start of the season. At the peak season, the tomato price went down due to increase in supplies in the market. Afterwards, the pricesagain increased but not reached the same level as observed at the start.

2.4 Price Fixation

Method of price setting is also an important aspect in marketing of vegetables. Myint (2003) reported different methods of price setting in vegetablesmarket.Farmers generally rely on the nearest town, bus or boat drivers, extensionworkers, and neighboring farmers of the same village come from the nearest town market. Another information source is the agent who comes to village to buy a crop. Farmers compare prices offered by the agents and the primary collectors. Farmers choose the best trading partners based on honesty and reasonable prices offered to them. The wholesalers find out daily market information in the produce exchange centre. They also exchange market information of export demand, prices in major producing areas and supply situation. For price setting, traders gather information from their regular trading partner by telephone including cell phones. In Bangladesh, the common sources of market information are the personal visit to market, other farmers, traders, contractors, extension workers, and market information services (Rahman 2003). In the present days, cell phone is mainly used as an important source of market information.

2.5 Marketing Costs and Margins

Various middlemen perform different functions in the process of marketing and they charge fees for the services they provide. These charges include costs for packaging, loading, unloading, sorting, grading, market fees, commission, etc. In the case of the profit of the middlemen, beginning from the sale of the produce from the farmers till it reaches the consumers, different actors like Faria, Bepari,

commission agent, wholesalers, retailers, and so on handle produce and they earn profit by adopting this profession. Their profit is included in the price of the commodity and it also becomes a part of the market margins Chhina 2009). Producers share is an important indicator of market efficiency. Higher marketing costs indicate less efficient market but it is not always true. Marketing cost depends on various factors. According to Chhina (2009), it can be concluded that low marketing cost expressed as a percentage of the consumers price is not an indicator of high efficient market and similarly the marketing cost expressed as a percentage of the consumersprice is always not an indicator of low efficiency market system. The cost of marketing of a particular commodity is influenced by different factors such as quantity of the product, perishability, bulkiness, risk involved, facilities in the market, grading, storage, transportation, regular or irregular supply,advertisement, processing, packaging, retail or wholesale, degree of market information and competition in the market. There are some important points to be considered to reduce marketing cost which include improvement of management, better handling of products, increase in the volume of business, reduction in market charges, creating the conditions for perfect competition, reduction of risk, practice of grading and provision for market information (Chhina 2009).

In terms of marketing margins in vegetables trade, Roy (1992) reported that Faria wasthe most beneficiary group among the traders. In contrast, Sabur (1992) reported that the profit margin was the highest for Aratdar (93%) followed by Faria (79%),Paiker(75%), Bepari (33%) and retailers (20%). However, the marketing costs were higher for Beparifollowed by retailers, Paiker, Faria, and Aratdar. This is quite common that some people look at prices paid to farmers and compare them with the prices consumers pay for the same product. They accuse traders who are exploiting the farmers because the retail price paid by consumers is higher than the price received by farmers.

Simple comparison of farmers prices with retail prices is a poor indicator of marketing efficiency as it does not take into account the cost involved in moving produce along the marketing chain from the farmers to the consumers. Myint (2003) reported from Myanmar that the farm and retail prices of cabbage were Kyat 14.50 and 43.00 piece^{-1} showing only 34% received by the farmers. When marketing costs were calculated, the net margins of the farmers, collectors and retailers were Kyat

6.96, 1.95 and 13.00 piece^{-1}. Similar up to date information is required for the selected commodities in Bangladesh to prepare policy for the improvement of marketing performance of vegetables.

According to CPD report, 6 different marketing chains for brinjal and chili were identified. The major components of the consumers expenditure for brinjal and chili were attributable to the production cost which ranged from 41%-43% of the retail value. The market intermediaries received about 60% equivalent value of the retail price. Among the intermediaries the retailers received the highest share (24-28% of the retail value). However, the author explained the reasons for the higher margin of the retailers. Vegetables are perishable and hence the retailers add premium to the prices to offset the risk of spoilage. Secondly, the consumers generally choose and pick better quality products and remaining products become gradually inferior in quality and ultimately sold at lower prices. Often, a portion of the products are not sold. That is why, the retailers tend to add premium to compensate the perceived losses (CPD 2007).

Studying marketing margins is very important for several reasons such as to study marketing efficiency, compare different markets, improve marketing system, study the role of the middlemen, and implement different Government policies. Role of middlemen is an important aspect in influencing the marketing costs and margins. If the results of marketing margins of the different middlemen indicate that there are certain unreasonable charges and inefficiency in the services of the middlemen, those can be improved accordingly. The required intervention of the Government is also based on the study of the market margins (China 2009). Barman (2008) investigated the marketing costs and margins in winter vegetables trade in Dhaka city. He reported that the marketing costs for supermarket and conventional markets were Tk. 481 and 453 ton^{-1}, respectively, and the corresponding net returns were Tk. 11988 and 7511 ton^{-1} respectively and which results manifested that the margins of supermarkets were higher than that of conventional markets.

2.6 Marketing Efficiency

There are two types of marketing efficiency. One is technical efficiency and another is pricing efficiency. Regarding technical efficiency, different market functions are performed in the process of marketing, and naturally cost is involved to

perform these functions. The efficiency is based on the performance of these functions at the lowest cost. In the present study, emphasis has been give to examine the pricing efficiency of different marketing channels of the selected vegetables and fruits. Generally, market efficiency is measured on the basis of consumer's satisfaction at the minimum cost and the maintenance of high volume of outputs. Marketing efficiency is the ratio of market output (satisfaction) to market input (cost of resources). An increase in ratio indicates improved efficiency and a decrease denotes reduced efficiency. According to Shepherded (1972), marketing efficiency is the ratio of the total value of goods marketed to the marketing cost. The higher the ratio the higher the efficiency and vice-versa. There are different expectations of the growers, traders and middlemen in marketing system. The growers wish to sell their products at the highest possible prices in the shortest period and may realize the quick payment of their sale. The consumers wish to purchase the best quality products at the minimum prices.

Marketing efficiency and price behaviour of brinjal was investigated by BARI (2007)inselected areas in terms of growth, instability, annual fluctuation of prices and decomposition of the series components. Both primary and secondary data were used for the study. Six performance indicators were used for measuring marketing efficiency of brinjal. Growth rates of real prices in Chittagong and Jessore were found to increase over the period due to high demand of Brinjal. Annual real prices of Brinjal in selected areas fluctuated to a great extent and it was the highest in Comilla followed by Jamalpur, Chittagong and Rangpur. Annual Time Series Data consisted of four components, namely trend, seasonal, cyclical and irregular movement which were decomposed to see the annual price movement separately. The upward trend of real price was found for Chittagong and Jessore. The length of cycle in real prices was found 3-6 years on an average in the selected areas. It was evident from the seasonal indices that wide seasonal fluctuation occurred in Brinjal prices in all the selected markets. The performance indicators revealed that the channel, Farmer-Bepari (Local district)-Aratdar (Local district)-Retailer (Local district)-Consumers was the most efficient channel in the selected areas where the net marketing margin was Tk. 739.15 $Quintal^{-1}$.

2.7 Marketing Constraints

Price volatility in vegetables marketing is an important constraint. Very often it is noticed that price of one vegetable is high in one year and less in the following year. This is possibly due to the cyclical nature of production (Myint 2003). If prices in one year are bad, farmers will often respond by planting less in the next year. This will lead to lower production and higher prices, so encouraging more planting in the following year and a consequent fall in prices. This cyclical nature of production and prices is quite common.

Successful farmers are sometimes those who do the opposite to what is being done by other farmers. Lack of reliable and up to date information on market prices is an important constraint. For example, farmers rely on time consuming and costly personal market visit toobtain price information and often they have information only about vegetables they produce and market they sell to. The traders do not see in their interest to provide accurate information to the farmers. They only know about the vegetables and the markets with which they deal.

Extension workers are rarely trained to assist farmers in marketing (Rahman 2003). Existence of business syndicate is often seen as price controlling body. Rabbani*et al*. (2010) reported that formation of business syndicate by the traders for price fixation in the market has been mentioned by the respondents from Comilla-Chandpur (26.70%), Jessore-Kushtia (30.00%) and Rangpur-Dinajpur (13.33%) zones. Similarly, presence of few traders in the market in Jessore-Kushtia(13.33%), Rangpur-Dinajpur(16.67%) and Jamalpur-Sherpur(10.00%) zones. The results revealed that 10.34% large, 9.84% medium and 14.75% small potato growers reported the existence of business syndicate in the potato market. On the other hand, 12.07% large, 1.64% medium and 6.56% small potato growers reported the presence of fewer traders in the market channel resulting in less bargaining and more control of the market price of potato by the traders in the market. However solid evidence and how the syndicate operates in the market are not well documented even though public perception is always in favour of this statement.

2.8 Final Remarks

In conclusion, the commodity price is apparently higher at the retailers level. Hassan (2010) reported that the price of vegetables is increased by 105% at the retailers level. But, Hassan (2010) did not calculate the costs and margins of the market actors. The intermediaries are very often blamed to take the lion share of marketing margins. But, reliable information on this matter is meager in the scientific literature. Presently, the crying research need is the generation of reliable up to date data on the actual costs and margins of the market intermediaries and other indicators of marketing performance for the selected commodities.

The outputs of the present study would fill up the information gap and indeed contribute greatly to find out the most efficient marketing options in order to formulate a meaningful national policy to improve the fragile marketing systems of fruits and vegetables in Bangladesh.

Scope of the Study:

There are different types of vegetables in the country and each type of vegetables has a wide range of varieties. That is why only two types of vegetables are purposively selected for this study. The selected two vegetables are potato and Brinjal. There are different types of potatoes. The names of different types of potatoes are Lal Pakhri, modern Granula, Cardinal, Lady Rosetta and Diamantetc. All of the varieties of potatoes are grown in most of the district of Bangladesh. But for the time constraint it is not possible to collect data from all over the country. For potato the Munshiganj district was selected as the growers of the district do prefer to grow all kinds of potatoes as a part of their culture and the district is famous for the production of potatoes.

Brinjal (eggplant) is an important vegetable in our country. There are different varieties of Brinjals are grown in most of the district of Bangladesh. But for the time constraint it is not possible to collect data from all over the country. For Brinjals,Narsingdi district was selected as the growers of the district do prefer to grow deshi as well as hybrid varieties as a part of their culture and the district is famous for the production of Brinjals. The varieties of Brinjals which are available through out the year in the country are taken into account for the study.

CHAPTER 3

Methodology

3.0 Nature of the Study

This research is of exploratory type. Different studies have also been conducted on the causes and remedies of price variation for different types of vegetables. But no rigorous study has been conducted on supply chain management system used in marketing of vegetables. Thus, this study will help to get insights into the problem.

3.1Methodology of the Study:

The details of the methodology are described in the following sections:

Collection of Secondary Data

For this study, secondary data have been collected from different books, journals, reports of BBS, BARI, BIDS, BARC etc. and also from online sources. The collected data are relevant for the study of marketing channel, market actors, production cost, marketing costs and margins, seasonality and price formation on the selected vegetables. To calculate seasonality of the selected commodities (potato, brinjal) secondary data have also been collected for at least five years.

Collection of Primary Data

The target population of the study has been divided into five groups. The name of five groups are Farmers/ Producers, Aratdar, Faria, Wholesalers and Retailers. For the convenience of the study, some data have been collected from cold storage owners. Since the number of target population is huge and diverse, it is not possible to identify the exact number of total population in different categories. For this study, ten(10) producers, ten(10) Farias, ten(10) wholesaler, ten(10) retailers and two cold storage owners have been selected as respondents of different categories of samples. No statistical formula has been used to determine the size of those samples. Rather personal judgment is used to determine the size of the sample. In selecting the respondents in different categories non probability sampling has been used. Since the

total number of population is not known the non probability sampling is the option to apply. Here judgmental sampling technique has been applied to select respondents in different categories. The primary data have been collected from the target population by using structured questionnaire. The questionnaire has been furnished with some open ended and some close ended questions. The questionnaire includes the information related to production cost of vegetables, types of vegetables, buying places, costs of transportation, rent of the shops, other associated costs like *Chada,* profit margin, causes of price fluctuation, remedies of price fluctuation etc. To collect this information interviews have been conducted with Farmers, Faria, Aratder, Wholesalers, Coldstorage owners in different markets of selected areas. When data are collected, proper measures have been taken to reduce the errors of data. Whenever some confusion arises, cross check methods have been applied for verification.

Data Collection from Producers/Growers:

It has been mentioned earlier that Convenience Sampling has been followed to conduct primary survey. Narsingdi district for brinjals and Munshiganj district for potatoes have been selected. From each district, ten (10) growers have been selected. The growers, who grow and sell their products (whole or part) have been interviewed. The selected growers have been interviewed with structured questionnaire and pre-determined interview schedules. Data are recorded on age, education, income, cultivated varieties, production and marketing costs, mode of sales, sale price, gross and net profits and constraints. Data collection from the growers is more marketing oriented rather than production.

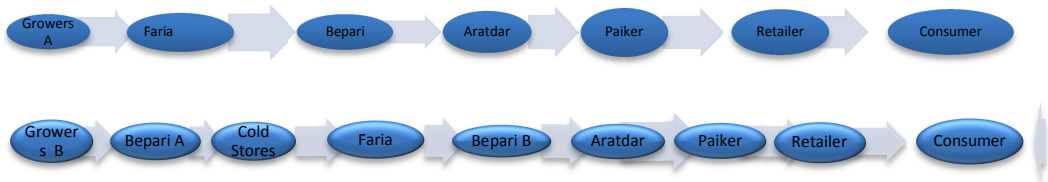

Fig 3.1 Conceptual marketing chains for Brinjals and Potatoes .

Data Collection from Intermediaries

The intermediaries refer to those people who act between the growers and consumers. The important intermediaries are Faria, Bepari, Aratdar, Wholesaler and retailers. For each of the intermediaries data have been collected on trade volume, marketing costs (depreciation on investment capital, interest on running capital, transport cost, shop cost, commission, market chadas, wastage, etc.), mode of sales, purchase and sale prices, price formation, gross and net margins, marketing constraints and remedies.

Data Enumerator and Data Analysis

Data have been collected with proper care by researcher. Data obtained from questionnaire and interviews have been tabulated and summarized and then they are entered into a database system using Microsoft EXCEL and analyzed by using statistical methods. Descriptive statistics (percentage, mean, range, standard deviation, co-efficient of variation, etc.) have been used to describe the variables. Seasonality has been calculated as per Moving Average Method.

3.2 Parameters Studied

To answer the research questions and to achieve the objectives of the study, various parameters have been studied. These parameters are annual price fluctuation, seasonality, co-efficient of seasonal indices, costs and margins of growers and intermediaries and supply chain / marketing performance. The methods of studying these parameters are given in the following.

3.3 Price Variation

Time Series Analysis has been performed to examine the pattern of yearly price fluctuation of the selected vegetables. Both nominal and real (deflated) prices are used for examining the pattern of price variation for the selected vegetables. Real price of variation in several years has been calculated by the formula, Real price = (Nominal price of a given year/CPI of the same year) × CPI of the last year of the series.

3.4 Seasonality and Co-efficient of Variation

Seasonality and co-efficient of variation in seasonal price indices have been estimated for the selected vegetables. There are several methods of studying seasonal price variation. These are simple average, ratio to trend method, ratio to moving average method and link relative method. However, in the present study ratio to moving average method has been used. The steps for calculating seasonality are described below (Months: January-December; Year: 2008-2013 as an example):

Step 1: 12-Month moving total for June = (PJan + PFeb +... + PDec)

Step 2:12-Month moving average for July = (PJan + PFeb +…..+ PDec)/12

Step 3:12-Month moving average centered = (12-Month moving average, June & July 08)/2

Step 4:%Moving average centered (Jul 05) = (PJul 08/12-Month moving average centered Jul 08)

Step5 : Monthly average of price variation for Jan = (PJan 08 + PJan 09 +….+ PJan 2013)/6

Step 6: Correction factor (C.F.) = 1200/Summation of the monthly averages of price

Step 7: Adjusted seasonal indices = S.I.*C.

The coefficient of variation in seasonal indices was calculated as per the following method: Coefficient of variation **(CV) = σ/X*100**

Where,

σ=Standard deviation for seasonal price

X = Arithmetic mean of the seasonal price

3.5 Production Costs and Margins of Growers

In the present study the costs and profits of the growers of the selected vegetables were calculated. The methods are briefly described in the following:

Other Related Costs

Production costs include both variable and fixed costs. The variable costs include costs for seed/seedling, cost of human labour, cost of cultivation, cost of fertilizer, cost of manure, cost of irrigation, cost of insecticide and pesticide, etc. The fixed costs include mainly land use cost, interest on running capital and depreciation. They all are collected in a single figure that is production costs. Whereas in the case of faria, paiker or the other intermediaries other relevant data such as rate of interest on capital, transportation costs, packaging costs and wastage value, chadas and other associated costs etc. are included.

Profitability of Growers

The following profit equation was used to assess the profitability of production of theselected vegetables.

∏ =P.Q - (TVC+TFC)

Where

∏ = Profit of producer per kg per year

P = Perkg price of vegetables

Q = Quantity of vegetables

TVC = Total variable cost

TFC = Total fixed cost

Gross Returns of Producers

Gross return have been calculated by multiplying the total volume of output by the per kg price of the vegetables at the time of harvest. The following equation have been used to estimate gross return (GR):

GR = ∑P. Q

Where

GR = Gross return from product

P = Price of vegetables

Q = Quantity of vegetables

Gross Profit of Producers

Gross profit calculation have been done to have an estimate of the difference between total return and variable costs. The argument for using gross margin analysis is that the farmers are more interested to know their return over variable cost. The following equation was used to assess the gross margin.

GM = TR - VC

Where

GM = Gross margin

TR = Total return

VC = Variable cost

Net Profit Margin of Producers

Net profit margin was calculated by deducting all costs (total production and marketing costs) from gross margin.

Net Profit Received by Producers

Net profit received by farmer is expressed by the following formula:

NPf = GPf - MCf

Where,

NPf = Net profit received by farmers

GPf= Gross price received by farmers

MCf = Marketing cost of farmers

3.6 Marketing Profits of Intermediaries

The net marketing profits of the intermediaries (after physical losses) are calculated by the following formula:

Net marketing profit = Sales price - (Purchase price + Marketing cost)

The marketing costs mainly include costs for various market operations like transportation, loading and unloading, market tolls&chadas, rents, staff salary, electricity, generator, commission, wastage, depreciation, and other miscellaneous costs. The items of the marketing costs vary with the type of intermediaries.

3.7 Marketing Performance

Marketing performance was evaluated using different measures of marketing efficiency as described by Shepherd (1972), Hugar and Hireman (1984), and Acharya and Agarwal (2004). In the present study, the efficiency of marketing was investigated by examining price spread, growers share, Acharya's methods for estimating efficiency. The methods for studying these estimates are given in the following.

Price Spread

Price spread = Price paid by consumers - Price received by the growers

Growers' Share

$$\text{Growers' share (\%)} = \frac{\text{Price received by the growers}}{\text{Consumers' price}} \times 100$$

Conventional Method for Estimating Marketing Efficiency

$$\text{Marketing efficiency} = \frac{\text{Value of goods marketed}}{\text{Total marketing cost}}$$

Where operating capital = (Purchase price + marketing cost)

CHAPTER 4

Limitations of the Study

1 Time Limitation:

There are so many vegetables grow in the country and each vegetable as a number of varieties. For the time constraint of the study, it is not possible to get the information about all of the vegetables. That is why only two vegetables are taken for the study which will represent the whole vegetables.

2 Lack of Experience:

The researcher had no previous experience about the survey which makes the study a little bit complex.

3 Authenticity of Data:

A large number of secondary data are used in the study. But the validity of all data is not checked due to time constraint or for other constraints. So there may have some error in the data.

4 Sample size Problem:

Since the number of the total population is unknown, random sampling could not be used for the study. Convenience sampling is used for the study which may have biasedness.

5 Lack of willingness of Intermediaries to Provide Information:

Most of the intermediaries are not interested to provide information willingly. Besides all of us know that there are so many chadas are involved in the business if somebody wants to do the business without any harassment. But in many cases the business men are not interested to acknowledge this for an unknown fear.

6 Too Many Chains in the Marketing:

There are too many chains in the marketing system some of which are too long with many middlemen.

CHAPTER 5

Discussions, Analyses and Findings

In accordance with the study of the present research substantial amounts of secondary data on production of selected vegetables (Potato & Brinjal) have been collected from different sources including books, journals, periodicals, reports and online resources. The collected secondary data have been made structured and tabulated through the Microsoft Excel. Required tables and graphs have been prepared to present and discuss the results. Apart from secondary data, primary data on the selected vegetables have been collected from various market actors using structured and pre-tested questionnaire and interviews. Results obtained from analysis of secondary and primary data are presented and discussed in the following.

5.1 Different types of Intermediaries and Supply Chain Management System used in Vegetables Marketing:

Marketing channels and market actors of potatoes of Munshiganj district have been investigated. Marketing channels and market actors vary with production locations. The actors in Munshiganj-Dhaka channel is growers, Faria, Bepari, Aratdar, wholesalers, retailers and consumers. The Faria purchase potatoes from different places like grower's field or grower's house (traditional store) or assemble markets. The Faria mainly sell potatoes to Bepari. The traditionally-stored potatoes are marketed until the month of May. The cold stored potatoes come to the markets after May and remain until January. The actors in Munshiganj-Dhaka channel included growers, Bepari, Aratdar, wholesalers, retailers and consumers.

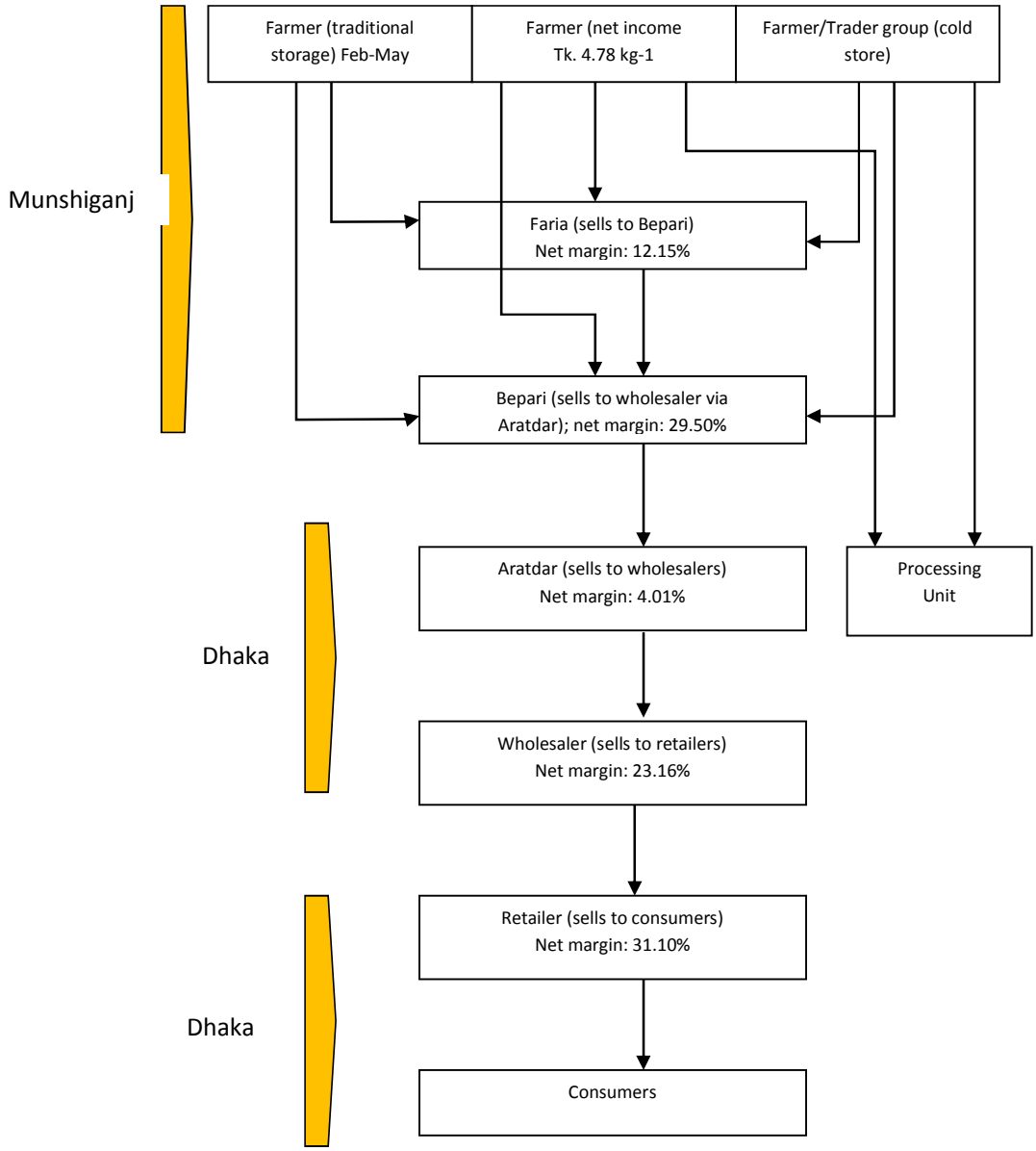

Fig 5.1: Different intermediaries of potato starting from Munshiganji to Kawran Bazar, Dhaka (Marketing of early potato or traditionally stored and cold stored potatoes).

5.2 Factors Contributing to Price Fluctuation of Potatoes:

Potato is an important tuber vegetables all over the world. The highest potato producing country of the world is China (75 million metric tons) followed by India (37 million metric tons). Among the leading potato producing countries, Bangladesh ranked the 8th position. Other major potato producing countries are Russia, Ukraine, USA, Germany, Poland, Belarus and Netherlands etc.

Trend in Acreage and Production of Potatoes in Bangladesh

Bangladesh produces considerable amounts of potato each year. In 2009-10, potato occupied 65% of the total vegetables area, of which 83% was occupied by high yielding varieties (HYV) and 17% was occupied by local varieties. In the years 2009-10 and 2011-12, 7930 and 8326 thousand metric tons of potatoes were produced in the country.

In general, potato production steadily increased over the last years except 2005-06 and 2008-09. In 2005-06, at the time of planting dry weather prevailed throughout the country and potato cultivation suffered to some extent. During growth stage, potato crop experienced thick foggy weather condition that favoured potato late blight disease which caused significant yield loss. Apart from that, farmers of some main potato growing regions in the northern part of the Bangladesh brought large potato areas under maize cultivation, which caused significant decrease in potato area and thereby production. Similarly, in 2008-09, a large part of potato area was brought under ricecultivation due to global food shortage and resulting price hike in the preceding year 2007-08.

Potato price fluctuation is quite common in Bangladesh, and often the farmers are the worst sufferer of low prices of their produce. Relationship between production and price of potato during the period from 2005-06 to 2012-13 was investigated. The retail price of potato increased with time except 2004-05. It was noticed that when production increased price fell, especially during the years 2005-06, 2007-08 and 2010-11. The year with lower production caused higher prices, which pushed the growers to produce more in the next year with a resultant price drop in the following year (cyclical nature of production), for example during 2009-10 to 2010-11, potato

price (nominal and real) fell sharply. Even though the present result does not fully at par with the cobweb type model but it certainly partially supports cobweb model. Another important observation was found that the real price of potato in the year 2005-06 (Tk. 16.12 kg-1) was almost the same as the price recorded in the year 2012-13(Tk. 17.83 kg-1), which indicated that the changes in potato prices in real term were very negligible over the last ten years.

To safeguard the growers interest potato acreage could be defined. However, this measure would cause the consumers to pay higher prices for potato. On the other hand, the export of surplus potato would be the best option but the limitation is the absence HACCP and other internationally accepted standards, which are actually hindering export promotion, especially in gaining access to the mainstream global markets. Despite limitations, Agri Concern Bangladesh, a NGO, started exporting quality potatoes to different foreign countries, particularly to Malaysia and Singapore (Anon. 2010). So, as a short term option, especially to encourage the growers, defining acreage would be beneficial. Department of Agricultural Extension (DAE) would shoulder this task utilizing its devoted, motivated and trained manpower. But for long-term policy, the production should be increased and the surplus should be exported to earn foreign currency and exploit the suitable agro-climates for potato production in Bangladesh. It is worth to mention that Bangladesh is the 8th largest potato producer in the world and there are enormous potential if export markets are created. At the same time, diversified use of potato (flakes, dry chips, French fries, flours, etc.) should be strengthened both for domestic use and export purposes so that the demands are created and growers are not affected.

Seasonality

Seasonality in potato prices has been examined. Results revealed that significant seasonality existed in potato prices. Months with the minimum and maximum prices (wholesale and retail) have been summarized in Tables 5.1 and 5.2. In case wholesale price, the price index varied from 59.55-128.20 with co-efficient of variation 24.57%. There was a clear peak during the months of August-October and a clear trough in the months of March and April. Seasonal price index (wholesale) was also high in the month of January possibly due to higher prices of the early crops. Later, during February-April, price was the lowest, and this could be attributed to the abundant

supply of potatoes in the market. During these months, potato lands are also cleared by the growers for planting other summer vegetables. After April, potato price started to climb and the trend continued up to the month of October. In November, the wholesale price of potato fell again possibly due the availability of winter vegetables in the markets. At the same time the cold store owners tend to vacate their cold stores to get ready to store new season potatoes. The retail prices of potato also followed more or less the similar pattern, where the potato prices were lower in the months of February to March and higher thereafter. The seasonal index in retail price ranged from 73.89-116.85 having a co-efficient of variation 14.13%. It is very important to note that the seasonality in potato was found to be much more pronounced as compared to other vegetables.

Year	Month	Minimum Price (Tk. kg^{-1})	Month	Maximum Price (Tk. kg^{-1})
2008	April	7.00	November	12.00
2009	March	5.00	October	8.00
2010	March	8.00	December	22.00
2011	March	11.00	December	22.00
2012	March	10.00	September	16.00
2013	March	11.00	October	27.00

Table 5.1: Months with minimum and maximum prices (national average of wholesale) of potatoes during the period from 2008 to 2013.

Year	Month	Minimum Price (Tk. kg^{-1})	Month	Maximum Price (Tk. kg^{-1})
2008	February	7.00	October	13.00
2009	February	7.00	December	14.00
2010	February	9.00	November	23.00
2013	March	15.00	October	31.00

Table 5.2: Months with minimum and maximum prices (national average of retail) of potato during the period from 2008 to 2013.

Variety

A number of potato varieties are cultivated in the surveyed district. The commercial and predominant varieties grown in Munshiganj are indigenous LalPakhri and

modern Granula and Cardinal. Lady Rosetta and Diamant are also grown in Munshiganj but in small scale. In Munshiganj, the growers do prefer to grow red-skinned potatoes like Cardinal and LalPakhri as well as hybrid as a part of their culture. Due to the variety of potatoes its price fluctuates. Generally the price of local variety potatoes is higher than the High Yield Varieties (HYV).

Postharvest Handling

Postharvest handling also differs between districts to districts. Washing is an important postharvest operation, and is practiced if potatoes are marketed immediately after harvest to get off the dirt and adherences. The grower's of Munshiganj wash potatoes, especially for early vegetables to fetch apparent higher profit. Early crop may receive higher market price but it is to be remembered that the yield of the early premature potato tubers is less as compared to those of the mature tubers. Since the growers need money, so they can't wait and harvest the premature potatoes and sell them. A simple calculationwas performed to demonstrate whether early harvesting was profitable. It was observed that the growers practice this not only for having early income but this seem significantly profitable. However still there remains scope for a detailed economic analysis to explicitly state that the early harvest is profitable than optimum harvesting. However, if the mature potatoes are held in cold stores and prices increases over time, the situation would be changed.

Stage of maturity	Yield(kg ac^{-1})	Unit price(Tk. kg^{-1})	Gross income(Tk. ac^{-1})
Early harvest (Dec-Jan)	4000-6000	40.00	150000-200000
Harvest at optimum maturity	8000-10000	10.00	80000-100000

Table 5.3 Comparison between early harvest and optimum harvest of potato in relation to gross income

Packaging

Packaging is commonly practiced in potato marketing in Bangladesh. Generally, gunny sacks of 80-85 kg capacity are used in packaging of table potatoes. Plastic sacks are also used but only for limited scale local transportation. Old and used gunny sacks are used for transportation of early and traditionally-stored potatoes but those potatoes to be held in cold stores are packaged in new gunny sacks. For seed potatoes, some cold store owners use plastic net bags to facilitate more ventilation

so that qualities of seed potatoes are maintained.

Transportation

Most of the agricultural goods are not consumed at the places of their production. They are required to be transported to different destinations. There are various modes of transportation. For potatoes, the modes of local transportation in Munshiganj were head load, bi-cycle, van,Votvoti, tractor trolley, pick-up van, etc. For long-distance transportation, the predominant modes were mini and large trucks of 5, 7 and 10 tons capacities, respectively.

5.3 Cost of Production and Marketing of Potatoes by the Intermediaries:

Storage

Storage is an important function in agricultural marketing. The excess supplies at the harvest time are stored so that they could be supplied in the off-season. Proper storage is required to protect produce from quantitative and qualitative deterioration. The perishable agricultural goods need special type of storage to prolong their usage. The agricultural products are produced in a particular season but more of the products are used throughout the year. Also there is variation in the production of agricultural goods from year to year. Considering the importance of these products, they are stored even for more than a year.

There are now around 393 cold stores (public and private), with a capacity of only 4.0 million metric tons. Potato production in the year 2012-13 was 28.3 million metric tons, and the target in 2012-13was 82.05 million metric tons. So, there are still demands for more cold stores in the country. In 2012-13, the cost for cold store was Tk. 300-320 or even more sackper sack of potato (80-85 kg potato per sack).

Rent of the Cold Storage in Munshiganj

There are variations in the rent of cold stores. For example, the Akku Cold Storage of Munshiganj had different categories of rent like Tk. 240.00 per sack for 10000 sacks or more, Tk. 250.00 per sack for 2000-5000 sacks, and so on. This

measure is very confidential and is followed only to provide facilities to the growers and traders so that they store potatoes in this particular cold storage. For seed potato, some cold store owners charge more. For example, the Himadri Cold Storage of Munshiganj charge Tk. 350 per sack since proper temperature and relative humidity must be maintained for seed potatoes, which costs more due to operation of the machine for longer duration.

Other cost of Cold Storage

Attempt was made to estimate the cost and profit of the private cold stores. The operating cost of the privately owned cold stores of Munshiganj was estimated to be Tk. 186.52 per sack (85kg capacity) during the year 2011-2012 with the net profit of Tk. 107.13 $sack^{-1}$.The net profit of the BADC seed potato (own production through contract growers) was Tk. 10.00 per kg (Tk. 500.00 per bag of 50 kg capacity). The predominant costs were due to the sources of energy (electricity and diesel), which accounted for 42-44% of the total cost. The second highest cost for cold storage facilities was due to labor and employees, which accountedfor26-33%.

Items of expenditure	**Cost (Tk. $Sack^{-1}$)**	**Tk.per kg**	**% of total cost**
Electricity	65	0.77	30.31
Diesel	30	0.36	14.17
Labour	25	0.30	11.81
Employees	30	0.36	14.17
Repair/maintenance	20	0.24	09.45
Miscellaneous(Donation, Tax, contingency etc	20	0.24	09.45
Interest on running capital	23	0.27	10.63
Total	213	2.54	100
Gross return	300	3.57	-
Net Return	87	1.04	-

Table 5.4 Operating costs and profit of a commercial potato cold storage.

Source: MonjurulAlam, Manager, Akku Cold Storage,Munshiganj (Fixed cost was not considered).

5.4 Marketing Costs of Potato Intermediaries

Marketing costs and margins of the market actors were calculated on the basis of primary data. Results obtained are presented and discussed in the following.

Production and Marketing Costs of Potato Producers

The cost of production of potato in Munshiganj was observed to be Tk. 49024.56 per hac. Marketing costs of the potato producers were also calculated. Marketing costs included mainly the costs for transportation and packaging (Table 5.5). The total cost of marketing of potato producers in Munshiganj was estimated to be Tk. 0.62 kg^{-1} (Tk. 12547.92 per ha), and the major cost was due to transportation (56.18%) followed by packaging (43.77%) (Table 5.5). This cost analysis was for the traditionally-stored potatoes.

Items of cost	Cost (Tk.per kg)	Stdev	% of total cost
Transportation	0.3461	0.07670	56.18
Packaging	0.2696	0.30300	43.77
Miscellaneous (depreciation)	0.0003	0.0003	0.05
Total	0.616	0.1804	100

Table 5.5 Marketing costs for potato producers (N=10; Diamant)

The gross return of potato producers was calculated based on the average yield ha^{-1} and prevailing market price. The gross return from production of potatoes in one ha of land was Tk. 152775.00 (Average yield × prevailing market price = 20.37 tons per hac × Tk. 7500.00 ton^{-1}). Average net return from production of potato was Tk. 91202.52 per hac [(Gross return- Gross cost (production cost + marketing cost)]. This return was equivalent to Tk. 4.48 per kg. The net return varies with price variation of potatoes with time.

Marketing Costs of Faria

In Munshiganj, Faria are active, who buy potatoes from the farmers and sell mainly to the Bepari. They are small-scale traders with or without own working capital. They act as broker in the markets. Marketing cost of Faria has been calculated and presented in Table 5.6. The total marketing cost of the Faria was Tk. 0.55 per kg, and the major costs incurred for loading and unloading (51.19%) followed by transportation (45.37%) (Table 5.6).

Items of cost	Cost (Tk.per kg)	Stdev	% of total cost
Transportation	0.25	0.06	45.37
Loading/unloading	0.28	0.09	51.19
Depreciation (gunny sack)	0.02	0.02	3.44
Total	.55	0.10	100.00

Table 5.6 Marketing cost of Faria in potato trade (Mirkadim, Munshiganj; N=5)

Marketing Costs of Bepari

Bepari are the large-scale traders who may be from the local area or from different cities or districts of Bangladesh. The Bepari purchase potatoes, especially from the local assemble markets with the assistance from local Aratdar/Faria and sell to the wholesalers through Aratdar (commission agent) at the destination markets. Two types of Bepari are involved in potato trade. The first category Bepari purchase potatoes from the growers and sell directly in the city markets (early crop and traditionally-stored potatoes). The other category Bepari purchase potato from the cold stores and sell in the city markets. Marketing costs for the first category Bepari have been calculated and presented in Table 5.7. The second category Bepari (may also be the same persons as first category) generally starts their business from the end of May or June when the traditionally-stored potatoes are completely consumed, and they continue trade until the next season potatoes arrives in the market. Marketing costs of Bepari involved transportation, loading, unloading, commission, damage, depreciation, and so on. The total marketing costs of the Bepari of Munshiganj was Tk. 1.04.

The comparatively lower marketing cost of the MunshiganjBepari was possibly due to the shorter distance travelled. Again, the major costs of Bepari were due to transportation (48.41-54.60%) and loading and unloading (23.27-36.40%) (Table5.7).

Items of cost	Cost (Tk.per kg)	Stdev	% of total cost
Transportation	0.57	0.16	54.60
Loading/unloading	0.38	0.11	36.40
Aratdar commission	0.04	0.01	3.95
Wastage	0.03	0.01	2.39
Depreciation (gunny sack)	0.03	0.02	2.39
Total	1.04	0.21	100.00

Table 5.7 Marketing costs for Bepari for potato trade

Marketing Costs of Aratdar (commission agent)

Aratdar is an important actor in potato marketing channel. There were two types of Aratdar, one in the assemble markets in the growing areas and another in the wholesale markets in Dhaka city. In the present investigation, only the Aratdar of Dhaka city was considered. There were different types of costs for the Aratdar such as rent, costs for unloading, electricity bill, staff salary, security guards, etc. The total marketing cost of the Aratdar of Dhaka city was estimated to be Tk. 0.81-0.87 kg^{-1} (Table 4.8). The major cost items of the Aratdar were due to the rent of Arat space (37.17-40.05%) and unloading (43.48-45.85%) (Table 5.8).

Items of cost	Cost (Tk. Per kg)	Stdev	% of total cost
Rent	0.350	0.131	40.05
Unloading	0.380	0.130	43.48
Electricity bill	0.060	0.010	6.86
Staff salary	0.080	0.020	9.15
Security guard	0.004	0.002	0.46
Total	0.874	0.160	100

Table 5.8 Marketing costs of Aratdar of Dhaka

From the above information, it is clear that transportation contributes greatly to the total marketing cost. In agricultural marketing, the transport cost is paid by the farmer if he sells the produce in the market, but if he sells to the village traders, the cost is paid by the traders.

Transport cost is the most important cost in the process of agricultural marketing. It varies with mode of transportation, distance covered, nature of the product, condition of road, risk involved, and movement among big cities and development of transport system. The efficiency of marketing is dependent on reducing the cost of transportation. In the rural economy, the truck is not so popular mode of transportation; though it is popular for the transportation from assemble market to different towns and cities. The bullock carts, vans, rickshaws, easy-bike etc. are the important modes of transportation in the villages to bring the produce in the market. With modernization and use of machinery in agriculture, the use of tractor trolley is increasing in the process of transportation from farm to market. The

efficiency of transportation is dependent on the cost of transportation and the speed with which the goods reach the destinations. It also depends on the care with which the goods are handled. From the present survey, the main problems in transportation were related to the lack of farm roads, broken and uneven roads and highways, lack of coordination in transport agencies, high damages during transportation and slow movement in transportation due to traffic congestions.

Marketing Costs of Wholesalers

There are local wholesalers and wholesalers in Dhaka city. In the present study, only the wholesalers of Dhaka wholesale markets have been considered. The wholesalers generally purchase potatoes from the Bepari through Aratdar (commission agent). The marketing costs of the wholesalers involved in potato trade in Dhaka city are furnished in Table 5.9. The total marketing cost was found to be Tk. 1.20-1.29 per kg (Table 5.9). The items of costs of the wholesalers included transportation, loading and unloading, rent for space, commission paid to the Aratdar and wastage. Amongst them, the principal cost items were due to transportation, loading and unloading and rent for space.

Items of cost	**Cost (Tk. per kg)**	**Stdev**	**% of total cost**
Karwaran Bazar			
Transportation	0.470	0.190	36.49
Loading/unloading	0.350	0.080	27.17
Cost for place in Arat	0.340	0.090	26.40
Aratdar commission	0.100	0.000	7.76
Wastage	0.024	0.007	1.86
Depreciation (gunny sacks)	0.004	0.002	0.31
Total	**1.288**	**0.236**	**100.000**
Jatrabari			
Transportation	0.410	0.110	34.18
Loading/unloading	0.370	0.080	30.85
Cost for place in Arat	0.310	0.070	25.84
Aratdar commission	0.100	0.000	8.34
Wastage	0.003	0.007	0.21
Depreciation (gunny sacks)	0.007	0.002	0.58
Total	**1.200**	**0.120**	**100.00**

Table 5.9 Marketing costs of wholesalers (Dhaka city)

Marketing Costs of Retailers

Retailers play an important role in delivering potatoes to the consumers. The retailers obtain potatoes mainly from the wholesalers (retailers of Dhaka city) or Faria/wholesalers (retailers of local markets in the production areas). The marketing costs for the retailers of the production area and Dhaka city varied widely (Tables 5.10). In Dhaka city, marketing costs of the retailers varied with markets and ranged from Tk. 1.23-1.45 per kg (Tk. 1.38, 1.23 and 1.45 per kg in Azimpur Bazar, Hatirpool bazar,Newmarket kancha Bazar and Palashi bazar respectively) (Table 5.10)

Items of cost	Cost (Tk. Per kg)	Stdev	% of total cost
Hatirpool Bazar (N=5)			
Rent	0.830	0.260	60.145
Loading/unloading	0.330	0.120	23.913
Electricity bill (incl. generator)	0.070	0.060	5.072
Cleaner	0.020	0.010	1.449
Damage/wastage	0.010	0.010	0.725
Security guard	0.010	0.010	0.725
Packaging (shopping bags)	0.050	0.020	3.623
Depreciation (bamboo basket)	0.040	0.020	2.899
Depreciation (weighing machine)	0.020	0.005	1.449
Total	1.380	0.350	100.000
Azimpur Bazar (N=5)			
Transportation	0.410	0.130	33.358
Rent	0.350	0.150	28.476
Loading/unloading	0.250	0.098	20.340
Electricity bill (incl. generator)	0.020	0.010	1.627
Generator	0.017	0.010	1.351
Cleaner	0.020	0.010	1.627
Damage/wastage	0.023	0.017	1.831
Security guard	0.020	0.010	1.627
Packaging (shopping bags)	0.050	0.020	4.068
Depreciation (bamboo basket)	0.050	0.020	4.068
Depreciation (weighing machine)	0.020	0.010	1.627
Total	1.229	0.280	100.000
Newmarket Bazar (N=)			
Transportation	0.450	0.150	30.949
Rent	0.390	0.180	26.823
Loading/unloading	0.270	0.100	18.569
Electricity bill (incl. generator)	0.020	0.010	1.376
Salary/wages	0.075	0.058	5.158
Generator	0.025	0.038	1.719
Cleaner	0.020	0.010	1.376
Damage/wastage	0.064	0.068	4.402
Security guard	0.020	0.004	1.376
Packaging (shopping bags)	0.050	0.020	3.439
Depreciation (bamboo basket)	0.020	0.010	1.376
Depreciation (weighing machine)	0.050	0.020	3.439
Total	1.454	0.570	100.000

Table 5.10: Marketing costs of retailers of different retail markets of Dhaka city.

5.5 Costs and Margins of the Potato Intermediaries and Portion of each share:

One of the important objectives of the present study was to explicitly calculate the costs and margins of the market intermediaries. Results on costs and margins of the potato intermediaries are presented in Tables 5.11. The marketing costs were the highest for the retailers of Dhaka city (Tk. 1.2-1.5 per kg), and the corresponding net margins of the retailers ranged from Tk. 0.8-1.2 per kg The highest net marketing margin (Tk.1.2 per kg) was received by the retailers of NewmarketKacha Bazar followed by the Hatirpool Bazar retail market (Tk. 1.1 per kg). The second highest net marketing margin was made by the Bepari (Tk. 1.0 per kg). The net marketing margins of the Aratdar were the lowest (Fig 4.16). Among the market intermediaries, Aratdar received the lowest net margin (Tk. 0.2-0.4 per kg) followed by the Faria (Tk. 0.6 per kg). This calculation of cost and margin was based on the price of November 2014 for the variety, Diamant. The costs and margins of the intermediaries would vary with variety and time.

The results of the present study were in agreement with those of CPD (2007) who reported that the potato market intermediaries received about 60% equivalent value of the retail price. Among the intermediaries the retailers received the highest share (24-28% of the retail value). The reasons for the higher margin of the retailers may be due to the fact that the potato is perishable, especially as compared to food grains and hence the retailers add premium to the prices to offset the risk of spoilage. Secondly, the consumers generally choose and pick better quality products and remaining products become gradually inferior in quality and ultimately sold at lower prices. Often, a portion of the products are not sold. That is why, the retailers tend to add premium to compensate the perceived losses. Nevertheless, the unusual and very high (unlimited) addition of premium by the retailers cannot be ruled out, and which need to be monitored and researched to suggest or guide the minimum and maximum levels of net margins for the retailers of Dhaka city.

Intermediaries	Purchase price (Tk./ kg	Sale Price (Tk. /kg)	Gross margin (Tk./ kg)	Marketing cost (Tk./ kg)	Net margin (Tk./ kg)
Faria, Munshiganj (N=10)					
Mean Stedy	7.00 0.61	7.96 1.23	0.96 0.74	0.55 0.10	0.41 0.74
Bepari, Munshiganj (N=10)					
Mean Stedy	7.82 0.55	9.89 0.06	2.07 0.92	1.07 0.29	1.00 0.99
Aratdar, Karwan Bazar, Dhaka (N=10)					
Mean Stedy	- -	- -	1.01 0.06	0.88 0.16	0.14 0.17
Aratdar, Jatrabari, Dhaka (N=10)					
Mean Stedy	- -	- -	1.02 0.07	0.81 0.20	0.22 0.19
Wholesaler, Karwan Bazar, Dhaka (N=10)					
Mean Stedy	10.00 0.95	12.07 0.66	2.07 0.87	1.29 0.23	0.78 0.94
Wholesaler, Jatrabari, Dhaka (N=5)					
Mean Stedy	10.10 0.95	12.03 0.97	1.93 0.77	1.20 0.07	0.73 0.91
Retailer, Karwan Bazar, Dhaka (N=5)					
Mean Stedy	12.04 0.96	14.47 0.93	2.43 0.53	1.38 0.38	1.05 0.97
Retailer, Newmarket Kancha Bazar, Dhaka (N=5)					
Mean Stedy	12.06 0.97	14.51 0.98	2.45 0.53	1.23 0.38	1.22 0.97
Retailer, Hatirpool Market, Dhaka (N=5)					
Mean Stedy	12.00 0.86	14.54 1.02	2.54 0.49	1.45 0.57	1.09 0.96
Retailer, Azimpur Bazar, (N=5)					
Mean Stedy	10.00 0.71	11.69 0.96	1.69 0.52	0.88 0.21	0.82 0.67

Table 5.11 Costs and margins of intermediaries in potato marketing channels (Munshiganj-Dhaka)

NB.Aratdar generally do not purchase or sell and they do not have any gross margin. So, in case of Aratdar, gross margin is cited as commission.

For local consumption:

Channel I: Farmers → Faria1 → Wholesalers → Retailers → Consumers
Channel II: Farmers → Faria2 → Wholesalers → Retailers → Consumers
Channel III: Farmers → Wholesalers→ Retailers → Consumers

For consumption in Dhaka city:

Channel I: Farmer → Bepari → Aratdar → Wholesalers → Retailers → Consumers
Channel II: Farmer → Faria1 → Bepari → Aratdar → Wholesalers → Retailers → Consumers
Channel III: Farmer →Faria 2 → Bepari → Aratdar → Wholesalers → Retailers → Consumers

Price spread

Price spread is an important measure of marketing efficiency. In the present study, price spread was calculated using the formula: Price Spread = (Price paid by consumers - Price received by the growers). Results revealed that the price spread was high but majority of the price paid by the consumers are taken by the intermediaries. Market to market is also have variation in prices though all the market situated in the Dhaka city and all of them but the vegetables from the same wholesale market.

Share's of Intermediaries:

Growers share is one of the important measures of marketing efficiency. Results showed that growers share of the marketing channels Mushigonj-Dhaka was higher (46.52-88.15%) than the other channels of vegetables(35.71-56.60%).In another study Reardon et al. (2012) investigated the shares of rewards of growers in potato value chain in Bangladesh (Munshiganj-Dhaka). In both seasons (harvest and off-harvest season), the Munshiganj farmers took the preponderant share of the urban retail price, reaching 69.00% in harvest season and77.00% in off-harvest season, which partially supports the results of our study. The main reason for increase in share in the off-harvest season was the farmers reward for storage.

The net margin of potato growers of Munshiganj was Tk. 1.99 per kg (traditionally stored). Along the marketing channel Munshiganj -Karwan Bazar, Dhaka), the highest value was added by the retailers of of Dhaka city (31.10%) followed by the Bepari (29.50%). By contrast, the Aratdar of Karwan Bazar added the lowest value of 4.01% (Fig 4.13). The values added by the Faria and the wholesalers along the chain were 12.15% and 23.16%, respectively. In the case of cold stored potatoes, net margins of growers/trader group, significantly increased. For example, it was Tk. 8.76 per kg in 2001-13 season .Again, along the marketing channel, the lowest value was added by the Aratdar of Karwan Bazar (5.28%). Results indicated that the retailers of Dhaka city are actually adding more values in the marketing channel. The Bepari, especially of Munshiganj was also found to add high value along the chain, and this was possibly due to the risks taken by them. Some amounts of potatoes from Munshiganj are used in the production of potato

chips, and this has great potential in the country. For example, the Kashem Group and Nasir Group purchase sugar free potatoes from the cold storage owners (e.g. Himadri Cold Storage, Munshiganj) for the production of potato chips.

5.6 Factors Contributing to Price Fluctuation Brinjal:

Brinjal(Eggplant) is an important vegetable all over the world. The leading brinjal producing countries are China, India, Egypt, Iran, Turkey and Bangladesh.

Trend in Acreage and Production of Brinjal in Bangladesh

In Bangladesh, Brinjal is found available in the markets round the year. Presently, Bangladesh produces substantial amounts Brinjal annually. During 2013, 360 thousand metric tons of Brinjal(summer and winter) were produced in the country (BBS 2013). Production of summer Brinjal showed slightly increasing trend except 2007-08 and 20011-12. By contrast, the production of winter Brinjal showed a decreasing trend. Regarding area coverage both summer and winter Brinjal showed decreasing trend. The gradual decrease in production of winter Brinjal could be attributed to the corresponding increase in rice (Boro) and maize areas over the last several years. Nevertheless, yield of both summer and winter Brinjal significantly increased possibly due to the introduction of new high-yielding and hybrid varieties and also due to the use of improved production technology. Brinjal production would have been further increased but the biggest threat is the havoc caused by shoot and fruit borer . Recently BtBrinjal resistant to shoot and fruit borer, has been developed in which a gene called Cry1Ac from naturally occurring bacterium (Bacillus thuringiensis) has been introduced.

Seasonality

Seasonality in brinjal price has been investigated. The months with the minimum and maximum wholesale and retail prices have been summarized in Tables 5.12 and 5.13. The minimum price months remained during March-April and December-February (Tables 5.12 and 5.13), and these durations are generally the peak harvesting seasons of various other summer and winter vegetables, respectively. Similarly, the maximum price months remained during September-October, which is known as lag period of vegetables supply in the market. Therefore, varietal improvement could be sought so that adequate supply can be ensured during the lag period in order to stabilize the price of vegetables including brinjal round the year. The seasonal price indices were calculated as ratio to moving average. Results revealed

that there existed pronounced seasonality, and it was found identical for both the wholesale and retail prices. In terms of wholesale price, seasonal price indices varied from 59 to 174 with a co-efficient of variation 35.75%. In the case of retail price, seasonal price indices ranged from 73 to 172 with an estimated co-efficient of variation 31.67%. There was a sharp peak during September-October. Summer brinjal reaches the markets from February with oversupply during April-July. Then, there is a shortage of brinjal supply in the markets that may have caused higher prices and seasonal peak during September-October. Seasonal indices were lower during April-June, and then start to climb until October followed by a dramatic fall in December .During December, again market becomes oversupplied with winter brinjal along with several other winter vegetables. So, there seems a very clear marketing and pricing patterns of brinjal over the last years. The lowest price was found in the month of April and the highest in the month of October.

Year	Month	Minimum Price (Tk. kg^{-1})	Month	Maximum Price (Tk. kg^{-1})
2008	March	12.00	October	24.00
2009	January	10.00	October	28.00
2010	April	14.00	October	36.00
2011	April	13.00	September	35.00
2012	March	15.00	September	46.00
2013	December	16.00	October	38.00

Table 5.12: Months with minimum and maximum prices (wholesale) of brinjal during the period from 2008 to 2013 (DAM)

Year	Month	Minimum Price (Tk. kg^{-1})	Month	Maximum Price (Tk. kg^{-1})
2008	February	14.00	October	38.00
2009	January	16.00	October	42.00
2010	February	16.00	October	45.00
2011	March	18.00	September	48.00
2012	April	16.00	October	44.00
2013	December	24.00	September	55.00

Table 5.13: Months with minimum and maximum prices (retail) of Brinjal during the period from 2008 to 2013 (DAM)

Variety

Different varieties/types of brinjal are available in the markets. The predominant variety in Narsingdi is Bombai, Chaga, Globose, Round green and Elongated.Due to the variety of Brinjal its price fluctuates. Generally the price of local variety Brinjal is higher than the High Yield Varieties (HYV).

Postharvest Handling

Various postharvest operations like sorting, grading, packaging, etc. are followed in Brinjal supply chain. Sorting is generally practiced to remove diseased, insect infested and damaged Brinjal. In terms of packaging, the growers use bamboo baskets to bring Brinjal to the assemble markets. For long distance transportation, large Dhope (made of bamboo basket and gunny sacks) is used. Plastic net bags are the recent introduction and are used principally to sell Brinjal to the wholesalers and in limited scale to the customers (5-kg bag). Very often, brinjals are carried in open trucks without any packaging, especially from Narsindgi-Dhaka .

5.7 Different Marketing Channel and Market intermediaries:

The primary marketing channels of Brinjal from Narsingdi to Dhaka city have been furnished in Figs 4.20. Cost margin analysis revealed that the highest net margin was received by the retailers of Dhaka city (49.64%) followed by Bepari (16.77%). In contrast, the lowest net margin was received by Faria (10.07%) (Fig 5.3).

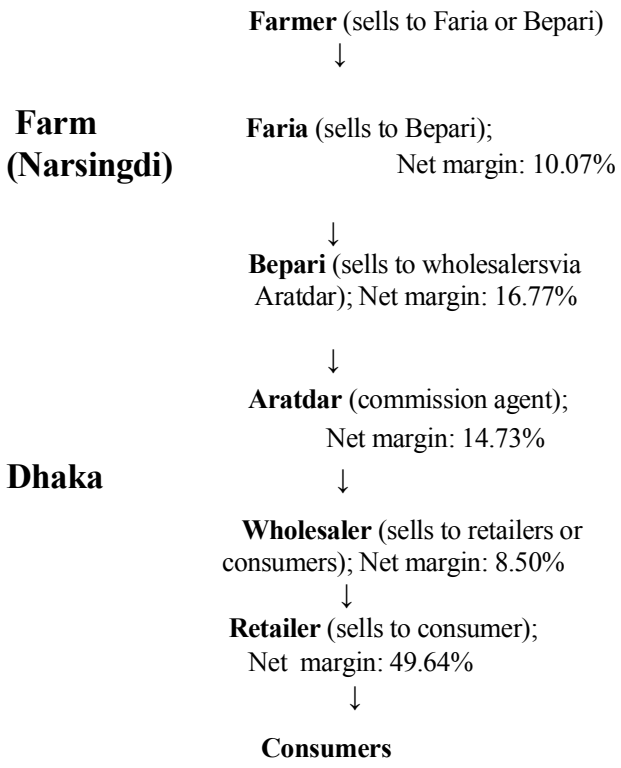

Fig: 5.3 Marketing channel of Brinjal (Narsingdi-Dhaka) with percentage of net margins of the market intermediaries.

The growers of Narsingdi make a net margin of Tk. 0.3 per kg (cost is Tk. 0.20 per kg). Then the commission agents make necessary arrangement to sell Brinjal to the primary buyers (Bepari). For this service, the commission agents take a commission of Tk.

0.50/ kg of Brinjal. This indicates that there is a little option for competition in the market. There also have risk of unusual agreement between the commission agent and the primary buyers, which may result in less bargaining option of the growers and a resultant reduced price. By contrast, the local commission agent and the primary traders may make unusually higher profits in the business. The traders also charge 2 kg extra (Dholta) per mound (40 kg) by convincing the growers that this extra is to adjust weight loss and wastage during marketing.

5.8 Marketing Costs and Returns of Brinjal Producer

Marketing costs of Brinjal growers of Narsingdi has been calculated. The price of November of 2014 has been considered for the calculation. Average value has been taken from 10Brinjal producers of Raipura Upazilla of Narsingdi district. Average yield of Brinjal in RaipuraUpazilla was 78506 kg ha^{-1}.

Marketing Cost of Brinjal Producers

The costs for marketing of Brinjal producers has been calculated and presented in Table 5.14. The calculated marketing cost was Tk. 0.27 per kg (Table 5.14). The major cost was due to the cost for transportation (71.00%).

Items of cost	**Cost (Tk. kg^{-1})**	**% of total cost**
Transportation	0.19468	71.00
Packaging	0.07933	28.92
Depreciation (gunny sacks)	0.00023	0.08
Total	**0.27423**	**100**

Table 5.14 Marketing cost brinjal producers

Gross and Net Margins of Brinjal Producer

Gross margin = Average yield per hectare × prevailing market price = 78506 kg brinjal ha^{-1} × market price Tk. 22.00 kg^{-1} = Tk. 1727132 ha^{-1}. The net margin = Gross margin - Cost (production cost + marketing cost) = Tk. 1727132- Tk. (46683 + 21528) = Tk. 1720321 ha^{-1}. Marketing cost for 1 kg brinjal = Tk. 0.274229 Tk. So, marketing cost for 78506 kg brinjalproduced in 1 ha of land = Tk. 21528.

5.9 Marketing costs and margins of brinjal intermediaries

Marketing costs of intermediaries involved in marketing channel from Narsingdi to Dhaka have been calculated from primary data. Price of the month November 2014has been considered to calculate costs and margins of Brinjal intermediaries. Details of estimation of marketing costsof intermediaries have been given below.Purchase and sales prices, gross margin, marketing costs and net margins of intermediaries are presented in Table 5.15.

Intermediary	Purchase price ($Tk.kg^{-1}$)	Sale price margin ($Tk.kg^{-1}$)	Gross margin ($Tk.kg^{-1}$)	Marketing cost ($Tk.kg^{-1}$)	Net ($Tk.kg^{-1}$)
Faria (Narsingdi)	21.40	22.50	1.10	0.38	0.72
Bepari (Narsingdi)	22.30	24.60	2.30	1.11	1.20
Aratdar (Dhaka)	-	-	2.40	1.35	1.05
Wholesalers					
Karwan Bazar	25.40	27.80	2.40	1.77	0.63
Jatrabari Bazar	25.25	28.00	2.75	1.17	1.58
Retailers					
Newmarket bazar	24.00	29.48	5.48	1.37	4.12
Hatirpool Bazar	27.60	32.20	4.60	1.05	3.55
AzimpurKacha Bazar	28.00	33.00	5.00	1.35	3.65

Table 5.15Marketing margins of Brinjal intermediaries (Narsingdi to Dhaka)

Results has been revealed that net marketing margins of retailers of Newmarket Kacha Bazar was the highest (Tk. 4.12per kg) followed by those of the Hatirpool Bazar retail market (Tk. 3.55 per kg). Overall, net margins of retailers were much higher than those of other intermediaries . Another contrasting result was observed that net marketing margins of Brinjal intermediaries were much higher than those of potato intermediaries as described earlier. This is probably attributed to the less perishability and existing storage facility of potato and corresponding high perishability and no storage facility of Brinjal. The marketing cost and net marketing margins of Bepari were Tk. 1.11 and 1.20 per kg, respectively .This result would be attributed to the shorter distance between Narsingdi and Dhaka.

Percentage of Net Margins of the Intermediaries

Percentage of net margins of various intermediaries in marketing (Narsingdi-Karwan Bazar, Dhaka) have been calculated. It is exceptionally high at retail level in Dhaka (49.64%) followed by Bepari of Narsingdi (16.77%) (Table 5.16). Net margins are lower at wholesale level in Karwan Bazar and at Faria level in Narsingdi (8.80

and 10.07%, respectively)

Intermediary addition	**Net margin (Tk/kg)**	**% of value**
Faria	0.720	10.07
Bepari	1.199	16.77
Aratdar	1.053	14.73
Wholesaler (Kawran Bazar)	0.629	8.80
Retailers (Karwan Bazar)	3.550	49.64
Total	**7.152**	**100**

Table 5.16 Value addition by intermediaries (Raipura, Narsingdi-Kawran Bazar)

Price Spread

Marketing Channel Narshindi- Dhaka	Price received Growers‟ by farmers (Tk. Kg^{-1})	Price paid by consumers share (%)(Tk./ Kg)	Price spread (Tk./ Kg)	Growers Share%
Raipura-Azimpur Bazar	22.44	33.75	11.31	66.49
Raipura-Palashi Bazar	22.44	33.75	11.31	66.49
Raipura-HatirpoolKacha bazar	22.44	32.40	9.96	66.49
Raipura-Newmarket Bazar	22.44	38.00	15.56	59.05
Mean	21.62	34.02	12.40	63.78

Table 5.17 Price spread and growers share in marketing channel starting from Narsingdi to Dhaka city

5.10: Drawbacks of the Existing Supply Chain:

At present the unorganized retailers are linked with farmers through wholesalers or commission agents. Sometimes there would be more than one commission agent and wholesaler for the same produce to reach the retailer. Redundant commission agents and wholesalers make supply chain practices further inefficient. The agricultural sector in Bangladesh is facing several constraints. Major constraints in Production and marketing of fresh vegetables are non- availability of Quality seeds, inadequate irrigation facilities, inefficiency in pest management, credit availability constraint, high costof production, lack of timely information, huge post harvest losses, lack of roads, cold storage, inadequate space, poor marketing network and high transportation cost. A study estimated that the strengthening of Supply Chain(SC), the benefits to consumers and producers can increase by 20-25% in the most perishable commodity like potato, brinjal,tomato etc. Due to inefficient SC, the price received by the farmers is only about 30% to 65% of the retail price paid by the consumer. Post-harvest technology and management not only helps in reducing the level of wastages, but also facilitates to add value to quality of the produce and also facilitates the stakeholders to get better returns.

Difference in prices between the farm and the retail in Bangladesh is highest in the world. Postharvest technology of fresh vegetables gained enormous momentum to save losses during harvesting, handling, storage and transportation. The extent of loss of Vegetables is very high and the loss of quantity ranges between 10% to 80% in some of the most perishable vegetables. 30% of Bangladesh's Vegetables produces goes waste because of the lack of the storage chains. Several research initiatives and considerable investments have resulted in the growth of supply and trade of fresh vegetables during the past decade but still a lot more needs to be done. Increased investments, technology and managerial resources are essential to reduce post-harvest losses, to increases productivity of farmers and to ensure better returns to farmers. This also facilitates to increase the per capita consumption of Vegetables in the country. Bangladesh agricultural sector has huge potential as it has a vast domestic market, labor, fertile land, varied geographical conditions and agricultural dependent farmers. This can be used as a leverage to gain a leading position in the global market too. In the traditional system of wholesale marketing, the commission agents and

traders dominate the Supply Chain and are the major price setters, and most of the time, farmers have to depend on them for credit. Small farmers have lack marketing power and have a low share in the final consumer price. Traditional wholesalers do not have the vision to make supply chain integrated. The wholesale markets are poorly designed with non- existent infrastructure for packing, grading, sorting, and cold storage. Supply Chain Management needs proper business vision and to build a long term collaboration between farmers and retailers. The supply chain provides services for transportation, packing, sorting, grading, cold storage and post harvest technology. There is a strong need for government interaction in removing infrastructure constraints like setting up of distribution centers, cold chains, roads to the markets, etc. ensuring the quality and quantity of the produce to the stores is another basic requirement for smooth functioning of supply chain.

Vegetable supply chain has traditionally been fragmented. Structural changes are required to maintain and build supply chain infrastructure. For example, unorganized retailers do not have scale of operation to build their own SC. It is necessary to integrate them with an ever increasing fraternity of organized retailers, as far as SC concerned. Business processreengineering is an answer to many of these problems. In order to make SC effective, it is necessary to segment different customers. Caterers, hostels, small town unorganized retailers, unorganized retailers in a metro, organized retailers and processors of Vegetables cannot be considered as one segment of buyers. For make SC more effective, it is necessary to have different approach to all these stakeholders.

Demand planning for Vegetables is difficult and challenging. Farmers, wholesalers, food manufacturers and retailers are not working with philosophy of integration. Sourcing has gone strategic in Industries. The cost of Procurement, transportation cost, regularity of Supply, quality of products, ethical practices of producers, terms and condition of payment and road connectivity are important factors which influence strategic sourcing, which is crucial for the success of Vegetable Supply Chain in the long run. New benchmark has to be set from time to time to make the Supply chain improve its performance. The biggest challenge to make any Supply Chain for Vegetables to work better is to make the stakeholders realize their role. The responsibility of each stakeholder changes with the change of scale of operation, and sometimes, the stakeholder perceive that their roles are

conflicting. The Business to Business(B2B) relationship among different stakeholders make cost sharing and collaborating a challenging task. Who has to share what cost is a big conflicting point in integrating Supply chain? Who has to share the cost of construction and maintenance of roads? Who has to pay for cold storage and how much? Who has to bear the cost of processing and analyzing information which is useful to farmers and consumers? Incompatible organizational cultures make it difficult for different stakeholders to agree for one size solution. As per the study the important drawbacks of the current supply chain are number of intermediaries, high level of wastages, quality degradation, poor infrastructural facilities and high cost.

Most of the intermediaries are not interested to provide information willingly. Besides All of us know that there are so many chadas are involved in the business if somebody wants to do the business without any harassment. But in many cases the businessmen are not interested to acknowledge this for an unknown fear.

In a nutshell it can be said that scores of constraints were identified in the existing marketing channels of vegetables. Firstly, almost all the channels were long with many middlemen. The other important constraints were mainly related to inadequate market infrastructures, paucity of uninterrupted electric supply in potato cold stores, unauthorized tolls and commission throughout the channels, restricted entry of vehicles into Dhaka city, existence of syndicate/price control, hegemony of middlemen in the marketing channel, absence of modern marketing tools and equipment's, lack of market information, lack of knowledge and skills, and lack of specialized training. In running potato cold stores there were scores of problems which include: lack of power supply, especially during the peak loading period (April-May) and lack of proper management in relation to turn over ventilation, positioning (horizontal in place of upright), intake of fresh air, etc.

5.11:Recommendations:

Measures for improving Supply Chain and its Effectiveness :

There has to be structural changes at different levels - farmers, intermediaries and consumer. The government, private, public-private partnership, cooperatives, technology providers, and even media can play a crucial role. Infrastructure like roads, transport, information and communication technology and cold storage are

basic requirement for better results in Supply chain.

1. Demand forecasting is one of the important requirements for improving SCeffectiveness. Due to poor forecasting, there is a imbalance between supply and demand. In some months vegetables are either not plucked from the farm due to lack of demand. In some reasons, produce is not available and a result prices are boost up.

2. The Department of Agriculture acts as the facilitator for creation of infrastructure facilities for marketing of vegetables in the country. The Department of Agricultural can established storage system wherein the growers/farmers can bring their vegetables to the market and sell them directly to that store .

3. Vertical coordination of farmers through cooperatives, contract farming and retail chains would facilitate better delivery of output, reduce market risks, provide better infrastructure, attract more public interest, acquire better extension services, and create awareness regarding the prevailing and new technologies.

4. Customized logistics is another important immediate requirement to make logistic effective. This reduces the cost, facilitates the maintenance of quality of the produce and fulfills the requirements of targeted customers.

5. The Government is providing electricity consumed by cold storages but didn't provide any support for cold storage. The Government can provide facilities for onstruction/modernization of cold storage units. Cold storages can be classified as Agro Food Processing Industry for providing incentives and concessions available to Agro Food Industry.

6. Information system for better coordination among different stakeholders from farmers to consumers is the need of the hour. The internet and mobile communication can also be used to enable information and financial transfer between the stakeholders.

7. Public private partnership is another strategic solution. Supply chain like washing, waxing, grading, sorting, packing, pre-cooling, handling facilities, insurance, finance, transport and processing facilities would add value to supply chain

functioning.

8. The main objective of establishing Food and Technology Parks it to promote agro and processing industries in cluster in area where there is predominant production of processable agriculture and Horticulture Products. These parks will also provide the required infrastructural and common facilities which are essential for sustenance of the industries. Quality assurance laboratories, Ware housing including cold storages, common effluent treatment plants etc.

9. Unwanted toll locally which is called *chada* has to provide by all the intermediaries to the local musclemen, politician, police, and different organisations which is now in the form of disease in all sector of Bangladesh including vegetable sector. Government should take proper initiative to remove or control from this.

10. Sometimes seed is not good for which its effect on the production of vegetables. Government should provide good seed for the better production of vegetables.

11. Government should provide loan at the lowest interest rate to the vegetable producers.

12. Above all the political condition of the country shouldnot be unrest. Due to the unrest of the country supply of the produce badly hampered due to transportation problem.

CHAPTER 6

Conclusion

The existing supply chain is not quite effective. All the stakeholders have to join hands to improve the supply chain which should be started from farmers to consumers. This would not only improve the economic and social status of consumers but also facilitates the consumers to get quality produce at economical rates. The intermediaries and all the stakeholders in the supply chain benefit from the improved supply chain infrastructure. In a country like Bangladesh, where majority of population lives in rural areas, the benefits of improved supply chain would have implications on a good number of people. Government has to join hands with private players in building infrastructure which require huge investments and long term and multiple uses like roads, storage system and communication technologies. Bangladesh has the potential not only to cater the domestic demand but also to the major global requirement.

REFERENCES

1. Acharya, S.S. and Agarwal, N.L. 2004. Agricultural Marketing in India (4th Edition), Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
2. Ahmed, D. 1992. Vegetable marketing system for domestic and export markets. In: Vegetable Production and Marketing: Proceedings of the National Review and Planning Workshop. AVRDC, Shanhua, Tainan, Taiwan. pp. 170-183.
3. Ahmed M., A.K.M. Haque, M.A. Matin and M.I. Hossain. 1990. Winter vegetables marketing system in selected areas of Bangladesh. Research Report No. 8.
4. Agricultural Economics Division, BARI, Joydebpur, Gazipur. 24p.
5. BARI (Bangladesh Agricultural Research Institute). 2007. Annual Report (2006-07), BARI, Joydebpur, Gazipur, Bangladesh, pp. 330-339.
6. Barman, L.R. 2008. Supermarket and Conventional Marketing Channels of Winter Vegetables in Dhaka City.MS Thesis, Department of Cooperation and Marketing, Bangladesh Agricultural University, Mymensingh, Bangladesh.
7. BBS. 2005-13. Bangladesh Bureau of Statistics. Statistics Division, Ministry of Planning, Government of the People‟s Republic of Bangladesh.
8. China, S.S. 2009. Agricultural Marketing in India. Kalyani Publishers, New Delhi,p.292.
9. CPD (Centre for Policy Dialogue). 2007. Price of Daily Essentials: A Diagnostic Study of Recent Trends. A Report Prepared for the Ministry of Commerce, Government of Bangladesh. pp: 1-50.
10. BCIP. 2010. Bangladesh Country Investment Plan: A Road Map towards investment in agriculture, food security and nutrition. Food Division, Ministry of Food and Disaster Management, The Government of the People's Republic of Bangladesh,pp:1-28.
11. DAM. 2012. National Commodity Prices. Department of Agricultural Marketing. Ministry of Agriculture, Government of the Peoples Republic of Bangladesh [www.dam.gov.bd].

12. FAO. 1997. Horticulture Baseline Production and Marketing Survey, Vol. II, Main Report. Food and Agricultural Organization of the United Nations Engineering and Planning Consultants Ltd., Dhaka, Bangladesh. 299p.
13. FAO/WHO. 2003. Diet, nutrition and the prevention of chronic diseases. Report of a joint FAO/WHO. Expert consumption WHO Technical Report Series 916. Geneva. World Health Organization.
14. GoB (Government of the People's Republic of Bangladesh). 2008. Safe, Quality Food Supply, Area of Intervention 3.6, The National Food Policy Plan of Action 2008-2015,p. 25.
15. Hajong, P. 2011. Marketing and Storage System of Potato in Some SelectedAreasofRangpur District. MS Thesis, Department of Agribusiness and Marketing, Bangladesh Agricultural University, Mymensingh, Bangladesh.
16. Hassan, M.K. 2010. Final Report- Postharvest Loss Assessment: A Study to Formulate Policy for Loss Reduction of Fruits and Vegetables and Socio-Economic Uplift of the Stakeholders (Funded by USAID and EC & Jointly implemented by FAO and FPMU of MoFDM). p. 189.
17. Hossain, M.A, and M.A.M. Miah. 2009. Final Report (CF 2/08): Postharvest Losses and Technical Efficiency of Potato Storage Systems in Bangladesh. Funded by USAID and EC & jointly implemented by FAO and FPMU of MoFDM). p. 88.
18. Hudges, R.J., J.C. Buzby and B. Bennet. 2010. Postharvest losses and waste in developed and less developed countries: opportunities to improve resource use. Journal of Agricultural Science (Cambridge University Press), page 1-9.
19. Mahajan, B.V.C. A.S. Dhatt, K.S. Shandhu and A. Garg. 2008. Effects of CIPC {isopropyl-N (3-chlorophenyl) carbamate}on storage and processing quality of potato. J. Food Agric. Environ., 6(1): 34-38.
20. Matin, M.A., M.A. Baset, Q.M. Alam, M.A. Karim and M.R. Hasan. 2008. Mango marketing system in selected areas of Bangladesh. Bangladesh Journal of Agricultural Research, 33(3): 427-438.
21. Minten, B., A.Z.M.S. Alam, U.K. Deb, A.Z. Kabir, D. Laborde, M. Hasanullah, and K.A.S. Murshed. 2010. Agricultural marketing, price stabilization, value chains, and global/regional trade. Paper presented for the Bangladesh Food Security Investment Forum, May 2010.

22. Murshid, K.A.S., N. Ahmed, M. Yunus, and S.M.Z. Ali. 2009. Re-emergence of Food Insecurity in Bangladesh? Instability in Food Production and Prices, Nature of Food Markets, Impact and Policy. Final Report PR 7, National Food Policy Capacity Strengthening Programme (NFPCSP). pp. 1-77.
23. Myint, U.K. 2003. Agricultural Marketing System Information in Myanmar. Agricultural Marketing: A National Level Quarterly Journal on Agricultural Marketing, 45(4): 16-28.
24. NFPCSP (National Food Policy Capacity Strengthening Programme). 2011. TOR 7 (For the Research Proposal to be Funded under NFPCSP Phase II): Improving the Performance of Marketing System of Fruits and Vegetables in Bangladesh. P. 1
25. Rabbani, M.G., M.A. Siddique, M.M. Islam and M.S. Islam. 2010. The Potato Sector in Bangladesh: Its Challenges and Opportunities. Katalyst, Dhaka, Bangladesh.p.144.
26. Rahman, M.F.2003. Agricultural Marketing System Bangladesh. Agricultural Marketing: A National Level Quarterly Journal on Agricultural Marketing, 45(4) : 29-32.
27. Rolle, R.S. 2006. Improving postharvest management and marketing in the Asia-Pacific regions. In: Postharvest Management of Fruits and Vegetables in Asia-Pacific Region. FAO (Food and Agricultural Organizations) and APO (Asian Productivity Organization). pp: 23-31.
28. Roy, M. 1992. A study on the production and marketing of brinjal in selected areas of JessoreDistrict. M.Sc. Ag. Thesis.Department of Horticulture, BAU, Mymensingh.57p.
29. Sabur, S.A. 1992. Vegetables Marketing System in Bangladesh. Journal of Business Administration, 18(3-4): 141-155.
30. Shepherd, G.S. 1972. Marketing of Farm Products. Iowa State University Press, Iowa, USA.
31. Sirivatanapa, S. 2006. Packaging and transportation of fruits and vegetables for better marketing. In: Postharvest Management of Fruits and Vegetables in Asia-Pacific Region. FAO (Food and Agricultural Organizations) and APO (Asian Productivity Organization). pp: 43-48.
32. World Bank. 2008. High-Value Agriculture in Bangladesh: An Assessment of Agro-business Opportunities and Constraints. Bangladesh Development Series Paper No. 21. IFC-South Asia Enterprise Development Facility. pp. 47-59.