FARMERS' CONSTRAINTS FOR VEGETABLE MARKETING IN BANGLADESH

A Thesis By

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MASTER OF SCIENCE IN AGRICULTURAL EXTENSION AND INFORMATION SYSTEM

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CERTIFICATE

This is to certify that the thesis entitled **"Farmers' Constraints for Vegetable Marketing in Bangladesh"** submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science in Agricultural Extension and Information System**, embodies the result of a piece of bona fide research work carried out by **Razeul Islam**, Registration No. **11-04622** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated: June, 2017
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Dedicated

To

My Beloved

Parents and

Grandfather

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FARMERS' CONSTRAINTS FOR VEGETABLE MARKETING IN BANGLADESH

Razeul Islam

Abstract

Agricultural produce of vegetable growers is often lost after production due to many marketing challenges which make it difficult for vegetable growers to explore full market potentials and these also reduce incentives of participation in formal (commercial) or high-value markets. The main objective of the study was thus to index and analysis factors (constraints) affecting marketing of major vegetables from growers perspective. Data were collected from 113 vegetable growers with structured questionnaire, Pearson's correlation co-efficient (r) was used to determine the relationship between the selected socio-economic characteristics of the vegetable growers and their extent of marketing constraints faced. With regard to constraints, majority (68.1 percent) of the respondents faced medium constraints, while 16.9 and 15 percent of them had low and high marketing constraints, respectively. Among eleven characteristics, growers' training received, knowledge on vegetable marketing and availability of marketing information showed significant and negative relationship with their extent of marketing constraints faced. While age, education, family member, vegetable cultivation experience, annual family income, credit availability, extension contact did not show any significant relationship with their extent of marketing constraints. Results showed that lack of access to storage facilities was ranked the most prominent constraint followed by presence of middle man, lack of market information, inadequate access roads, lack of access to credit availability and high perishability of produce. Therefore development of better infrastructure in the form of storage facilities and availability of marketing information are vital for commercialization of vegetables.

CHAPTER I

INTRODUCTION

1.1 General background

Bangladesh is one of the pioneer countries in term of vegetable production in the South Asia (Ali, 2000). Vegetables production is profitable and the future performance of the sector will largely determine how successful the country is in diversifying its agricultural production and achieving higher agricultural growth rates (Ateng, 1998; Mahmud *et al*., 2000).

Subsistence farming is traditionally practiced by the farmers. So, there is no cost-benefit calculation. However, Bangladesh is now moving towards commercial agriculture from subsistence agriculture. Many entrepreneurs are investing in agriculture. Farmers are commercially cultivating crops specially vegetables. During the last decade, both area and production of vegetables increased in manifolds (AIS, 2001 and 2011).

Diversification into vegetable crops and increasing commercialization can support the development of the agricultural sector in several ways. Commercialization is characterized by households moving from subsistence systems into semi-commercial and commercial systems (with the main objective of achieving food self-sufficiency), thereby maximizing profits and generating surplus (Pingali and Rosegrant, 1995).

Government of Bangladesh Government has called for a departure from “rice-led” growth to a more diversified production base that includes several non-rice crops like, maize, legumes, livestock, and vegetables (Hoque, 2000).

Successful commercial fresh vegetable production is a demanding task that requires a combination of production and marketing skills from the growers. This is a consequence of the special attributes of fresh produce. For instance, the perishability of fresh vegetables leads to fewer storage opportunities compared to other agronomic crops. As a result, growers are compelled to accept the market price close to, or during, their harvesting period. Furthermore, traditional risk mitigation options (i.e., future markets) do not exist for fresh vegetables. Thus, growers are more vulnerable to market fluctuations. Growers need to operate in a changing market environment with greater demand for more varieties and quality (Dimitri *et al*., 2003). If the vegetable produced

does not meet the required standards, then the grower has to sell at a lower price or not at all.

Crop production has increased by two to three times in the last few economic years. But it is evident that without an efficient agricultural marketing system, high crop production cannot be sustained for a long time. When the farmers do not get the fair price for their products they must be lost their interest to continue farming as for financial crisis. Vegetables, as high value crops, often require an intensive input regime, necessitating large labor input in planting and harvesting. In Bangladesh, higher profit variability in commercial cultivation of vegetables is evident due to variability in yields and market prices (Weinberger and Genova II, 2005).

So far, there have been several studies of the possibility of horticultural sector improvement in Bangladesh. Most of them have highlighted the potential of horticultural crops like vegetables (Weinberger and Genova II, 2005; Ali, 2000).

Agricultural marketing is an essential tool to uninterrupted, adequate and timely supply of agricultural products, inputs and services to target groups, including producers, consumers and intermediaries and agricultural marketing is not just a means of distributing agricultural product but also a way of stimulating new forms of production (Mahmud *et al*., 2000).

There are a number of factors that obstruct the farmers from getting fair price for their products. Farmers are compelled to sell their products at the harvest time when the prices are minimal resulting in a very low return for their produced products. Ultimately, the farmers who produce and bear the risks associated with the crop production are deprived of the major benefits of their products (Faruqee, 2005). Therefore, identifying the constraints on the expansion of vegetables production and marketing are important, since the supply of vegetables is quite irregular in most Asian countries, including Bangladesh (Ali, 2000). It is reported that due to various constraints farmers are not getting expected benefit from their investment. Moreover, constraints vary from one farmer to another due to influence of various factors (Rahman *et al*., 2008-10).

It implies increased market transactions since farmers participate in the process to capture gains from specialization (Von Braun, 1995). Similarly, increasing capital intensity in production and processing leads to growth in the agribusiness sector. As a

result, the number of agro processing, distribution and farm-input provision companies increases (Reardon and Barrett, 2000). In most cases, solutions to existing constraints in the vegetable marketing requires use of available information and application of available efforts at the appropriate scale and also trying as much as possible to increase the efforts to be more effective. Also, overcoming the socio economic constraints is essential to achieving the goal of reducing marketing constraints. Conclusively, reductions of marketing constraints to the barest minimum continue to be of utmost importance to the country's aspiration for the attainment and sustenance of national food security.

The researcher intended to take an attempt to understand how the vegetable growers are being encountered by marketing constraints. Viewing and analyzing the aforesaid conditions the researcher has become interested to undertake a research entitled "farmers' constraints for vegetable marketing in Bangladesh".

Source: Daily Star, 2018

Fig. 1.1 A frustrated farmer due to the underrated price of produce

Source: Ali *et al.*, 2013

Fig. 1.2 Cabbage transport without packaging

Source: Ali *et al.*, 2013

Fig. 1.3 Overloaded mixed transport of cucumber

Fig. 1.4 Damaged vegetables after traditional practices

1.2 Statement of the Problem

The purpose of the study had an understanding of the marketing constraints of the vegetable growers. Moreover, since various characteristics of an individual are likely to have an influence on the marketing constraints, it would be necessary to ascertain the associations and contributions of such factors with respect to the constraints. Therefore, examining the associations and contributions of a set of personal, socioeconomic and socio-psychological characteristics of the vegetable growers with their marketing problems would be considered pertinent to the study. In the light of the above discussion and the background information, the present study has been undertaken with the following research questions:

- What are the constraints being faced by vegetable grower in vegetables marketing?
- What are the growers' characteristics (personal, social, economic and psychological) that are directly related to their constraints faced in vegetable marketing?
- What relationships exist between selected characteristics of the vegetable growers and their marketing constraints?

An understanding to these queries is likely to be helpful for the extension organizations to take strategies for market development of the vegetable growers through designing marketing system.

1.3 Specific Objectives of the Study

The focal point of the research work was to indexing marketing constraints of vegetable growers in the locale. This is why the following objectives were framed out in order to provide an appropriate track to the research work:

1. To determine and describe the following selected characteristics of vegetable growers;
    a. Age
    b. Level of education
    c. Family size
    d. Farm size under vegetable cultivation
    e. Vegetable cultivation experience
    f. Annual family income
    g. Credit availability
    h. Training received
    i. Extension contact
    j. knowledge on vegetable marketing
    k. Availability of marketing information
2. To determine the constraints faced by the farmers in vegetable marketing;
3. To explore relationship between each of the selected characteristics of the growers and their extent of vegetable marketing constraints;
4. To index the constraints faced by the growers in vegetable marketing;

1.4 Scope or rationale of the Study

i. The present study was designed to have an understanding of marketing constraints of vegetable growers and to explore its relationship with their selected characteristics.

ii. The findings of the study will, in particular, be applicable to the study area at Raynagar union under Shibganj upazila of Bogura District. The findings may also be applicable to other areas of Bangladesh where socio-cultural, psychological, and economic situation do not differ much than those of the study area.

iii. The findings of the study may also be helpful to the field works of agricultural marketing service providers to improve strategies of action for adopting vegetable marketing.

iv. The findings of the study will be helpful to accelerate the development in agriculture, farmers' logistic supports, information needs and the way of dissemination especially turned to key role players in the society as well as reducing the marketing constraints of the vegetable growers. The findings might also be helpful to the planners and policy makers and extension workers.

v. To the academicians, it may help in the further conceptualization of the systems model for analyzing the constraints of vegetable growers. In addition, the findings of this study may have other empirical evidence to all aspects of marketing constraints faced by vegetable growers which may be used to build an adequate theory of marketing activities.

1.5 Justification of the Study

Vegetable production in Bogura district is mainly with irrigation, ponds, shallow wall and sometimes flood diversion especially to vegetables where oversupply of harvested products is the main characteristics. The nature of the product on the one hand and the lack of organized market system on the other have resulted in low producers' price. There are production and marketing problems challenging fruit and vegetable development in the District. These are input supply, pest and disease, low productivity, production seasonality from the production side and lack of transport, storage, post handling facilities, organized market system from the marketing side (DAE, 2011). This therefore demands a holistic study of the system in the form of market chain analysis.

A number of factors related to technological, institutional, organizational and political situations influence competitiveness of market chain. So information on factors that affect competitiveness of fruit and vegetable market is essential for the design of any strategy or policy that has an objective of intervention. Identification, characterization and evaluation of market chain help's to remove barriers affecting performance and to strengthen strong sides.

Although vegetables are economically important commodities there was very few studies conducted on vegetables marketing to identify the key constraints and potentials

on the system in the district. There was no adequate information on the supply of vegetables as well. It is essential that the marketing system of a commodity like vegetables operates efficiently.

Market chain analysis is believed in studies of production and marketing problems. Investigation of the system in terms of vegetable market structure, conduct and performance and institutional support services taking in to consideration the product and location specificity will, therefore, be used to identify the restricting factors and come up with specific possible solutions of the district. It is for these specific reasons that the study was designed to be under taken in that locale.

1.6 Assumptions of the Study

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence (Goode and Hatt, 1952).

The researcher had considered the following assumption while undertaking the study:

1. The respondents included in the sample were capable of furnishing proper responses to the questions included in the interview schedule.
2. The responses furnished by the respondents were reliable. They express the truth while passing their opinions and providing information.
3. The views and opinions furnished by the vegetable growers included in the sample were the representative views and opinions of all the vegetable growers of the study.
4. The researcher who acted as interviewer was well adjusted to the social and cultural environment of the study area. Hence, the respondents furnished their correct opinions without hesitation.
5. Data were normally and independently distributed with their means and standard deviation.
6. The findings of the study will have general applications to other parts of the country with similar personal, socio-economic and cultural conditions.

1.7 Limitations of the Study

Considering the time, respondents, communication facilities and other necessary resources and to make the study manageable and meaningful, it became necessary to impose certain limitations bellow-

- The study was confined to Shibganj upazilla in Bogura district.
- Population for the present study was kept confined within the heads of farm families in the study area.
- There were many characteristics of the farmers in the study area but only 12 of them were selected for investigation.
- For information about the study, the researcher depended on the data furnished by the selected respondents during their interview with him.
- Facts and figures collected by the researcher applied to the situation prevailing during the year 2018.
- Reluctance of the farmers to provide information was overcome by establishing rapport.

1.8 Definition of Terms

Respondents: Randomly selected people considered to be representable of the population are known as respondents. They are the people from whom a social research worker usually gets most data required for his research. In this study the respondents were the village level vegetable farmers.

Age: Age of a respondent was defined as the span of life and was operationally measured by the number of years from his/her birth to the time of interviewing.

Level of education: Empirically it was defined to the development of desirable changes in knowledge, skill and attitudes in an individual through reading, writing, walking, observation and other selected activities. It was measured on the basis of classes a farmer has passed from a formal educational institution.

Family size: Family size referred to the number including the respondent himself, his wife, children and other permanent dependents, which lived and lived together in a family unit.

Farm size: Farm size meant the total area of land on which a farmer's family carried on farming operations in terms of full benefit to the family.

Vegetable cultivation area: Vegetable cultivation area referred to the area of land under his/her management only for vegetable cultivation. The area was estimated in terms of full benefit to farmers or his/her family.

Experience in vegetable cultivation: Experience as a general concept comprises knowledge or skill of something or some event gained through involvement in or exposure to that thing or event. Experience refers to the nature of the events someone or something has undergone. Experience is what is happening to us all the time - as long we exist. However, in this study, it was considered as the year of starting from first vegetables cultivation till the year of data collection.

Annual family income: Annual family income referred to the total earnings of a respondent and the members of his family from agricultural and non-agricultural sources (business, services, daily labor etc.) during the previous year.

Training received: Training experience of a farmer was defined as the number of days s/he had so far received training. It was used to refer to the completion of an activity by the farmer which was offered by the government, semi-govt. or non-government organizations to improve the knowledge & skills of farmers and changing attitude of a farmer for doing a specific job properly.

Extension media contact: It refers to the extent of contact with various communication media by the farmers in receiving agricultural information.

Vegetable marketing knowledge: Knowledge on vegetable marketing is the extent of basic understanding of the vegetable growers related to production, management, marketing, processing, grading and processing, quality controlling of vegetables.

Marketing information: Marketing information means the different information like as demand, supply and marketing price of specific products.

Marketing: Marketing is the process of handover goods or products from growers to consumers either directly or through some channel.

Vegetable: The term vegetable, in this study, referred to the edible parts of plants (root, stem, leaf, fruit etc.) which are eaten as cooked food or green salad.

Vegetable cultivation: Vegetable cultivation includes the different steps of vegetable production, harvesting, processing, conservation and marketing of vegetables.

Vegetable Growers: Vegetable growers are those who cultivate vegetable commercially.

Constraints: Constraints are the elements which hinder/resist/oppose in doing some activities or operations in a certain field. The constraints in technology transfer are those, which act as the barriers to the adoption of technologies by the potential users (Kabir *et al*., 2013).

CHAPTER II

REVIEW OF LITERATURE

This chapter deals with a brief review of previous research studies relating to the problem related to marketing. The relevant information regarding this problem is limited in number. However, the researcher has tried her best to collect needful information through searching relevant studies. Unfortunately, few research works were found directly related to the problem faced in vegetable marketing. However, research works related to problem faced by the farmers in different aspects of marketing of some important crops are presented below.

2.1 Overview on Vegetables and Growing Patterns

More than 60 types of vegetables of indigenous and exotic origin are grown in Bangladesh. Based on the growing season, vegetables are categorized as summer/rainy season vegetables, winter season vegetables, and all-season vegetables. Of the summer vegetables, various cucurbits, vegetable cowpea, hyacinth bean, stem amaranth, several aroids and Indian spinach are predominant as summer vegetables. Winter vegetables include tomato, cabbage, chinese cabbage, cauliflower, eggplant, carrot, spinach, bottle gourd, bush bean and radish. Crops like okra, heat-tolerant tomato, eggplant, carrot, spinach, many leafy vegetables and small onion are grown all year round. Summer vegetables are cultivated during the monsoon season from May to October. On the other hand, winter vegetables are grown from November to April. The production of vegetables is higher during winter (60 to 70%) and most districts produce marketable surplus during that season.

Vegetables are cultivated in only 1.8 per cent of the total cultivatable land (BBS, 2017). Besides this, the premises of houses, tin sheds and roof tops are used for vegetable cultivation. In some areas vegetables are also cultivated on floating systems. Almost 20-25 varieties of vegetables, including tomato, bottle gourd and cauliflower, are produced year-round. By using improved varieties and modern technologies 30 per cent more vegetables can be produced in the country, according to scientists. The land under vegetable cultivation in the country has increased at the rate of 5.0 per cent in the last decade (BBS, 2017). The rate of increase of vegetable production was 6.0 per cent in the last three years (BBS, 2017). Land under vegetable cultivation during the current

Rabi season has been set at 528 thousand hectares. Every year 10 million MT of potato is produced of which 100 thousand MT are exported abroad (BBS, 2017).

According to FAO, vegetable production has increased five times in the past 40 years. Bangladesh has scored 3rd in global vegetable production, next to China and India. The farmers are getting a huge profit from vegetable production which is changing their life. Literate youths are joining the industry and are achieving targets with the use of improved technology and their talents. According to the Ministry of Agriculture and Department of Agricultural Extension, some 142 types of home-grown and exotic vegetables were grown in Bangladesh with the output hitting 14.34 million tons from 0.8 million hectares of land in the last fiscal year. Of the 14.34 million tons, some 10 million tons is just potatoes (BBS, 2017). Though classified as vegetable, potato is seen as starchy food like rice and wheat.

The annual demand for vegetables in the country is 13.25 million metric tons, whereas the annual production is only 3.73 million metric tons (BBS, 2017). An adult in the country on an average consumes only 60 to 70 grams of vegetables (except potato) each day, which about one third of the amount (220 gram) is recommended by the United Nations Food and Agricultural Organization (FAO, 2017), they said. Quality seeds are necessary for ensuring production of quality vegetables and vegetable varieties capable of tolerating climate change and salinity should be invented for higher yields.

Although vegetable production has increased over the years, its contribution to export earnings in Bangladesh continues to be marginal. Main crops exported are yard long bean, taro, and several gourds (teasle gourd, bitter gourd, bottle gourd, ridged gourd, and white gourd). Most exports are destined to the United Kingdom and the Middle East (United Arab Emirates, Saudi Arabia, Qatar, Kuwait and Oman), all countries with a large population of Bangladeshi migrant workers (Quasem, 2003).

2.1.1 Market and Growth

Markets may provide the incentives to profit maximizing participants to develop new technologies, products, resources of supply, new markets and methods of exploiting them. The role of marketing in development process could be summarized as follows: the marketing system channels the net capital surplus out of agricultural sector which could be used to accentuate the development of industry, infrastructure and social

service; it integrates the farming community in to the market economy through communication and exchange; the provision of secured market outlets which encourage producers to increase marketable surplus and diversify production; and marketing becomes and remains as one of the most important economic sub-sector during the whole process of development. Markets also have an influence on income distribution, food security, and other important development objectives. Despite its importance, as indicated above, marketing is given little attention or credence in the developing countries.

CIAT (2004) states that the traditional form of agriculture started to change as communities and nations started to be modernized. Urbanization was fostered by industrialization and this led to increased demand for food for urban dwellers. More sophisticated arrangement of actors' evolved with the arrangement of farm produce transport, storage, processing, retailing and wholesaling. As cities expand, food supply system developed in the increasingly longer market chains with clear division according to product type and market segmentation.

Markets aggregate demand and supply across actors at different spatial and temporal scales. Well-functioning markets ensure that macro and sectorial policies change the incentives and constraints faced by micro-level decision makers. Macro policy commonly becomes ineffective without market transmission of the signals sent by central governments. Similarly, well-functioning markets underpin important opportunities at the micro level for welfare improvements that aggregate into sustainable macro-level growth. For example, without good access to distant markets that can absorb excess local supply, the adoption of more productive agricultural technologies typically leads to a drop in farm-gate product prices, erasing all or many of the gains to producers from technological change and thereby dampening incentives for farmers to adopt new technologies that can stimulate economic growth.

Markets also play a fundamental role in managing risk associated with demand and supply shocks by facilitating adjustment in net export flows across space and in storage over time, thereby reducing the price variability faced by consumers and producers. Markets thus perform multiple valuable functions: distribution of inputs (such as fertilizer, seed) and outputs (such as crops, animal products) across space and time,

transformation of raw commodities into value-added products, and transmission of information and risk.

Characteristics of Vegetables Marketing

Being produced both by commercial and smallholder farmers vegetable marketing is influenced by a number of factors that can be attributed to production, product, and market characteristics. Kohl and Uhl (1985) identified these attributes as-

Perishability: As vegetables are highly perishable, they start to lose their quality right after harvest and continued throughout the process until it is consumed. For this purpose elaborated and extensive marketing channels, facilities and equipment's are vital.

This behavior of vegetables exposed the commodity not to be held for long periods and fresh produce from one area is often sent to distant markets without a firm buyer or price. Prices may be negotiated while the commodities are en route, and they are frequently diverted from their original destination of a better price can be found. Sellers might have little market power in determining a price. As a result, a great deal of trust and informal agreements are involved in marketing fresh vegetables. There could not always be time to write everything down and negotiate the fine details of a trade. The urgent, informal marketing processes often leads to disputes between buyers and sellers of fresh fruits and vegetables. Producers are normally price takers and are frequently exposed for cheating by any intermediary.

Price /Quantity Risks: Due to perishable nature and biological nature of production process there is a difficulty of scheduling the supply of vegetables to market demand. The crops are subjected to high price and quantity risks with changing consumer demands and production conditions. Unusual production or harvesting weather or a major crop disease can influence badly the marketing system. While food-marketing system demands stable price and supply, a number of marketing arrangements like contract farming provide stability.

Seasonality: Vegetables have seasonal production directly influencing their marketing. Normally they have limited period of harvest and more or less a year round demand. In fact, in some cases the cultural and religious set up of the society also renders demand to be seasonal. This seasonality also worsened by lack of facilities to store.

Product bulkiness: Since water is the major components of the product, it makes them bulky and low value per unit that is expensive to transport in fresh form every time. This, therefore, exposed farmers to loose large amount of product in the farm unsold.

These listed characteristics of the product require a special complex system of supportive inputs. It demands a regular marketing preparation process like washing, cooling, proper management from the time of harvest until the produce is put on display. It is frequently believed a vegetable not only remain attractive to the consumer it must also have a shelf life of few days after having purchased by the consumer (Nonnecke, 1989).

Improving vegetables marketing in developing countries is vital for a number of reasons: rapid increase in demand from growing domestic urban populations, opportunities to earn foreign exchange by exporting high value-off-season produce; the income raising opportunities it offer to small farmers and the contribution to employment made by its labor intensive production, handling and sales requirement are some to mention (Abay, 2007).

Horticulture production is profitable. Farmers involved in horticulture production usually earn much higher farm income as compared to cereal producers. Cultivation of fruits and vegetables allows for productive employment where the labor/land ratio is high, since horticultural production is usually labor intensive. Increasing horticulture production contributes commercialization of the rural economy and creates many off-farm jobs. However, expanding the scale of horticulture production is often hindered by lack of market access, market information, and many biological factors (Weinberger and Lumpkin, 2005).

Ideally, measures commonly recommended for the improvement of vegetables marketing are better packaging, handling, and transport; sorting by quality; extending the market season and leveling out gluts and shortages by market delivery planning and storage; developing new markets; installation of refrigerated transport and processing equipment: and establishing marketing enterprises .

Bezabih and Hadera (2007) stated that production is seasonal and price is inversely related to supply. During the peak supply period, the prices decline. The situation is worsened by the perishability of the products and poor storage facilities. Along the market channel, 25 percent of the product is spoiled. From these reviewed literatures

severe production seasonality, seasonal price fluctuations, poor pre-and post-harvest handling, prevalence of pest and diseases, lack of storage are some of the critical problems encountered vegetable production in Ethiopia.

2.2 Constraints faced by the vegetable growers in different aspects of marketing

Rahman (1995) in his study identified that farmer faced severed problems in cotton cultivation. Non-availability of quality seed in time, unfavorable and high cost of fertilizer and insecticides, lack of operating capital, not getting fair weight and reasonable price according to grade, effects of cattle in cotton field, lack of technical knowledge, lack of storage facility, stealing from field at maturity stage, and late buying of raw cotton by Cotton Development Board were identified as major problems of cotton farmers in Mymensingh district.

According to Ortmann and King (2006), South African smallholder farmers have limited access to factors of production, credit and information, and markets are often constrained by inadequate property rights and high transaction costs.

Lumpkin *et al.,* (2005) generally, smallholders have inadequate capital resources, including physical and financial resources, and also intellectual capital resources such as experience, education and extension that limit their ability to diversify farm activities.

Yadev *et al.,* (2000) conducted a survey during 1996-97 in the Basti district of Uttar Pradesh, India, among farmers of 6 selected villages who were classified based on the size of their farmland: below 1 ha (38 farmers), 1-2 ha (33) and 2 ha and above (19). Three potato disposal channels (I: producer-consumer, II: producer-retailer-consumer and III: producer-wholesaler-retailer-consumer) were used. Under channel III, 3 storage systems were used: without storage, storage by producer and storage by wholesaler. Tabulated data were presented on (1) the pattern of potato disposal by size of farmland, (2) potato price spread in Basti vegetable markets for the 3 channels and (3) inter-channel comparisons as a whole. Potato marketing problems can be overcome by cooperative marketing.

Ismail (2001) conducted a study on farm youth of haor area of Mohangonj upazila. Study revealed that there were six top problems in rank order such as (i) no arrangement of loan for the farm youth for fishery cultivation, (ii) lack of government

programs in agriculture for the farm youth and (iii) absence of loan giving agencies for establishing farm.

Pramanik (2001) made an extensive study on the twenty-four problems of farm youth in Mymensingh villages relating to different problems in crop cultivation and marketing. Out of twenty-four problems top five problems in rank order were; i) local NGO take high rate of interest against a loan, ii) lack of agricultural machinery and tools, iii) lack of cash iv) financial inability to procure improved seeds, fertilizers and irrigation v) marketing facilities.

Erbe and Neubauer (2002) reported that potato production area in Germany increased by 2.1% to 288000 ha in 2002 compared to production area in 2001. The area reduced in 2001 because of marketing problems. The greatest reduction (14%) was in Sachsen-Anhalt. The main varieties are Agria (7.3% of total area), Kuras (5.4%), Cilena (4.1%), Marabel (3.9%) and 20 other varieties. Seventeen new varieties were approved for 2002, including 1 very early, 3 early, 10 semi-early (5 for consumption and 5 for processing), and 3 semi-late and late ripening, while 5 varieties were removed from the German national list.

Salam (2003) in his study identified constraints in adopting environmentally friendly farming practices. Top six identified constraints according to their rank order were :(i) low production due to limited use of fertilizer (ii) lack of organic matter in soil (iii) lack of Government support for environmentally friendly farming practices (iv) lack of capital and natural resources for integrated farming practices (v) lack of knowledge on integrated farm management and (vi) marketing facilities.

Uddin (2004) in his study identified five aspects of constraints in commercial cultivation of vegetables viz. seed constraints, disease and insect infestation constraints, field management constraints, marketing of vegetable constraints and extension work constraints. Among these aspects of constraints they revealed marketing problem severely faced by the farmers.

Yulafc and Cinemre (2007) conducted a study to explore marketing structures of fresh fruits and vegetables, which are produced in Carsamba plain (Turkey), to determine marketing problems and to put forward solution suggestions. According to brokers, the most important problem of fresh vegetable and fruit marketing was not being able to find quality crops. Producers had only limited power in setting the prices of vegetables

and fruits which in the market was estimated around 6-7 percent. The most important problem in the market was said to be not having enough standard size. In addition to this, there were some deficiencies related with infrastructure of the market area.

Pramanik (2001) made an extensive study on twenty-four constraints of farm youth in Mymensingh villages relating to different constraints in crop cultivation. Major four constraints were: (a) local NGO take high rate of interest against a loan (b) Lack of agricultural machinery and tools (c) lack of cash and (d) financial inability to arrange improved seeds, fertilizers and irrigation.

Ali (2000) conducted a survey on jute crops in seven districts of Bangladesh to find out the state of art in jute cultivation and found that scarcity of quality seeds, high labor wage and low market price of fiber were the major constraints of jute production.

Sandip *et al.,* (2013) found that large middleman margins that restrict prices received prices received by poor farmers in last developed countries (LDCs) are often believed to constrain growth and poverty reduction.

Gumataw *et al.,* (2016) stated that middlemen play an important role by linking farmers to traders and final markets. This is particularly the case in developing countries, where market failure is ubiquitous and food chains still consist of many stages.

Makhura and Mokoena (2003) identified that improved market access for emerging farmers in South Africa is hampered by poor road conditions, high transport costs and distant markets.

Jacobs (2008) found that farmers attributed their marketing challenges to lack of resources, lack of relevant marketing skills, and failure to meet market standards such as quality and quantity.

2.3 Relationship between Selected Characteristics of the Vegetable Growers and Their Constraint Faced of Marketing

There were no literature found directly on Relationship between Selected Characteristics of the Vegetable Growers and Their Constraint Faced of Marketing. However some literature were found on farmer's characteristics and constraints on various croup cultivation / production. Some of those are mention below:

2.3.1 Age and marketing constraint

Bhuiyan (2002) in his study found a positive and significant relationship between age of the farmers and their constraints in banana cultivation. A similar finding was obtained by Rahman (1996) in his respective study.

Rashid (2003) found that age of the rural youth had significant negative relationship with problem faced in selected agricultural production activities and marketing.

Pandict *et al.* (2013) conducted a study to identify the relationship between the personal characteristics and constraints facing in vegetable marketing of Trishal Upazila under Mymensingh district found that there was no significant relationship between the age of the farmers and their faced constraints in vegetable cultivation and marketing.

Azad *et al.* (2014) also found that age of the vegetable growers has no significant relationship with problem faced in vegetable cultivation.

Rahman (1995) conducted a study to identify the relationship between the personal characteristics and constraints facing in cotton marketing of Muktagacha Thana under Mymensingh district. He found that there was no significant relationship between the age of the farmers and their faced constraints in cotton cultivation and marketing. Similar findings were obtained by Rashid (1999), Pramanik (2001), Ahmed (2002), Hossain (2002) and Salam (2003) in their respective studies.

2.3.2 Education and marketing constraint

According to Gasperini and Atchoarena (2005), education is a fundamental human right and essential for reducing poverty and improving the living conditions for rural people. They further indicates that from a perspective of agricultural improvements, basic education improves farmer productivity and business management.

Azad *et al*. (2014) also found that education of the vegetable growers has no relationship with problem faced in vegetable cultivation.

Pandit *et al.* (2013) found a significant negative relationship between education and problem faced of the vegetable growers in vegetable cultivation.

Hoque (2001) found a significant negative relationship between education and problem faced of the FFS farmers in product marketing.

Rahman (1995) in his study on constraints faced by the farmers in cotton cultivation at Muktagacha thana under Mymensingh district observed had significant negative relationship between the education of the farmers and their faced constraints in cotton cultivation. The findings indicated that the higher the education of the farmers, the lower was their faced constraint in cotton cultivation.

Islmail (2001) found in his study that there was no significant relationship between education and problem confrontation for farm youth. Similar relationships were obtained by Raha (1989) and Halim (2003) in their respective studies. Thus it could be concluded that an overwhelming majority of the researchers found a negative relationship between these two variables.

2.3.3 Family size and marketing constraint

Pandit *et al*. (2013) found a significant negative relationship between family size and problem faced of the vegetable growers in vegetable cultivation and marketing.

Rahman (2004) found in his study that family size of the farmers had no significant relationship with their knowledge on boro rice cultivation and marketing practices.

Hossain (2003) found that family size of the farmers was not significantly related to farmers' knowledge on modern Boro rice cultivation and marketing practices.

2.3.4 Farm size under vegetable cultivation and marketing constraint

Lionberger (2009) after reviewing the situational factors from the related literature in the field of adoption of new ideas and practices concluded that size of farm was nearly always positively related to the adoption of new farm practices.

Pandit *et al.* (2013) found a significant negative relationship between farm size and problem faced of the vegetable growers in vegetable cultivation.

Hossain (1996) in a study on landless labourers in Bhabakhali union of Mymensingh district found a significant relationship between borga farm size of the landless labourers and their problem confrontation.

Mansur (1999) in his study on the feeds and feeding constraints confrontation found a significant negative relationship between the farm size of the farmers and feeds and feeding constraints confrontation.

Azad *et al.* (2014) also found that farm size of the vegetable growers has significant negative relationship with problem faced in vegetable cultivation.

2.3.5 Vegetable cultivation experience and marketing constraint

Pandit *et al.* (2013) found a significant negative relationship between farm size and problem faced of the vegetable growers in vegetable cultivation and marketing.

Azad *et al.* (2014) also found that vegetable cultivation experience of the vegetable growers has no significant relationship with problem faced in vegetable cultivation.

The study by Pote (2008) found that farming experience was very important in market access because farmers adapt to information regarding markets. Therefore, the number of years of farming experience was expected to positively influence the marketing decision of farmers.

Islam (2008) found that vegetable cultivation experience had a negative and substantial significant relationship with knowledge on vegetables production by woman members in homestead area under world vision project.

2.3.6 Annual income and marketing constraint

Hossain (1989) in his study on landless labourers in Bhabakhali union of Mymensingh district found a significant positive relationship between annual family income of the landless laborers and their problem confrontation

Pandit *et al.* (2013) found a significant negative relationship between the family income and problem faced of the vegetable growers in vegetable cultivation and marketing.

Azad *et al.* (2014) also found that annual income of the vegetable growers has significant negative relationship with problem faced in vegetable cultivation.

Mansur (1998) in his study on the feeds and feeding constraints confrontation found a significant relationship between the annual family income of the farmers and feeds and feeding constraints confrontation, but showed a negative trend.

Rahman (1995) in his study found that a significant negative and substantially relationship between the annual family income of the farmers and their faced constraints in cotton cultivation.

2.3.7 Credit availability and marketing constraint

Hossain (1989) in his study found a significant positive relationship between income and constraints faced by the landless laborers.

Ahmed (1993) in his survey explored different constraints faced by the farmers in cotton cultivation. His major findings were: high cost of fertilizers, lack of capital and loan facility, shortage of sufficient land for cotton cultivation, inadequate availability of inputs in time, irrigation water, lack of technical knowledge, lower price and lack of storage facility.

According to Machethe (2004), one of the key elements in raising agricultural productivity is improving access to credit. Small scale farmers often fail to secure loans due to the issue of loan collateral, which is important to qualify for bank loans. In rural areas ownership of the land belongs to the traditional authority and the farmer is just given the right to use the land. Therefore, small scale farmers do not own assets such as land which can serve as collateral.

According to Clover and Darroch (2005), the lack of investment, or start-up capital, and difficulty in accessing investment capital has been identified by Small-Micro-Medium Enterprises (SMME) owners in South Africa as a major constraint to their business' survival and growth. The production and marketing of agricultural produce is therefore affected by both technical and institutional constraints.

2.3.8 Training received and marketing constraint

Van der Walt (2005) as cited by Ortmann and King (2007) indicated that poor management, lack of training, conflict among members (due mainly to poor service delivery), and lack of funds were important contributory factors to the smallholder cooperative failures in Limpopo province.

Hossain (2001) found that the length of the training of the respondents had positive relationship with their knowledge of crop cultivation and marketing.

Azad *et al.* (2014) also found that training exposure of the vegetable growers has no relationship with problem faced in vegetable cultivation.

2.3.9 Extension contact and marketing constraint

Pandit *et al.* (2013) found a significant negative relationship between the extension media contact and problem faced of the vegetable growers in vegetable cultivation and marketing.

Ali (1978), Saha (1983), Sarker (1983) and Mansur (1989) found in their studies that organizational participation of the farmers had a significant negative relationship with the agricultural constraints faced. On the other hand Islam (1987) and Raha (1989) found no significant relationship with their agricultural constraints faced.

Rahman (1995) found in his study that there was no relationship between the organizational participation of the farmers and their faced constraints in cotton cultivation.

Rashid (1999) in his study revealed that the organizational participation of the rural youth had no relationship with their willingness for undertaking selected agricultural entrepreneurships in their self-employment and their problem perceived for undertaking selected agricultural entrepreneurships in their self-employment. Similar finding was obtained by Hossain (1989) in his respective study. Similar findings were obtained by Rahman (1996), Faroque (1997), Pramanik (2001), Hossain (2002), Bhuiyan (2002) Ahmed (2002) and Salam (2003) in their respective studies.

2.3.10 Knowledge on marketing and marketing constraint

Pandit *et al*. (2013) found a significant negative relationship between the knowledge on marketing and problem faced of the vegetable growers in vegetable cultivation and marketing.

Mansur (1989) in his study on the feeds and feeding constraints confrontation found a significant negative relationship between the technological knowledge in feeds and feeding cattle of the farmers and feeds and feeding constraints confrontation. Similar findings were obtained by Rahman (1996), Pramanik (2001), Hoque (2001), Ahmed (2002), Hossain (2002) and Bhuyan (2002) in their respective studies. Raha (1989) in his study found that knowledge in modem boro paddy of the farmers had no significant relationship with their irrigation constraints confrontation. Rashid (1999), Ismail (2001), Salam (2003)found similar findings in their respective studies.

Rahman (1995) in his study on constraints faced by the farmers in cotton cultivation at Muktagacha thana under Mymensingh district observed had a significant negative relationship between the technological knowledge in cotton cultivation of the farmers and their faced constraints in cotton cultivation.

2.3.11 Availability of marketing information and marketing constraint

Mkhabela (2005) in his study found that business opportunities perceived by agribusiness entrepreneurs depend on the availability of information, the entrepreneur's perception of his or her management skills, and other factors .Exposure to market information is of vital importance to farmers as it can assist them in making sound marketing decisions.

Shepherd (1997) distinguishes between market information and marketing information. They indicate that market information basically consists of data on prices and (sometimes) quantities. Marketing information is a much wider concept, which is likely to include details on potential market channels, payment requirements, packaging, quality and a whole host of information required by a producer to make a successful sale.

Ministry for Agriculture and Land Affairs, (1998) found that when marketing a produce, acquiring information on product prices, price trends and market segments is one of the crucial objectives of any farmer.

According to Ruijis (2002), cited by Jari (2009), information on consumer preferences, quantity demanded, prices, produce quality, market requirements and opportunities is necessary. Access to such market information puts a farmer in a better position to make informed decisions.

Mabuza *et al.* (2013) found in his study that farmers are able to make timely and better informed production and marketing decisions if they have full and easy access to reliable and up-todate market information.

Omiti *et al.* (2007) found in his study that the lack of access to information puts smallholder farmers at a marketing disadvantage in that they may not know what commodities to produce, the relative quantities to produce, and the most economical way to produce them with the resources available. In remote rural areas, the lack of reliable information is a major constraint.

Food and Agriculture Organization (2013) said that information must be received on time for it to be effective. In developing countries, however, such information is not always obtainable and may not always be reliable, so there is increased risk of poor market performance and failures.

Jacobs (2008) found in his study that access to information among smallholders vegetable farmer is generally poor and is compounded by the lack of reliable and efficient means of disseminating information.

A study conducted by Panday (1995) examined the onion and garlic export problems and prospects. Following a description of onion and garlic production in India, a review of the problems and opportunities facing the export sector was presented, trends in exportation of the two products were described and the principal export markets were identified. The constraints to increasing exports included the differing quality requirements of world market, storage and packaging, inadequate market information, poor transport infrastructure and pricing structure strategies to overcome these problems were discussed.

2.3.12 Constraints faced by the vegetable grower in different aspects

2.3.12.1 Transport facility and marketing constraint

According to Mabuza *et al.* (2013), the inclusion of transport-related variables in their study was meant to account for the opportunity cost of producers' time spent in organizing transport to convey their produce to distant markets. Producers who supplied the retail market had an opportunity cost of time spent in organizing transport and time spent during transportation. As a result, this study also regards transportation as a transaction cost component.

According to Chonhenchob *et al.* (2009), fresh produce (fruits and vegetables) is extremely sensitive to any physical changes during transportation and handling, which can cause various forms of bruises and cuts on the fresh fruit or vegetable which compromises its quality, aesthetic appeal and reduces its economic value to the farmer and retailer. Therefore, vehicles not suitable for transportation of fresh produce and poor road conditions can drastically reduce the quality of the produce being transported.

Bachmann and Earles, (2000) in transporting fresh produce, time is critically important because fresh produce can quickly get spoilt when in transit for a lengthy time

Therefore, fresh produce needs a special refrigerated vehicle and special care during transit.

According to Gustavsson *et al.* (2011), transporting goods to the market, transport is also used to transport inputs to the farm. If the public transport system is unreliable in the area, inputs may not be obtained on time. As a result, production is negatively affected and ultimately the marketing of the produce. Factors that determine access to input and output markets include distance to the markets, the state of the roads, the cost of transportation and the frequency of visits to these markets.

Chimuka *et al.* (2008), citing Makhura and Mokoena (2003), state that poor road conditions, high transport costs and distant markets have been identified as factors that hamper improved market access for emerging farmers in South Africa.

According to Clover and Darroch (2005), the lack of own transport markedly increases the transaction costs for farmers based in remote rural areas. Rural communities are spatially isolated in areas that typically have limited cash circulation. These rural areas are dominated by low-income earners forcing farmers to pursue larger and more developed markets, which are usually further away. Smallholders usually need to rely on public transport to bring their output to the market because transport contractors are reluctant to service smallholders due to the poor quality of feeder roads in rural villages (Jacobs, 2008). Although public transport may be available, it is not always adequate for transporting crops to markets.

2.3.12.2 Extent of use of quality control and marketing constraint

Rodriguez and Bermudez (1997) identify a major constraint facing farming and food production in the Boyaca region of Colombia is the small size of holdings. The region is characterized by small fields producing potatoes: the prevailing minifundio (small plots) have resulted in a low level of technical innovation. Boyaca has several regions well suited to potato growing. Central Boyaca represents a major demographic region where peasantry is dedicated to potato growing but where the average standard of living is low as a consequence of low production levels and marketing problems.

2.3.12.3 Distance of the market place and marketing constraint

Rahman (1993) conducted a study in Munshigonj and Narayangonj to investigate the comparative cost and return as well as loss arising from storing potato under traditional as well as in cold storage and marketing channel. A fact that emerged is gross return as

well as net return was higher under nearer distance to the long distance. Although total cost of storing potato in cold storage plants was higher than the traditional method, the former is more profitable than the other method.

Faroque (1997) found that female rural youth in Bhaluka (Mymensingh) lacked cash for buying seeds, seedling and fisheries and deprived of necessary knowledge in improved vegetable cultivation. He further added that the majority of female rural youth faced very high (54 percent) problems related to marketing due to distance.

2.3.12.4 Facilities of storage and marketing constraint

According to Bhopal (2004) storage is an important marketing function, which involves holding and preserving goods from the time they are produced until they are needed for consumption It ensures a continuous flow of goods in the market.

According to Randela (2003), harvest usually occurs at the same time for all farmers producing the same product leading to a glut of produce that cannot be consumed immediately.

According to Jari (2009), market infrastructure such as sheds and stalls in spot markets are crucial in maintaining freshness of agricultural produce.

According to Gustavsson *et al.* (2011), vegetables straight from the farm can be spoilt in hot climates due to lack of infrastructure for transportation, storage, cooling and markets.

According to Roper *et al.* (2006), for long term high quality storage, fresh produce needs to be maintained at proper temperatures.

Sabur and Molla (1993) conducted a study on constraints to production and marketing of spices in Bangladesh. The study revealed that the real prices of garlic, onion and turmeric increased significantly by 3.83 percent, 3.58 percent and 3.17 percent, respectively during the study period. They examined that the storage facilities for spices particularly cold storage were limited and the seasonal price variation largely dependent on the perishability of spices.

Alauddin (1979) and Ahmad (1980) in their separate studies on the preservation of potato opined that potato production is directly proportional to its preservation space.

Therefore, if the storage facilities are not increased the production of potato could not be increased considerably.

According to Bachmann and Earles (2000) farmers who can maintain the quality of the produce will be able to expand their marketing opportunities and will be better able to compete in the marketplace.

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

Huque (2003) conducted a study on potato marketing system in Bangladesh. He stated that cold storage performed significantly better. Farmer`s rustic storage method causes of storage losses for month during mid-August to mid-December. Another advantage of cold storage is that they may extend the time of farmer which cannot maintain in on farm storage. He described that farm storage for only one to four months and cold storage is the primary source of potato arriving in the market after that date.

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

2.4 Conceptual Framework of the Study

In scientific research, selection and measurement of variables constitute an important task. Constraints faced by the vegetable growers in marketing may be influenced and affected through interacting forces of many independent factors. It is not possible to deal with all the factors in a single study. Therefore, it was necessary to limit the factors, which included age, level of education, family size, farm size under vegetable cultivation, vegetable cultivation experience, annual family income, credit availability, training received, extension contact, knowledge on vegetable marketing and availability of marketing information. Thus, marketing constraints of vegetable growers were the main focus of the study and 11 selected characteristics of the

vegetable growers' were considered as those might have relationship with marketing constraints faced.

Considering the above-mentioned situation and discussion, a conceptual framework has been developed for this study, which is diagrammatically presented in the following Figure 2.

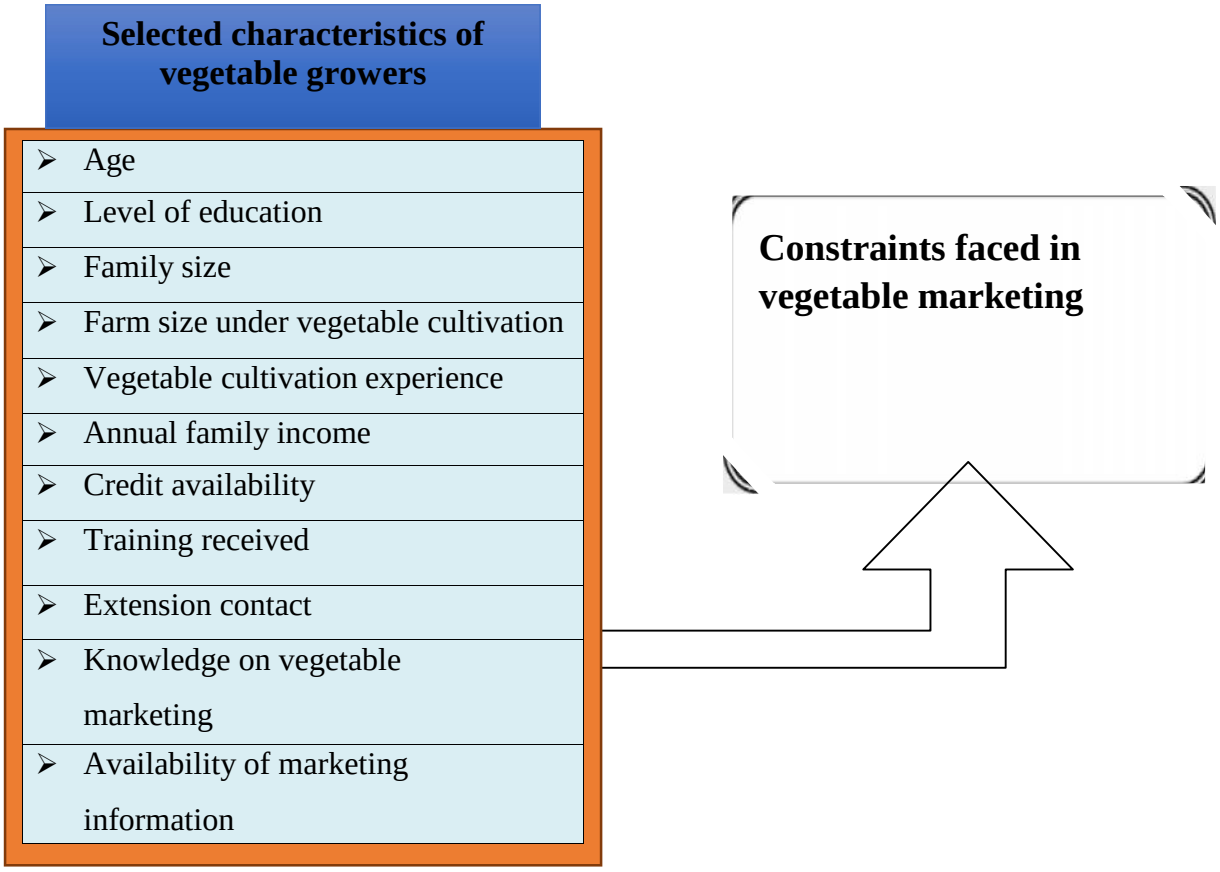

Figure 2.1 The Conceptual Framework of the Study

CHAPTER III

MATERIALS AND MEHODS

In conducting a research study, methodological issue is one of the prime considerations for yielding of valid and reliable findings. Appropriate methodology enables the researcher to collect valid and reliable information and to analyze the information properly in order to arrive at correct conclusions. However, the methods and operational procedures followed in conducting this study has been described in the subsequent sections of this chapter.

3.1 Locale of the Study

The study was conducted at Raynagar union of Shibganj upazila under Bogura district. Out of twelve unions, Raynagar union was purposively selected because of higher vegetables production. Thereafter, three villages namely, Pareaschili, Tepagari and Binnapara were selected randomly from 11 villages of this union. A map of Bogura district showing Shibganj upazila and a map of Shibganj upazila showing the study area have been shown in Fig 3.1 and 3.2, respectively.

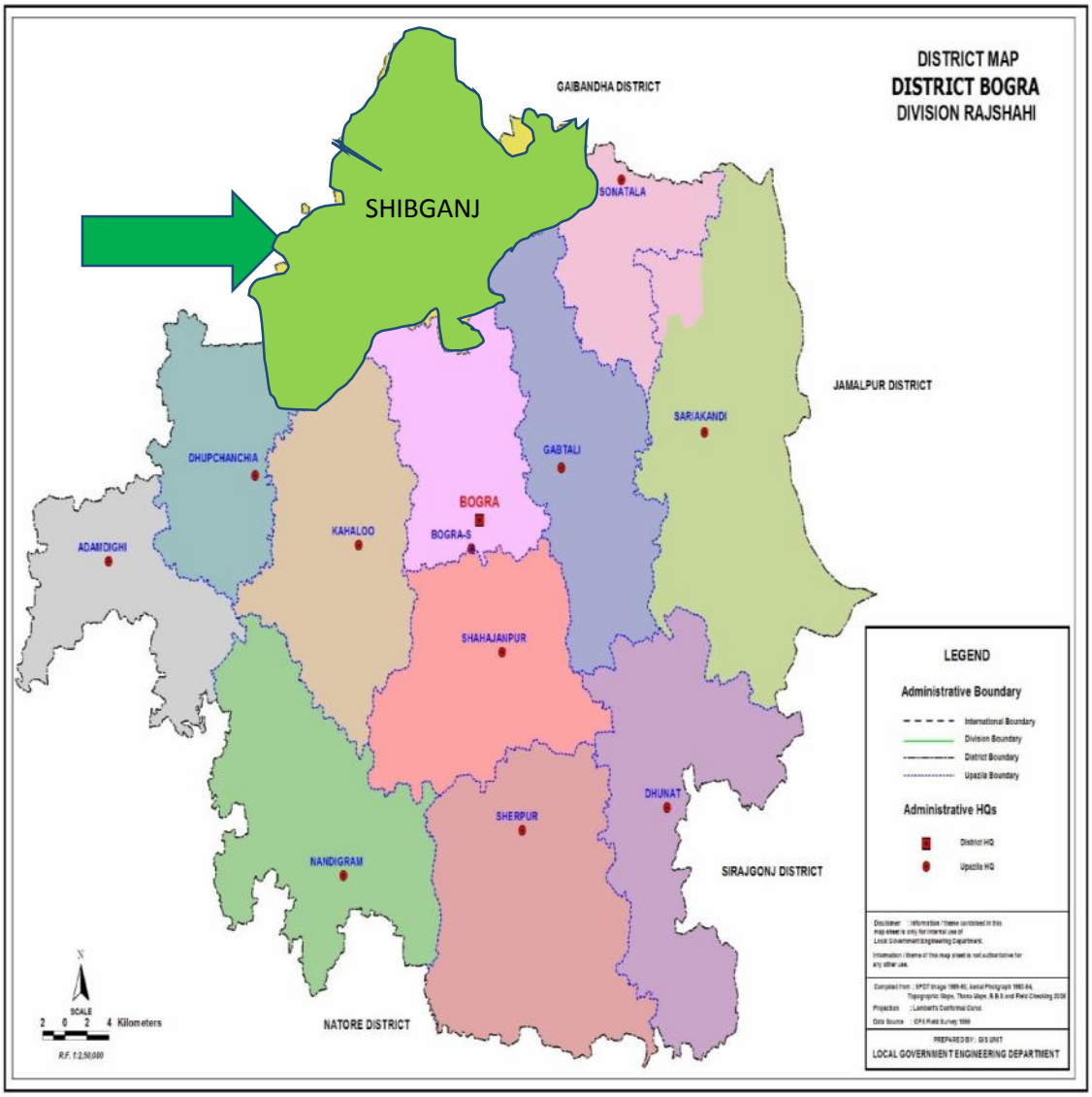

Figure 3.1 A Map of Bogura district showing Shibganj upazila

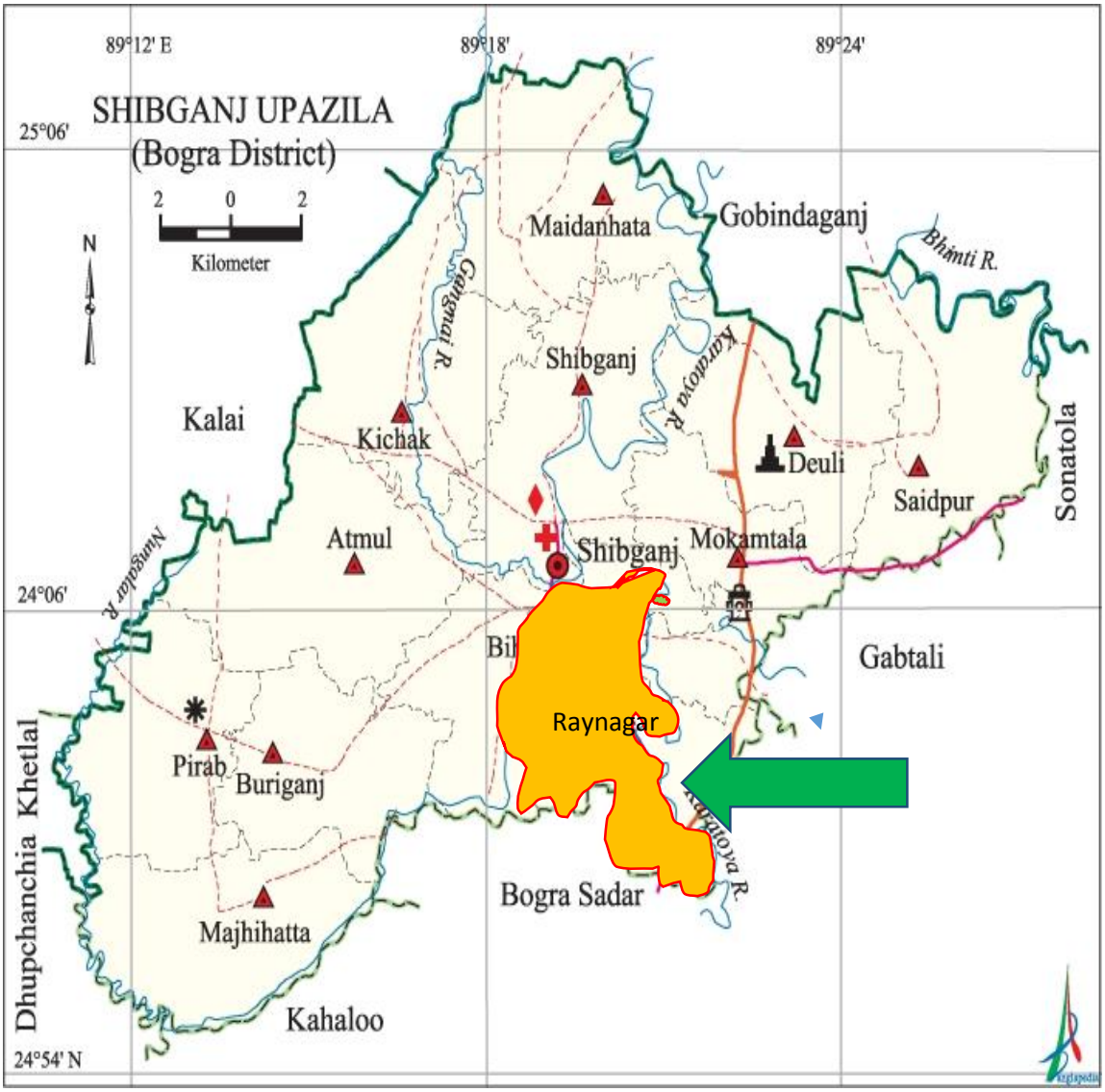

Figure 3.2 A map of Shibganj upazila showing the study area (Raynagar Union)

3.2 Population and Sample of the Study

Three separate lists of vegetable growers of the selected three villages were prepared by the researcher himself with the help of the Sub-Assistant Agriculture Officer (SAAO) of Upazila Agriculture Office (UAO), Shibganj. The list comprised a total of 547 vegetable growers from which 147 farm family heads from Pareachli village, 213 from Tepagari village and 187 from Binniapara village under the union of Raynagar which constituted the population of the study.

There are several methods for determining the sample size. Hear, researcher used Yamane's (1967) formula for study group:

$$n = \frac{z^2 P\,(1-P)N}{z^2 P(1-P)+N(e)^2}$$

Where,

n = Sample size

N (Population size) = 547

e (The level of precision) = 8%

z = the value of the standard normal variable given the chosen confidence level (e.g., z= 1.96 with a confidence level of 95%) and

P (The proportion or degree of variability) = 50%

By using the above formula, the sample size was determined 113 for this study. Separate sample sizes of each of the villages were determined proportionately. Sample was drawn from the population by using proportionate random sampling method.

A reserve list of 11 vegetable farmers was also prepared by using 10 percent of the sample size so that the respondent of this list could be used for interview if the respondents included in the original sample were not available at the time of conduction of interview. The distribution of the population sample and number of respondent in the reserve list are given in Table 3.1.

Table 3.1 Distribution of the population and sample of the respondents in three Villages of Raynagar union with reserve list

Name of villages	Population (No. of total vegetable farmers)	Sample Size	Reserve list
Pareachli	147	30	3
Tepagari	213	44	4
Binnapara	187	39	4
Total	547	113	11

3.3 Data Collecting Instrument

In a social research, preparation of an interview schedule for collection of information with very careful consideration is necessary. Keeping this fact in mind the researcher prepared an interview schedule carefully for collecting data from the respondents. Objectives of the study were kept in view while preparing the interview schedule.

The initially prepared interview schedule was pre-tested among 10 respondents of the study area. The pretest was helpful to find out gaps and to locate faulty questions and statements. Alterations and adjustments were made in the schedule on the basis of experience of the pretest. English version of the interview schedule is shown in appendix-A.

3.4 Collection of Data

The researcher collected data from the sample farmers with the help of a pretested interview schedule. Before starting collection of data, the researchers met with the local SAAOs of the respective blocks in order to explain the objectives of the study and requested them to provide necessary help and cooperation in collection of data. The local leaders of the area were also approached to render essential help. As a result of all these a good working atmosphere was created in the study area which was very helpful for collection of data by the researcher.

Before going to the respondents for interview they were informed earlier, so that they would be available in their respective area. The interviews were held individually in the house or farms of the respective respondent. The researcher established adequate

rapport so that the respondents did not feel hesitant to provide actual information. Whenever any respondent faced difficulty in understanding a particular question, the researcher took care to explain the same clearly. No serious constraints were faced by the researcher in collecting data. Collection of data took 30 days from 5th January to 5th February, 2018.

3.5 Selection of Predicted and Experimental Variables

Constraints faced by the vegetable growers in marketing were the main focus of this study and it was considered as the predicted variable.

For selection of experimental variables the researcher went through the past related literature as far as available. He discussed with the researcher, experts in the relevant fields and research fellows in agricultural and related disciplines. He also carefully noticed the various characteristics of the farmers of the study. Availability of time, money and other resources were also kept in view in selected the variables. Characteristics of the farmers like age, level of education, family member, farm size under vegetable cultivation, vegetable cultivation experience, annual family income, credit availability, training on vegetable cultivation, Extension contact, knowledge on vegetable marketing and availability of marketing information were selected as the experimental variables.

3.6 Measurement of Variables

In order to conduct the study in accordance with the objectives, it was necessary to measure the selected variables. This section contains procedures for measurement of both independent as well as dependent variables of the study. The procedures followed in measuring the variables are presented below:

3.6.1 Measurement of experimental variables

It was pertinent to follow a methodological procedure for measuring the selected variables in order to contact the study in accordance with the objectives already formulated. The procedures for measuring the experimental variables are described below:

3.6.1.1 Age

Age of a respondent was measured in terms of years from birth to the time of interview which was found on the basis of response (Azad, 2014). A score of one (1) was assigned for each year of age. Question regarding this variable appears in item no. 1 in the interview schedule (Appendix-A).

3.6.1.2 Level of education

Education was measured in terms of one's year of schooling. One score was given for passing each year in an educational institution (Amin, 2004). For example, if the respondent passed the S.S.C. examination, his education score was given as 10, if passed the final examination of class Seven (VII), his education scores was given as 7. If the respondent did not know how to read and write, his education score was given as '0' (zero). A score of 0.5 (half) was given to that respondent who could sign his/her name only. Question regarding this variable appears in the item no. 2 in the interview schedule (Appendix-A).

3.6.1.3 Family size

The family size was measured by the total number of members in the family of a respondent. The family members included family head and other dependent members like husband/wife, children, etc. who lived and ate together. A unit score 1 was assigned for each member of the family. If a respondent had five members in his/her family, his/her family size score was given as 5. Question regarding this variable appears in the item no. 3 in the interview schedule (Appendix-A).

3.6.1.4 Area under vegetable cultivation

Vegetable cultivation area was measured by the area of land under his/her management only for vegetable cultivation. The unit of measurement was in ha and was considered as the vegetable cultivation area of a respondent. Question regarding this variable appears in the item no. 3 in the interview schedule (Appendix-A).

3.6.1.5 Vegetable cultivation experience

Vegetable farming experience of the respondent was measured by the number of years a respondent engaged in vegetable cultivation. The measurement included from the year of starting of first vegetables cultivation till the year of data collection. A score of one (1) was assigned for each year of experience (Appendix-A). .

3.6.1.6 Annual family income

Annual income of a respondent was measured in '000' BDT on the basis of total yearly earning from agricultural and non-agricultural sources by the respondent himself and other family members (Appendix-A).

3.6.1.7 Credit availability

Credit availability of a respondent was measured in '000' BDT on the basis of total yearly availability of credit from different sources by the respondent himself and other family members (Appendix-A).

3.6.1.8 Training received

Training was measured by the total number of days a respondent received training in his/her life on vegetable cultivation. A score of 1 (one) was given to a respondent for every day of training. A zero (0) score was assigned for no training exposure (Appendix-A).

3.6.1.9 Extension contact

The extension contact of a respondent was measured with eleven selected extension media. A scale was developed arranging the weights for 0, 1, 2, 3 and 4 for the responses for never, rarely, occasionally, often and regularly contact with these media respectively. Extension contact score of the respondents could range from 0 to 44, while '0' indicating no extension contact and '44' indicating very high extension contact (Appendix-A).

3.6.1.10 Knowledge on vegetable marketing

Knowledge refers to the ability of a respondent to recall or recognize items of information related to anything. It was measured based on knowledge of the growers on post-harvest practices and marketing system of vegetables. The knowledge of a farmer on vegetables marketing was determined by computing a knowledge score based on the responses against 26 statements regarding post-harvest practices and marketing. These statements were collected after thorough consulting with relevant experts reviewing of existing literatures and searching websites. Each of the statements carried a full weight of 1 (one). Respondent were asked to choose one response against alternative responses as right, wrong and do not know. For each right response, a farmer received a full weight of 1, for each wrong or no response (as don't know) s/he received 0 (zero). The

response as “don’t know” helped to find the responses more accurately. Thus, knowledge score of a farmer could range from 0 to 26, where ‘0’ indicated very low knowledge and ‘26’ indicated highest level of knowledge on vegetable marketing (Appendix-A).

3.6.1.11 Availability of marketing information

Availability of marketing information of the respondent was measured by computing a score on the basis of vegetable growers' reply to seven questions. The score obtained by a respondent for responses of the entire seven questions were added together to compute their availability of marketing information scores. Each question had assigned 4, 3, 2, 1, 0 score for very available, moderately available, available, less available and not at all, respectively. Therefore, seven questions carried a total score of 28 for regular marketing information and zero for no marketing information and others score for other combinations (Appendix-A).

3.6.2 Measurement of predicted variable

Constraints faced by the vegetable grower in marketing was the main focus and marketing constraints of vegetable grower were measured on the basis of twenty two constraints. Each of the sample vegetable farmers was asked to indicate the degree of constraints faced by him / her against each of 22 selected constraints. The alternative a response were ‘very high’, ‘high’, ‘medium’, ‘low’ and ‘not at all’ constraints. The score of 4, 3, 2, 1 and 0 were assigned to these alternative responses respectively. Finally, marketing constraints score of a respondent was determined summing up the weights of his / her responses to all the twenty two statements. Thus, marketing constraint face score of the respondent was ranged from zero (0) to 88, where ‘0’ indicating no constraints of vegetable growers and highest ‘88’ indicating very high constraints of vegetable growers.

Attempts were made to compare the constraints by using Constraints Faced index (CFI) with the following formula

$$CFI = C_{vh} \times 4 + C_h \times 3 + C_m \times 2 + C_l \times 1 + C_0 \times 0$$

Where, CFI= Constraint Faced Index

C_{vh} = No. of vegetable growers faced very high constraints

C_h = No. of vegetable growers faced high constraints

C_m = No. of vegetable growers faced medium constraints

C_l = No. of vegetable growers faced low constraints

C_0 = No. of vegetable growers faced no constraints

Thus, the possible CFI of constraints items could range from 0 – 452, where '0' indicating no constraints and '452' indicating very high constraints. To compare the severity of the constraints, rank order was made by the descending order of the CFI.

3.7 Statement of the Hypotheses

As defined by Goode and Hatt (1952) a hypothesis is "a proposition which can be put to test to determine its validity. It may seem contrary to, or in accord with common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test."

3.7.1 Research hypotheses

In the light of the objectives of the study and variables selected, the following research hypotheses were formulated to test them in. The research hypotheses were stated in positive form, the hypotheses were as follows:

"Each of the selected characteristics of the vegetable growers had relationship to their marketing constraints."

3.7.2 Null hypotheses

In order to conduct statistical tests, the research hypotheses were converted to null form. Hence, the null hypotheses were as follows:

"Each of the selected characteristics of the vegetable growers had no relationship to their marketing constraints."

3.8 Data Processing

3.8.1 Editing

The collected raw data were examined thoroughly to detect errors and omissions. As a matter of fact the researcher made a careful scrutiny of the completed interview schedule to make sure that necessary data were entered as complete as possible and

well arranged to facilitate coding and tabulation. Very minor mistakes were detected by doing this, which were corrected promptly.

3.8.2 Coding and tabulation

Having consulted with the research supervisor and co-supervisor, the investigator prepared a detailed coding plan. In case of qualitative data, suitable scoring techniques were followed by putting proper weight age against each of the traits to transform the data into quantitative forms. These were then tabulated in accordance with the objective of the study.

3.8.3 Categorization of data

Following coding operation, the collected raw data as well as the respondents were classified into various categories to facilitate the description of the independent and dependent variables. These categories were developed for each of the variables by considering the nature of distribution of the data and extensive literature review. The procedures for categorization have been discussed while describing the variables under consideration in chapter IV.

3.9 Statistical Analysis

Data collected from the respondents were analyzed and interpreted in accordance with the objectives of the study. The analysis of data was performed using statistical treatment with SPSS (Statistical Package for Social Science) computer program, version 20.The statistical measures such as range, mean, standard deviation, percentage, rank order were used for describing both the independent and dependent variables. Tables were also used in presenting data for clarity of understanding. Initially, Pearson Product Moment correlation was run to determine the relationship between the selected characteristics of the vegetable grower with their marketing constraints. Five percent (0.05) level of probability was used as the basis for rejection of a null hypothesis throughout the study. Co-efficient values significant at 0.05 level is indicated by one asterisk (*) and that at 0.01 level by two asterisks (**). For determining severity of the constraints, rank order was made based on the descending order of the Constraint Faced Index (CFI).

CHAPTER IV

FINDINGS AND DISCUSSION

This chapter deals with the result and discussion of present research work. Necessary explanations and appropriate interpretations have also been made showing possible and logical basis of the findings. However, for convenience of the discussions, the findings are systematically presented in the following sections.

4.1 Characteristics of the Vegetable Growers

This section deals with the selected characteristics of vegetable growers which were assumed to be associated with the constraints faced by the vegetable growers in marketing. Different farmers possess different characteristics which are focused by his/her behavior. In this section 12 characteristics have been discussed. The selected characteristics of the farmers were; age, level of education, family size, area under vegetable cultivation, vegetable cultivation experience, annual family income, credit availability, training received on vegetable cultivation, extension contact, knowledge on vegetable marketing, availability of marketing information and constrains faced by the vegetable growers in marketing. Measuring unit, range, mean and standard deviations of those characteristics of vegetable growers were described in this section. Table 4.1 provides a summary profile of vegetable growers' characteristics.

Table 4.1 Characteristics profile of the respondents

Sl. No.	Characteristics (with measuring unit)	Range		Mean	Standard deviation
		Possible	Observed		
01	Age (years)	Unknown	21 – 87	44.83	14.69
02	Level of education (schooling years)	Unknown	0.0 – 15	4.12	4.29
03	Family size (number of members)	Unknown	2-10	4.47	1.50
04	Farm size under vegetable cultivation (hectare)	Unknown	.07 - 2.01	0.40	0.36
05	Vegetable cultivation experience (years)	Unknown	2 – 35	13.35	5.91
06	Annual family income (‘000’BDT)	Unknown	95 – 903	199.97	99.97
07	Credit availability (‘000’BDT)	Unknown	0 – 175	16.52	28.30
08	Training received (Number of days)	Unknown	0 – 3	.08	.48
09	Extension contact (Score)	0 - 44	7 – 18	8.63	1.49
10	Knowledge on vegetable marketing (Score)	0 - 26	16 – 23	18.93	1.37
11	Availability of marketing information (Score)	0 - 28	10 – 18	11.45	1.29
12	Constraints faced by the vegetable growers in marketing (Score)	0 - 88	45 – 72	57.61	5.44

4.1.1 Age

Age of the respondents varied from 21 to 87 years, the average being 44.83 years with the standard deviation of 14.69. According to their age, the respondents were classified into three categories as “young aged”, “middle aged” and “old aged”. The distribution of the farmers according to their age is shown in Table 4.2.

Table 4.2 Distribution of the vegetable growers according to their age

Categories	Basis of categorization (year)	Respondents	
		Numbers	Percent
Young aged	Up to 35	37	32.7
Middle aged	36-50	35	31.0
Old aged	Above50	41	36.3
Total		113	100

Data represented in Table 4.2 indicate that the old aged vegetable grower comprised the highest proportion (36.3 percent) followed by young old aged category (32.7 percent) and the lowest proportion were made by the middle aged category (31.0 percent). Data also indicates that the old and young aged respondents constitute almost 63.7 percent of total respondents. The young and middle aged respondents were generally more involved in vegetable cultivation than the old aged.

4.1.2 Level of Education

Education level of the respondents ranged from 0-15 in accordance with year of schooling. The average education score of the respondents was 4.12 with a standard deviation of 4.29. On the basis of their level of education, the farmers were classified into six categories as shown in Table 4.3.

Table 4.3 Distribution of the vegetable growers according to their level of education

Categories	Basis of Categorization (schooling years)	Respondents	
		Number	Percent
Illiterate	0	17	15.0
Can sign only	0.5	35	31.0
Primary	1-5	32	28.3
Secondary	6-10	18	15.9
Higher secondary	11 -12	7	6.2
Above higher secondary	Above 12	4	3.5
Total		113	100

Data shown in the Table 4.3 indicates that respondent under can sign only category constitute the highest proportion (31.0 percent) followed by primary education category (28.3 percent). On the other hand, the lowest proportion (3.5 percent) in above higher secondary education category followed by higher secondary education category (6.2 percent), can't read and write category (15 percent) and secondary education category (15.9 percent). Education broadens the horizon of outlook of vegetable grower and expands their capability to analyze any situation related to vegetable production and marketing. An educated vegetable grower is likely to be more responsive to the modern facts, ideas, technology and information of vegetable production and marketing. To adjust with the same, they would be progressive minded to adopt as well as involve with modern cultural, processing and marketing facilities of vegetables along with searching for the opportunities to exports their vegetables in different countries through proper marketing channel (Azad et al., 2014).

4.1.3 Family Size

The number of family members of the respondents ranged from 2 to 10 with an average of 4.47 and standard deviation of 1.49. Based on the family size the respondents were classified into three categories as small, medium and large family as shown in Table 4.4.

Table 4.4 Distribution of the vegetable growers according to their family size

Categories (No. of members)	Basis of categorization (No. of family member)	Respondents	
		Numbers	Percent
Small family	Up to 4	62	54.9
Medium family	5-7	46	40.7
Large family	Above 7	5	4.4
Total		113	100

Data furnished in the Table 4.4 indicated that the highest proportion (54.9 percent) of the respondents had small family size consisting up to 4 members, while 40.7 percent of the respondents belonged to the category of medium family compared to 4.4 percent of them having large family size. Such findings is quite normal as per the situation of Bangladesh (BBS, 2015). The trend of nuclear family has been rising in the study area and subsequent the family member becoming smaller than the extended family.

4.1.4 Farm Size under vegetable cultivation

Farm size of the respondents ranged from .07 hectare to 2.01 hectares with the mean of 0.40 and standard deviation of 0.36. On the basis of their farm size, the farmers were classified into three categories followed by DAE (1999) as shown in Table 4.5.

Table 4.5 Distribution of the vegetable growers according to their farm size

Categories	Basis of categorization (ha)	Respondents	
		Number	Percent
Marginal farm	Up to 0.2	30	26.5
Small farm	0.2 – 1.0	76	67.3
Medium farm	1.01 – 3.0	7	6.2
Total		113	100

Data presented in the Table 4.5 demonstrated that highest proportion (67.3 percent) of the farmers had small farm compared to 26.5 percent having marginal farm and only 6.20 percent had medium farm. The findings indicated that overwhelming majority (93.8 percent) of the farmers had marginal to small farm size. In Bangladesh most of the farmers live on below a subsistence level. This in one of the vital reasons for not

adopting improved farming practices in their farm as well as having lower skill on marketing practices.

4.1.5 Vegetable cultivation experience

Computed scores of the farmers about experience in vegetable production ranged from 2 to 35 years with a mean of 13.35 and standard deviation of 5.91. On the basis of farming experience, the respondents were classified into three categories as follows in Table 4.6.

Table 4.6 Distribution of the vegetable growers according to their farming experience in vegetable cultivation

Categories (year)	Basis of categorization (Years)	Respondents	
		Number	Percent
Short farming experience	Up to 9	26	23.0
Medium farming experience	10-16	55	48.7
Long farming experience	Above 16	32	28.3
Total		113	100

Data contained in Table 4.6 showing that 48.7 percent of the farmers had medium farming experience, where as 28.3 percent had long farming experience and 23.9 percent had short farming experience. Farming experience is helpful to increase knowledge, improve skill and change attitude of the farmers. It also builds confidence of the farmers for making appropriate decisions at the time of need. Above three fourth (77 percent) of the farmers had medium to long farming experience.

Generally, experience helps to cope up any problematic situation. Therefore, the higher experience might be increased the risk bearing ability of the farmers in vegetable cultivation as well as increase their knowledge and skill on marketing practice (Azad et al., 2014).

4.1.6 Annual family income

Annual family income of the respondents ranged from 95 to 903.00 thousand taka. The mean was 199.99 thousand taka and standard deviation was 99.97. On the basis of annual family income, the respondents were categorized into three groups as shown in Table 4.7.

Table 4.7 Distribution of the vegetable growers regarding annual family income

Categories	Basis of categorization ('000' BDT)	Respondents	
		Number	Percent
Low income	Up to 149.99	36	31.9
Medium income	150.1-300	67	59.3
High income	Above 300	10	8.8
Total		113	100

Data shown in Table 4.7 presented that the highest proportion (59.3 percent) of the respondents had medium family income while 31.9 and 8.8 percent of the respondents had low and high annual family income respectively.

The gross annual family income of a farmer is an important indicator of how much s/he can invest in his farming. Generally higher income encourages one's integrity to achieve better performance and to show his/her individual better status in the society. The higher income increases the risk taking capacity of the farmers' vegetable production and marketing. Farmers with low income generally invest less in their farms. It is therefore, likely that a considerable portion of farmers may face difficulty in vegetable production and marketing (Azad et al., 2014).

4.1.7 Credit availability

Credit availability for vegetable cultivation and marketing of the respondent ranged from 0.0 - 175 thousand taka. The mean was 16.52 thousand taka and standard deviation was 28.30. On the basis of credit availability for vegetable cultivation and marketing, the respondents were categorized into three groups as shown in Table 4.8.

Table 4.8 Distribution of the vegetable growers according to their credit availability for vegetable cultivation and marketing

Categories	Basis of categorization ('000' BDT)	Respondents	
		Number	Percent
Low availability	Up to 24.99	84	74.3
Medium availability	25.1-50	23	20.4
High availability	Above 50	6	5.3
Total		113	100

Data shown in the Table 4.8 indicated that 74.3 percent of the farmers had low credit availability where 20.4 percent farmers had medium and 5.3 percent had high credit availability for vegetable cultivation and marketing. Thus, the overwhelming 94.7 percent of the farmers had low to medium credit availability for vegetable cultivation and marketing. Credit availability of an individual allows him to invest more in vegetable cultivation and marketing as well as taking opportunity for improve marketing.

4.1.8 Training exposure on vegetable cultivation and marketing

The score of training exposure on vegetable cultivation of the farmers ranged from 0-3 days. The mean was .08 days and standard deviation was .48. On the basis of training exposure on vegetable cultivation, the respondents were categorized into three groups as shown in Table 4.9.

Table 4.9 Distribution of the vegetable growers according to their training exposure on vegetable cultivation and marketing

Categories	Basis of categorization (Days)	Respondents	
		Number	Percent
No training	0	96	85.0
Low training	1-3	17	15
Total		113	100

Data presented in the Table 4.9 showed that three fourth (85 percent) of the farmers had no training exposure; while only 15 percent of the farmers had low training exposure. It means that an overwhelming majority (85 percent) of the farmers had no training exposure. Training develops farmers' knowledge, skill, and attitude in positive manner. However, the findings show interns of training received, respondent status was found unsatisfactory.

4.1.9 Extension contact

The observed extension contact scores of vegetable grower ranged from 7 to 18 against the possible range from 0 to 28, the mean and standard deviation were 8.63 and 1.49 respectively. According to this score, the summer tomato farmers were classified into three categories: "low extension contact" (up to 7), "medium extension

contact" (8-10) and "high extension contact" (above 10). The distribution of the vegetable grower according to their extension contact is shown in Table 4.10

Table 4.10 Distribution of the vegetable growers according to their extension contact on vegetable cultivation and marketing

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low extension contact	Up to 7	11	9.7
Medium extension contact	8-10	95	84.1
High extension contact	Above 10	7	6.2
Total		113	100

Data presented in the Table 4.10 showed that a proportion of 84.1 percent of the vegetable grower had medium extension contact compared to 9.70 percent of them having low extension contact. Only 6.2 percent of the vegetable grower had high contact. Thus, overwhelming majority (93.8 percent) of the vegetable grower had low to medium extension contact. Extension contact is a very effective and powerful source of receiving information about various new and modern technologies. The status of no or having low and medium contacts might have significant impacts on the constraints on marketing of vegetables.

4.1.10 Knowledge on Vegetables marketing

Knowledge on vegetable marketing of selected vegetables score of the respondents ranged from 16 to 23 against the possible range of 0 – 26 having an average of 18.93 and standard deviation of 1.37. On the basis of knowledge scores, the respondents were classified into three categories namely, 'low knowledge', 'medium knowledge' and 'high knowledge'. The distribution of the respondents according to their knowledge on marketing of vegetables is given in Table 4.11.

Table 4.11 Distribution of the vegetable growers according to their marketing knowledge

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Medium knowledge	10-18	38	33.6
High knowledge	Above 18	75	66.4
Total		113	100.0

Data of Table 4.11 show that 66.4 percent of the respondents felt in high knowledge category followed by 33.6 percent in medium knowledge category. Knowledge is to be considered as vision of an explanation in any aspect of the situation regarding vegetable cultivation and marketing. It is act or state of understanding; clear perception of fact or truth, that helps an individual to foresee the consequence he may have to face in future. It makes individuals to become rational and conscious about related field. To perform optimum production and marketing, vegetable growers should have adequate knowledge and skill on different aspects of marketing.

4.1.11 Availability of marketing information

The observed score of marketing information of the respondents' vegetable growers ranged from 10 –18 against the possible range of 0 – 28 having the mean of 11.45 and standard deviation of 1.29. Based on their marketing information, the potato growers were classified into three categories: "low level market information" (up to 9), "medium level of market information" (10-12) and "high level market information" (above 12). The distribution of the farmers according to their marketing information is shown in Table 4.12.

Table 4.12 Distribution of the vegetable growers according to their marketing information

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Medium level market information	10-12	96	85.0
High level market information	Above 12	17	15.0
Total		113	100.0

The Table 4.12 shows that the highest portion (85.0 percent) of the vegetable grower were in medium level market information group and only 15 percent were in high level group. Most of vegetable growers of the study area had medium level of information but it is necessary to have available market information for attaining highest market price. Therefore it could be conducted that marketing information was not readily available in the study area.

4.2 Constraints faced in vegetable marketing

Constraint means the threat or use of force to prevent, restrict, or dictate the action or thought of others. Constraint defined by Matthew Arnold is the state of being checked, restricted, or compelled to avoid or perform some action. Constraint faced, therefore, refers to the extent to which individual faces restricted situations about which something needs to be done. The scores of constraint faced in vegetable marketing of the respondents ranged from 45 to 72 against the possible range of 0 – 88 with an average of 57.61 and standard deviation of 5.44. Based on the observed scores of constraints faced in vegetable marketing, the respondents were classified into the three categories i.e. Low level marketing constraints, Medium level marketing constraints and High level marketing constraints. The distribution has been shown in Table 4.13.

Table 4.13 Distribution of the vegetable growers according to constraint faced in vegetable marketing

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low level marketing constraints	Up to 52	19	16.9
Medium level marketing constraints	53-63	77	68.1
High level marketing constraints	Above 63	17	15.0
Total		113	100.0

Data of Table 4.13 show that among the respondents the highest 68.1 percent vegetable growers belong to the group of medium level marketing constraints and the lowest 15.0 percent in high level marketing constraints followed by low level marketing constraints (16.9) percent by the vegetable grower in marketing constraints. Among the growers, most of the vegetable grower (85 percent) have low to medium constraints of vegetable marketing.

4.3 Relationship between Selected Characteristics of the Vegetable Grower and Their Constraints Faced in Vegetable Marketing

To explore the relationships between the selected characteristics of farmers with their Constraints faced in vegetable marketing, Pearson Product Moment correlation was run to find out the relation between the selected characteristics of the vegetable growers and their constrains faced during marketing of vegetables. From this correlation test, it was found that vegetable farm size of the farmers had significant positive and training received, knowledge on vegetable marketing and availability of marketing information had significant negative relationship with their constrains faced during marketing. Beside these four characteristics, rest seven characteristics of the farmers (age, level of education, family size, vegetable cultivation experience, annual family income, credit availability and extension contact) had no significant relationship with their constraints faced in vegetable marketing (Table 4.14). Intercorrelation among all the variables may be seen in Appendix-B.

Table 4.14 Co-efficient of correlation showing relationship between selected characteristics of the vegetable growers and constraints faced in vegetable marketing

Predicted variable	Experimental variable	Computed value "r"	Tabulated value of "r"	
			at 0.05 level	at 0.01 level
Constraints faced in vegetable marketing	1. Age	-0.005^{NS}	0.185	0.241
	2. Level of education	-0.041^{NS}		
	3. Family size	0.024^{NS}		
	4. Farm size under vegetable cultivation	0.397**		
	5. Vegetable cultivation experience	-0.017^{NS}		
	6. Annual family income	0.066^{NS}		
	7. Credit availability	0.097^{NS}		
	8. Training received	-0.293**		
	9. Extension contact	0.122^{NS}		
	10. Knowledge on vegetable marketing	-0.247**		
	11. Availability of marketing information	-0.218*		

^{NS} Not significant

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

4.3 Relationship between Selected Characteristics of the Vegetable Growers and Their Constraints Faced in Vegetable Marketing

4.3.1 Age and constraints faced in vegetable marketing

The computed value of 'r' (-0.005) was smaller than that of the tabulated value (r=0.185) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12. Hence, the concerned null hypothesis was accepted and it was concluded that age of the farmers had no significant relationship with their constraints faced on vegetable marketing.

4.3.2 Education and constraints faced in vegetable marketing

The computed value of 'r' (-0.041) was smaller than that of the tabulated value (r=0.185) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12. Hence, the concerned null hypothesis was accepted and it was concluded that education of the farmers had no significant relationship with their constraints faced on vegetable marketing.

4.3.3 Family size and constraints faced in vegetable marketing

The computed value of 'r' (0.024) was smaller than that of the tabulated value (r=0.185) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12. Hence, the concerned null hypothesis was accepted and it was concluded that family size of the farmers had no significant relationship with their constraints faced on vegetable marketing.

4.3.4 Farm size under vegetable cultivation and constraints faced in vegetable marketing

The computed value of 'r' (.397) was greater than the tabulated value (r=0.241) with 111 degrees of freedom at 0.01 level of probability as shown in Table 4.12 with a positive trend. Hence, the concerned null hypothesis was rejected. The findings indicated that farm size of the farmers had a significant positive relationship with their constraints faced in vegetable marketing.

Based on the findings, it could be concluded that farmers' having big farm size need to work hard to manage their farm efficiently. As a result they might perceived higher constraints in managing their farm.

4.3.5 Vegetable cultivation experience and constraints faced in vegetable marketing

The computed value of 'r' (-0.017) was smaller than the tabulated value (r=0.185) with 111 degrees of freedom at 0.05 level of probability as shown in the Table 4.12. Hence, the concerned null hypothesis could not be rejected. The findings indicated Vegetable cultivation experience of the farmers had no significant relationship with their Constraints faced in vegetable marketing.

4.3.6 Annual family income and constraints faced in vegetable marketing

The computed value of 'r' (0.066) was smaller than that of the tabulated value (r=0.185) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12. Hence, the concerned null hypothesis was accepted and it was concluded that annual family income of the farmers had no significant relationship with their constraints faced on vegetable marketing.

4.3.7 Credit availability and constraints faced in vegetable marketing

The computed value of 'r' (0.097) was smaller than that of the tabulated value (r=0.185) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12. Hence, the concerned null hypothesis was accepted and it was concluded that credit availability of the farmers had no significant relationship with their constraints faced on vegetable marketing.

4.3.8 Training received and constraints faced in vegetable marketing

The computed value of 'r' (-0.562) was greater than that of the tabulated value (r=0.241) with 111 degrees of freedom at 0.01 level of probability as shown in Table 4.12 with a negative trend. Hence, the concerned null hypothesis was rejected. The findings indicate that training received of the farmers had a significant negative relationship with their constraints faced in vegetable marketing.

Based on the above findings, it can be summarized that a vegetable grower had more training increased the capabilities to reduce marketing constraints of vegetable grower in Bogura district. Because training received develops the farmers' knowledge, skill, and attitude in positive manner. Although the findings showed that most of the respondent had no training but suggest that training experience might be the most important factor for the respondents to change their knowledge and skill on marketing practices of vegetables.

4.3.9 Extension contact and constraints faced in vegetable marketing

The computed value of 'r' (0.122) was smaller than that of the tabulated value (r=0.185) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12. Hence, the concerned null hypothesis was accepted and it was concluded that extension contact of the farmers had no significant relationship with their constraints faced on vegetable marketing.

4.3.10 Knowledge on vegetable marketing and constraints faced in vegetable marketing

The computed value of 'r' (-0.247) was greater than the tabulated value (r=0.241) with 111 degrees of freedom at 0.01 level of probability as shown in Table 4.12 with a negative trend. Hence, the concerned null hypothesis was rejected. The findings indicated that knowledge on vegetable marketing of the farmers had a significant negative relationship with their constraints faced in vegetable marketing.

Based on the above findings, it can be summarized that a vegetable grower had more knowledge increased the capabilities to reduce marketing constraints of vegetable grower in Bogura district. Knowledge makes individuals to become rational and conscious about related field. It enhance the abilities of the vegetable growers at short time than other to reduce marketing constraints. So, knowledge has significant negative relationship with their constraints faced in vegetable marketing in Bogura district.

4.3.11 Availability of marketing information and constraints faced in vegetable marketing

The computed value of 'r' (-0.218) was greater than the tabulated value (r=0.185) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12 with a negative trend. Hence, the concerned null hypothesis was rejected. The findings indicated that availability of marketing information of the farmers had a significant negative relationship with their constraints faced in vegetable marketing.

Based on the above findings, it can be summarized that the vegetable grower of this particular area were not in contact of market information. So, they are being deprived to get a good price in the appropriate time. Educated people usually try to keep themselves updated about the marketing information. They seek market information from different sources to get a good and reasonable price for their hard-earned crops. More marketing information means greater opportunity to justify the market condition for the best time

and place to sell their harvested crops. So, the availability of marketing information has significant negative relationship with their constraints faced in vegetable marketing in Bogura district.

4.4 Indexing of the constraint faced by the vegetable growers

Indexing the twenty two dimensions of marketing constraints of vegetable grower is presented in Table 4.15. According to Constraint Facing Index (CFI), insufficient space for storage of produce positioned the 1st and misleading information of marketing intelligence in the last.

Marketing constraints of vegetable grower in Bangladesh according to descending order through analysis of the received data from respondents are presence of insufficient space for storage of produce, more number of middleman, inadequate market information, inadequate availability of vehicle for each packing, lack of pucca road, unavailability of packing material, high and undue market charge, undefined standard for grading, payment in parts, inadequate facilities for storage, bulkiness and perishable nature of the produce, auctioning, inadequate govt. assistance, weighing, qualitative losses, arbitrary commission charges, poor quality of packing material, late information of market, lack of machine facilities for grading, road block due to land slide, etc. and misleading information of market.

The result showed that the highest constraints among the marketing constraints faced by the vegetable grower was insufficient space for storage. The lowest constraints in vegetable marketing was misleading information about market intelligence. This happened because the respondent use some local technique and most of the respondents had awareness about marketing.

Table 4.15 Indexing of the marketing constraints of vegetable grower in the locale

Aspects of constraint	Constraint items	CFI	Rank order
Transport facility	Lack of pucca roads	407	4
	Road blockade due to land slide, etc.	149	21
	Bulkiness and perishable nature of the produce	301	12
	Inadequate availability of vehicle for	382	6
	Uneven road condition	204	19
Grading	Lack of machine facilities	164	20
	Undefined standards	330	8
Packing material	Poor quality	213	17
	unavailability during harvesting time	394	5
Storage of produce	Inadequate facilities	310	10
	Insufficient space	439	1
	Qualitative losses	259	15
	Inadequate govt. assistance	296	13
Malpractices	Weighing	285	14
	In bidding / auctioning	301	11
	High and undue market charge	366	7
	More number of middleman	429	2
	Arbitrary commission charges	219	16
Market intelligence	Late information	207	18
	Payment in parts	314	9
	Inadequate information	416	3
	Misleading information	127	22

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Findings

5.1.1 Marketing constraints of vegetable grower

Marketing constraints of vegetable grower scored varied from 45 to 72 with the mean and standard deviation of 57.61 and 5.44 respectively. On the basis of marketing constraints of vegetable growers' score, the vegetable growers were classified into three categories namely; low, medium and high marketing constraints of vegetable growers. Among the vegetable growers, the highest 68.1 percent vegetable growers belong to the group of medium marketing constraints and the lowest percentage 15.0 percent in high marketing constraints followed by low marketing constraints (16.9 percent) by the vegetable growers in marketing constraints. Among the growers most of the vegetable growers (85.0 percent) have low to medium marketing constraints of vegetable grower.

5.1.2 Selected characteristics of the vegetable grower

Age: Vast majority (69 percent) of the farmers were old aged to young. This seems that vegetable cultivation in the study area is being managed by comparatively younger farmers.

Education: The highest proportions (31.0 percent) of the farmers were in the can sign only. Primary, secondary, higher secondary, above higher secondary and illiterate level of literacy found 28.3 percent, 15.9 percent, 6.2 percent, 3.5 percent respectively and 15.0 percent. It means, about majority percent (85.0 percent) of the respondent were literate or having education up to above higher secondary level.

Family Size: The highest proportion (54.9 percent) of the farmers had small family size, while 40.7 percent and 4.4 percent belonged to the medium family size and large family size respectively.

Vegetable farm size: The highest proportion (67.3 percent) of the farmers had small farm size, while 26.5 percent and 6.2 percent belonged to the marginal farm and medium farm respectively.

Vegetable cultivation experience: About 48.7 percent of the vegetable grower had high experience on vegetable cultivation and marketing.

Annual family income: The highest proportion (59.3 percent) had medium annual family income compared with 31.9 percent having low income and 8.8 percent having high annual family income.

Credit availability: The highest proportion (74.3 percent) had low credit availability where 20.4 percent farmers had medium and 5.3 percent had high credit availability for vegetable cultivation and marketing.

Training received: Overwhelming majority (85.0 percent) of the vegetable growers received no training. Only 15 percent farmers had low training.

Extension contact: More than three-fourth (84.1 percent) of the farmers had medium extension contact where 11 percent had low and 9.7 percent had high extension contact.

Knowledge on vegetable marketing: Majority (66 percent) of the farmers had high knowledge on various aspects of vegetable marketing.

Constraints faced in vegetable marketing: About 77 percent of the farmers had medium problem.

5.1.3 Result of hypothesis testing

Out of eleven selected characteristics of the farmers, training received, knowledge on vegetable marketing, and availability of marketing information of the vegetable grower had significant negative relationship with their constraints faced in marketing, while constraints faced by the vegetable grower had significant positive relationship with their vegetable farm size. Rest seven characteristics i.e. age, level of education, family size, vegetable cultivation experience, annual family income, credit availability and extension contact had no significant relationship with their constraints faced in marketing.

5.2 Indexing of the constraints faced by the vegetable growers

For indexing the constraints, rank order of the twenty two dimensions of marketing constraints of vegetable growers was made by the descending order of constraints faced index (CFI). As per constraints faced index (CFI) insufficient space for storage of produce positioned the 1st and misleading information about market intelligence was in the last position.

5.3 Conclusions

i) Insufficient space for storage of produce is the highest ranked marketing constraints of vegetable growers in Bogura district. The number of the cold storage is not enough in comparison of the large production of this area. Along with this, the location of the cold storage is not well planned. So, the long distance of cold storage is more costly for the vegetable growers for conserving these perishable crops till a suitable time to sell their hard-earned crops at a good price for earning a good profit.

ii) The effect of middle man is the 2nd highest ranked marketing constraints of vegetable growers in Bogura district. The farmer are being deprived of getting a right price for their produce. Therefore, concerned authority should take proper steps to minimize the constraints so that the commercial vegetable grower can get expected return from their investment.

iii) Availability of marketing information is the 3rd highest ranked marketing constraints of vegetable growers in this locale. The farmer are being deprived of getting a price in the appropriate time. More marketing information means greater opportunity to justify the market condition for the best time and place to sell their harvested crops.

iv) Transport facility to market place is the 4th highest ranked marketing constraints of vegetable growers in this locale. If the transport facility become improved, it will be easy to reduce marketing problem through minimizing transportation cost of the produce.

v) Overwhelming majority (83.50 percent) of the vegetable growers had no training on vegetable cultivation and marketing. Pearson product moment

correlation also revealed that training on vegetable cultivation of the respondent had significant negative relationship with their knowledge and skill on marketing practices of vegetables. Therefore, it may be concluded that individuals having more training exposure had more knowledge and skill on marketing practices of vegetables.

vi) Overwhelming majority (77.0 percent) of the vegetable growers faced medium constraints in vegetable marketing. Pearson product moment correlation also revealed that constraints faced in vegetable marketing of the respondent had significant negative relationship with their knowledge on vegetable marketing. Therefore, it may be concluded that individuals having more knowledge faced low constraints in vegetable marketing.

vii) Near about 74.3% vegetable grower are less literate in this study area. A vegetable grower with more education increased the capabilities to reduce marketing constraints of vegetable growers in Bogura district. Education enhances the ability of the vegetable growers to face the marketing constraints and reduce it at short time than others.

5.4 Recommendations

5.4.1 Recommendation for policy implication

On the basis of observation and conclusion drawn from the findings of the study following recommendations are made to the planners and policy makers in contriving micro or macro level policy for increasing of potato production:

i) Infrastructural development such as roads, cold storage etc. needs to be constructed to mitigate the distance constraints

ii) Marketing facilities can be increased by the concerned authorities such as Department of Agricultural Marketing (DAM) and other $NGO_{S.}$

iii) Training exposure and Availability of marketing information was the most important contributing factors in marketing constraints of vegetables. Therefore, it may be recommended that measurement should be taken by the concerned authorities through providing accurate and reliable steps at the right time.

iv) Improve marketing facilities, increasing cold storage facilities for vegetables at local market, fixing minimum price of vegetables which is more than production cost, improve transport facility, developing vegetable marketing co-operation summit, easy conditioned equipment's supply for vegetable cultivation and marketing, introduction of govt. vegetable marketing policy, easy termed loan facilities should be developed.

v) Bangladesh government through Bureau of Non-formal Education (BNFE) and NGO_s can take necessary stapes to increase farmers' primary level of education through non-formal education (adult education) and regular farmers' training, workshop, rally needs to be organized to broaden their knowledge.

5.4.2 Recommendations for further study

i) Marketing constraints of vegetable growers were conducted in one selected union of bogura district. Findings of the study may be verified by similar research.

ii) The study examined the effects of eleven selected characteristics of the vegetable grower. Therefore, it is recommended that further research may be undertaken involving other variable in this regard.

iii) This study was conducted at 10% level of precision of the population. It would be verified by similar research in other areas of Bangladesh.

iv) Extension contact and education of the vegetable growers did not show any significant relationship with marketing constraints of vegetable growers. Further research is necessary to verify such relationship.

v) Training exposure of the vegetable growers may be intensively investigated for identify the vegetable growers' constraint.

vi) All constraints affect the performance of the vegetable growers. There is need for undertaking research on the various constraints faced by the vegetable growers which affect their performance.

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APPENDICES

Appendix - A

(English version of the interview schedule)

Department of Agricultural Extension and Information System

Sher-e-Bangla Agriculrural University, Dhaka-1207

An Interview schedule for a research study entitled:

"FARMER'S CONSTRAINTS FOR VEGETABLE MARKETING IN BANGLADESH"

Serial no…… Name of respondent……
Village…….. Union…… Thana …….
District ……. Mobile No:

(Please provide the following information. Give tick (√) marks if necessary. Your information will be kept confidential and will be used research purpose only.)

1. Age.
Please mention your age .....years

2. Level of Education
Please mention your educational level:

a) Can't read and write……..
b) Can sign only ……...……..
c) Up to or equivalent to class.....

3. Family member
Please mention the number of your family member in the following groups:
a) Male _____ b) Female _____ c) Total _____

4. Farm size under vegetable cultivation
(Please mention the total area of land you have cultivated vegetable in last year)
…….ha

5. Vegetable cultivation experience
(Please mention the following information)
How long have you been engaged in vegetable cultivation?
…….……Years

6. Annual family income

Please indicate your annual family income (in BDT)

Sl. No.	Source of income	Amount of income (in BDT)
1.	Agriculture	
2.	Livestock (cattle, goat, etc.)	
3.	Poultry (duck, poultry, etc.)	
4.	Fisheries	
5.	Service	
6.	Business	
7.	Other (Please specify)	
Total		

7. Credit availability: Have you received credit from the following sources for income generating activities? Yes / No.
If yes, please mention the source of receiving your credit with amount.

Sl. No.	Source of credit	Amount (BDT)
1.	Friends	
2.	Relatives	
3.	Banks	
4.	NGOs	
5.	Others (if any)	
Total		

8. Training Received

Have you attended any agricultural training program? ( ) Yes ( ) No
If yes, please mention the following information:

SI. No.	Name of the training courses	Organization	Duration (Days)
1			
2			
3			
4			

9. Extension contact:

Please mention the extent of your contact with the following personnel for receiving information regarding your agricultural business.

SI. No.	Sources (of information)	Extent of contact				
		Regularly	Often	Occasionally	Rarely	Never
1.	Sub-Assistant Agricultural Officer (SAAO)	2 or more times/ month( )	1-2 times/ 2 month ( )	1-2 times/ 3 month ( )	Once / 6 month ( )	Not even once ( )
2.	Upazilla Agricultural Officer (UAO)	6 or more times/ year ( )	4-5 times/ year ( )	2-3 times/ year ( )	Once / year ( )	Not even once( )
3.	Agricultural extension Officer (AEO)	6 or more times/ year ( )	4-5 times/ year ( )	2-3 times/ year ( )	Once / year ( )	Not even once ( )
4.	Input dealer (e.g. seed, pesticide, fertilizer)	2 or more times/ month( )	1-2 times/ 2 month ( )	1-2 times/ 3 month ( )	Once / 6 month ( )	Not even once ( )
5.	Other farmers /neighboring farmers/ relatives	3 times or more / month ( )	1-2 times / 2 month ( )	1-2 times /3 month ( )	Once / 6 month ( )	Not even once ( )
6.	NGO workers	3 times or more / month ( )	1-2 times / 2 month ( )	1-2 times /3 month ( )	Once / 6 month ( )	Not even once ( )
7.	Radio	4 times or more / month ( )	3 times /month ( )	2 times / month ( )	Once / month ( )	Not even once ( )
8.	Television program	4 times or more / month ( )	3 times /month ( )	2 times / month ( )	Once / month ( )	Not even once ( )
9.	Farm Publications (e.g. Krishi katha, poster, leaflet)	10 or more times/ year ( )	6-9 times/ year ( )	3-5 times/ year ( )	1-2 times/ year ( )	Not even once ( )

10.	Mobile phone	4-6 times/ week( )	1-3 times/ week( )	5-6 times/ month ( )	1-3 times/ month ( )	Not even once ( )
11.	Internet / Call Centre, etc.	1-2 times/ week( )	1-3 times/ month( )	1-3 times/ season( )	1-3 times/ 6 month ( )	Not even once ( )

10. Knowledge on vegetable Marketing:

Please put the tick mark (√) against each statement

Sl. No.	Statement	Extent of answer		
		Right	Wrong	Don't Know
1.	It is better to harvest vegetable at morning			
2.	It is to harvest cucumber at green stage before yellowing			
3.	It is better to harvest tomato at 5-10% of ripening color			
4.	No need to keep cover leaf for marketing of cabbage			
5.	It better to apply insecticide/pesticide day before harvesting			
6.	Over mature vegetable is not suitable for eating			
7.	No damage is done if immature or over mature vegetable harvested			
8.	Harvested vegetable should keep in shade for cooling			
9.	Quality detoriate if harvested vegetable keep in sun or in rain			
10.	Sorting is necessary for getting high market price			
11.	Grading is necessary for getting high market price			
12.	No need to wash for marketing of vegetable			
13.	It is better to pack tomato for marketing			
14.	No need of packaging brinjal for marketing			
15	It is better to pack cucumber for marketing purpose			
16	No need to pack for marketing of cabbage			
17	Loss can be minimized by using lining material in tomato packaging			
18	No need to use lining material for marketing of brinjal			

19	Loss can be minimized by using lining material in cucumber packaging			
20	No need to use lining material in cabbage packaging			
21	Transportation loss of Tomato is less in plastic crate and perforated polythene than gunny bag			
22	Transportation loss of brinjal is not so high in plastic crate and perforated polythene than gunny bag			
23	Loss is occurred due to transportation of cabbage in sack			
24	It is better to transport brinjal by using lining material in bamboo basket			
25	Cucumber should be marketed as soon as possible still it is bright			
26	It is better to transport two or more vegetables together to minimize transportation cost			
Total				

11. Availability of marketing information:

Please mention how frequently you receive the following information.

Sl. No.	Item	Very available	Moderately available	Available	Less available	Not at all
1.	Information about market price					
2.	Information about warehouse and storage facilities					
3.	Information about product demand and supply					
4.	Information about processing / handling cost					
5.	Information about sales commission / Aratder commission					
6.	Information about quality product					
7.	Information about buyer of your product					

12. Constraints faced by the vegetable grower in marketing:
Please mention the extent of the following constraints you face during marketing?

Sl. No.	Constraints	Very high (4)	High (3)	Medium (2)	Low (1)	Not at all (0)
A.	**Transport facility**					
1.	Lack of pucca roads					
2.	Road blockade due to land slide, etc.					
3.	Bulkiness and perishable nature of the produce					
4.	Inadequate availability of vehicle for each packing					
5.	Uneven road condition					
B.	**Grading**					
6.	Lack of machine facilities					
7.	Undefined standards					
C.	**Packing material**					
8.	Poor quality					
9.	unavailability during harvesting time					
D.	**Storage of produce**					
10.	Inadequate facilities					
11.	Insufficient space					
12.	Qualitative losses					
13.	Inadequate govt. assistance					

E.	**Malpractices**					
14.	Weighing					
15.	In bidding / auctioning					
16.	High and undue market charge					
17.	More number of middleman					
18.	Arbitrary commission charges					
F.	**Market intelligence**					
19	Late information					
20.	Payment in parts					
21.	Inadequate information					
22.	Misleading information					

Recommendations:

Please suggest at least three (3) suggestions that help you to overcome those constraints:

1.	
2.	
3.	
4.	

Thanks for your co-operation

……..

Signature of the Interviewer

Date:

Correlation Matrix of the dependent and independent variables (N = 113)

Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
X_1	1.000	-	-	-	-	-	-	-	-	-		
X_2	-.304**	1.000	-	-	-	-	-	-	-	-		
X_3	-.059	-.002	1.000	-	-	-	-	-	-	-		
X_4	-.018	.435**	.184	1.000	-	-	-	-	-	-		
X_5	.510**	-.185*	-.071	-.149	1.000	-	-	-	-	-		
X_6	.094	.295**	.248**	.713**	-.043	1.000	-	-	-	-		
X_7	.008	.038	.142	.228*	-.008	.174	1.000	-	-	-		
X_8	.002	.137	-.163	-.050	.065	-.030	.089	1.000	-	-		
X_9	.047	.252**	.081	.565**	-.057	.519	.100	.079	1.000	-		
X_{10}	.009	.160	-.023	.083	.013	.318**	.034	-.032	.048	1.000		
X_{11}	-.015	-.041	.061	.096	.121	.239*	.108	.071	.125	.200*	1.000	
X_{12}	-.005	.138	.024	.397**	-.017	.066	.097	-.293**	.122	-.247**	-.218*	1.000

* = Correlation is significant at 0.05 level of probability

** = Correlation is significant at 0.01 level of probability

X_1 = Age
X_2 = Education
X_3 = Family size
X_4 = Farm size
X_5 = Vegetable cultivation experience
X_6 = Annual family income
X_7 = Credit availability
X_8 = Training received
X_9 = Extension contact
X_{10} = Knowledge on vegetable marketing
X_{11} = Availability of marketing information
X_{12} = Constraints faced in marketing