A STUDY ON PROFITABILITY AND MARKETING OF CAULIFLOWER CULTIVATION IN NARSINGDI DISTRICT OF BANGLADESH

TANHA SULTANA

DEPARTMENT OF AGRICULTURAL ECONOMICS

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

SHER-E-BANGLA NAGAR, DHAKA -1207

DECEMBER, 2018

A STUDY ON PROFITABILITY AND MARKETING OF CAULIFLOWER CULTIVATION IN NARSINGDI DISTRICT OF BANGLADESH

BY

TANHA SULTANA

REGISTRATION NO: 12-05155

A Thesis
Submitted to the Faculty of Agribusiness Management
Sher-e-Bangla Agricultural University, Dhaka-1207
in partial fulfillment of the requirements
For the degree of

MASTER OF SCIENCE
IN
AGRICULTURAL ECONOMICS

SEMESTER: DECEMBER, 2018

Approved by:

(Dr. G M Monirul Alam)	**(Prof. Dr. Md. Mizanur Rahman Sarker)**
Head	**Dean**
Department of Agribusiness	**Faculty of Agribusiness Management**
Bangabandhu Sheikh Mujibur Rahman Agricultural University	**Sher-e-Bangla Agricultural University, Dhaka**
Supervisor	**Co-supervisor**

DEPARTMENT OF AGRIBUSINESS

Bangabandhu Sheikh Mujibur Rahman Agricultural University

Salna, Gazipur-1706, Bangladesh. Tel. Pabx: 02-9205310-14, Fax: 8802-9205333

CERTIFICATE

*This is to certify that the thesis entitled "***A STUDY ON PROFITABILITY AND MARKETING OF CAULIFLOWER CULTIVATION IN NARSINGDI DISTRICT OF BANGLADESH***" submitted to the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of* ***MASTER OF SCIENCE in AGICULTURAL ECONOMICS,*** *embodies the result of a piece of bona fide research work carried out by* **TANHA SULTANA**, *Registration No.* **12-05155** *under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

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

Dated: 27 November, 2020

Place: Dhaka, Bangladesh

Dr. G M Monirul Alam

Supervisor

DEDICATED TO

MY

BELOVED PARENTS

ACKNOWLEDGEMENT

First of all I would like to thank Almighty Allah, the most merciful and compassionate, the most gracious and beneficent to Whom every praise is due and to His prophet Mohammad (SM) Who is forever a torch of knowledge and guidance for humanity as a whole with whose delighting the present and endeavour beautiful. All praises are due to the omnipotent, omnipresent and omniscient Allah, Who enabled me to pursue my higher studies in Agricultural Economics and to complete the research work and this thesis successfully for the degree of Master of Science in Agricultural Economics.

Now, I would like to pay ineffable gratitude to my supervisor ***Dr. G M Monirul Alam, Associate Professor*** *and Head, Department of Agricultural Economics, Bangabandhu Sheikh Mujibur Rahman Agricultural University, for his ever inspiring guidance, keen interest, scholarly comments and scholastic and constructive suggestions throughout the research work and preparation of thesis. I am deeply indebted to and grateful for his prompt comprehensive feedback, encouragement and patience throughout the duration of the research undertaken for this thesis. Despite an enormous workload because of his teaching and research and many others responsibilities, Dr. G M Monirul Alam has always been extremely generous without limits in giving his time and assistance. Dr. G M Monirul Alam repeatedly read earlier draft of this thesis and provide me useful guidance and helped to clear my perceptions about the complex issues related to my thesis. Without his valuable intellectual advice, precise constructive comments and help this work would never have come to life.*

I am especially grateful to my respected Co-supervisor, ***Dr. Md. Mizanur Rahman Sarker,*** *Professor, Department of Agricultural Statistics, for his proper guidance, inspiring co-operation and encouragement during the research work and preparation of thesis.*

I would also like to extend my appreciation to Professor ***Gazi M. A. Jalil****, Chairman, Department of Agricultural Economics, Sher-e-Bangla Agricultural University, Dhaka, for his sincere cooperation, valuable suggestions and encouragement at every stage of this thesis.*

I would like to express my gratitude to farmers who actively participate in this survey and most importantly help me to understand their initiatives and activities related to farming in general and in particular. They provided important data upon which different models were employed to evaluate the efficiency of farming activities. Their invaluable cooperation during my data collection process is highly acknowledged.

I found no words to thank my parents for their never ending affection and continuous support, their sacrifice and untiring efforts to fulfill my dream of higher education. They were constant source of inspiration in the critical moments of my studies.

November, 2019

Tanha Sultana

CONTENTS

CONTENTS(Cont.)

CONTENTS(Cont.)

CONTENTS (Cont.)

TABLE **PAGE**

LIST OF FIGURES **PAGE**

ABBREVIATIONS AND ACRONYMS

BBS	: Bangladesh Bureau of Statistics
BDT	: Bangladeshi Taka
TVC	: Total Variable Cost
NGO	: Non-Government Organization
PI	: Problem Index
BCR	: Benefit Cost Ratio
GOB	: Government Of Bangladesh
MOP	: Muriate of Potash
SAAOs	: Sub-Assistant Agricultural Officers
Ha	: Hectare
Kg	: Kilogram
Sqkm	:Square Kilometers
Tk.	:Taka
DAE	:Department Agricultural Extension
etal	: and others (at elli)
pH	: Puissance de Hydrogen

ABSTRACT

Cauliflower is one of the popular winter vegetables in Bangladesh. Cauliflower is low in fat, but high in dietary fiber, folate, water, and vitamin C, possessing a high nutritional density, and beneficial to human health. This study was conducted to determine the profitability, marketing channel and marketing margin of Cauliflower in Narsingdi district of Bangladesh in 2019. A total of 105 respondents were interviewed through structured survey questionnaire. The result reveals that an average 65 man-days/acre was used for Cauliflower cultivation where on an average 31 man-days/acre was family supplied labour. The total cost of cauliflower production was Tk. 75807/acre. The quantity of main product on an average was 9500 kg and per unit price was Tk. 15.50/kg. Gross return was Tk 152250/acre and the benefit cost ratio was 2.04. Econometric analysis indicates that variables like seed, TSP, pesticides and farmers' experience had positive and statistically significant influence on Cauliflower production. The marketing costs of Faria (local traders), Bepari, Aratdar, Wholesaler and Retailer of cauliflower were Tk.68.72, Tk.161.37, Tk.135.09, Tk.155.66, and Tk. 154.39 per quintal respectively. It was revealed that marketing margin of the Faria, Bepari, Aratdar, Wholesaler and Retailer was Tk.170, Tk.210, Tk.240, Tk. 260 and Tk. 410 per quintal, respectively. In the study area farmers suffered with some problems in marketing their products such as poor communication and transport facilities, dominance of intermediaries, lack of adequate storage facilities, and low price in harvesting season. Providing good quality seed, storage facilities and helping them in forming ‘farmers group' for collective marketing of their products will contribute to increase their economic return.

CHAPTER I
INTRODUCTION

1.1 Background of the study

Bangladesh is an agriculture dominant country where most of the people depend directly or indirectly on agriculture for their livelihood. Agriculture has a great contribution to the Gross Domestic Product (GDP) to the country. The agricultural sector (crops, animal farming, forests, and fishing) contributes 14.23 percent to the total GDP of the country and provides employment of about 40.62 percent of the labor force (Bangladesh Economic Review, 2019). Earlier more than 50% of GDP came from agriculture sector. Still, agriculture sector plays a vital role in the economy of Bangladesh.

Government of Bangladesh is concerned about the contribution of agriculture sector. A notable portion of the annual budget has consistently been allocated for the development of the sector. The government has also been launching many programs one after another in order to boost up the agriculture production. Production of crops, cost of production of crops and market price of crops are directly interrelated. The government has to give proper attention to these three factors as stated so that farmers get the fair price of the crop produced during the harvest time. Generally, the government has to declare procurement price at the harvesting time of the crop so that the producer gets the proper price. If the procurement price is lower than the production cost, producers get looser and discouraged to produce more crops and if the procurement price is higher than the production cost, producers get profit and encouragement. This type of loss and profit influence positively or negatively on the cultivation of next year's crop.

Bangladesh by birth possesses very fertile land in which diversified crops can grow very easily. Various types of crops are produced in this country. Cauliflower is a very popular winter vegetable in Bangladesh. This is one of

the main vegetables in other countries of the world. Cauliflower is cultivated in the winter season in almost all parts of Bangladesh. It is an annual plant that is reproduced by seed and seedlings. Cauliflower is low in fat, but high in dietary fiber, folate, water, and vitamin C, possessing a high nutritional density. Cauliflower contains several phytochemicals, usually occurring in the cabbage family that may be beneficial to human health. A high intake of cauliflower has been associated with reduced risk of aggressive prostate cancer.

1.2 Cauliflower production in Bangladesh

Cauliflower is an important vegetable crop that contributes to mentionable shares of total vegetable production. The production of cauliflower largely depends on the use of seeds, fertilizers, irrigation, pesticide, etc. The Government of Bangladesh has, therefore, provided priority to increase the production of cauliflower by giving subsidy to the farmers on different inputs such as seeds, fertilizer, irrigation, etc. to achieve self-sufficiency in cauliflower production. Poverty cannot be reduced to the desired level except increasing productivity of the agriculture sector and at the same time, it is to be assured that farmers get fair price of the crops. Natural calamities like drought, flood, cyclone, tornado, etc. are a very regular phenomenon that hinders the production of agriculture to a great extent. Cultivable land is being decreased due to the pressure of a massive population. As a result, food security is being threatened and the risk of poor people is being increased.

Cauliflower is grown mainly as a Rabi crop during winter. The production of vegetables including cauliflower is increasing day by day in Bangladesh. Among all the vegetables produced in the country, cauliflower dominates a major share in terms of total cropping area and production. It grows in all the districts of Bangladesh but plenty of cauliflower are produced in the region of Dhaka, Jeshore, Rajshahi, Rangpur, Tangail, and Kustia. Cauliflower is grown on many different types of soil but does best in rich, well-drained soil with a high moisture-holding capacity. High humus content in the soil will provide

better aeration and water penetration. If soil is low in organic matter, stable or green manures can be supplied. Cauliflower grows best in neutral or slightly acid soil (pH 6.0 to 6.5). Well-drained, sandy loam soils are suited to early varieties, whereas loamy and clay loam soils are suited to late ones because they are to some extent tolerant of poor drainage (Akter, *et. al*. 2011). Good soil preparation is important when planting cauliflower. The best way to determine soil conditions is to have a soil test performed. Crop agriculture in Bangladesh is constrained every year by challenges, such as a)Loss of Arable Land ,b) Population Growth, c) Climate Changes, d) Inadequate Management Practices ,e)Unfair Price of Produces, and f)Insufficient Investment in Research. In Bangladesh, about 80,000 ha of arable land are going out of production every year. The loss is alarming and needs to be addressed immediately. The land use policy of the government should be updated and implemented immediately to stop further loss of arable land (Mondal, 2010).

In general, cauliflower is not difficult to grow, but it is sensitive to extreme temperatures. Primarily a cool-weather crop, cauliflower would not produce heads in hot weather and is frost-tolerant only as a mature fall crop. Most cultivators need about 3 months of cool weather to mature. To grow cauliflower successfully, the key steps are to choose the right cultivar for climate, plant at the proper time, and provide a steady supply of moisture. It grows best in a cool moist climate and is very hardy to frost. It is very sensitive to temperature depending on varieties so, selection of varieties depends on the time of planting. Its growth is best at a temperature of about 15°C to 25°c. Temperatures below this and above are not suited for it. In Cauliflower, harvesting is done depending on the maturity of the head and demand in the market. Normally harvesting is done when the head is firm. After the appearance of head harvesting may be done 90-100 days after seedling. If prices are high in the market harvesting is done earlier when the head is small. Proper grading is followed before heads are sent to the market.

The yield of cauliflower depends upon the variety, growing season and management practices, Hybrid cauliflower yields up to 40 tons per hectare. The yield of early varieties ranges between 12 to 15 tones/ha. The yield of late-season varieties is about 25 to 28 tones /ha. Farmers of Bangladesh are growing cauliflower following indigenous methods with the poor yield rate. The reasons behind such low yield due to lack of high yielding variety and method of production practices followed by the local growers. The yield of cauliflower can be increased by adopting improve production technology like proper plant spacing. Although cauliflower is an important vegetable crop of Bangladesh, its production technologies have not been standardized from the scientific and economic point of view. Therefore, research needs to bring improvement in production technologies as well as considering an economic return. If nature favors, farmers get a moderately good harvest.

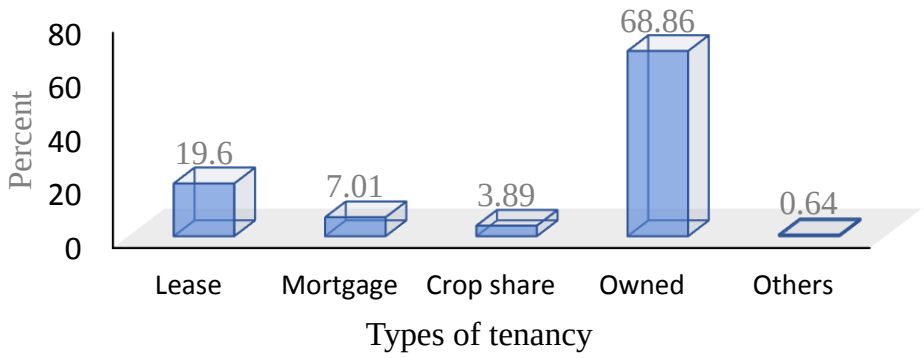

Figure 1.1 Percentage distribution of cauliflower cultivation area by tenancy
Source: BBS 2015

The Figure 1.1 shows that acres of land are under cauliflower crop of which an overwhelming majority of 68.86 percent is owned land, lease land 19.60 percent, mortgage land 7.01 percent, share cropland 3.89 percent and other land 0.64 percent. Figure 1.2 shows that out of total acres of land an overwhelming majority 86 acres are used for single cropped area trailing far behind by mixed cropped area of 14 acres of land.

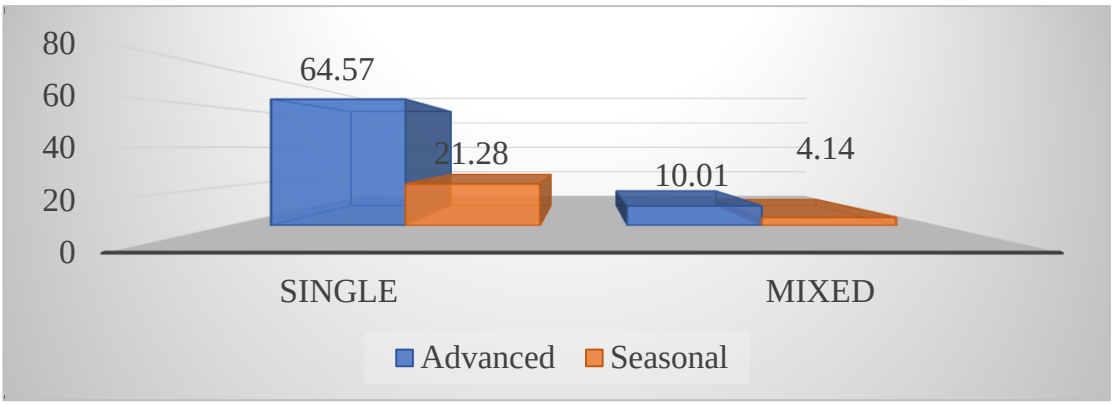

Figure 1.2: Percentage distribution of cauliflower producing area by cultivation type & farming time.

Source: BBS 2015.

Figure 1.3 presents varieties of cauliflower crop (local, hybrid and others) grown in area by farming time of advance and seasonal. Out of the total varieties, hybrid has the highest cultivation area of cauliflower which is 80.56 percent. The second highest 17.35percent land is used for the local variety of cauliflower. And the remaining land areas of 2.09 percent have been used for other varieties of cauliflower.

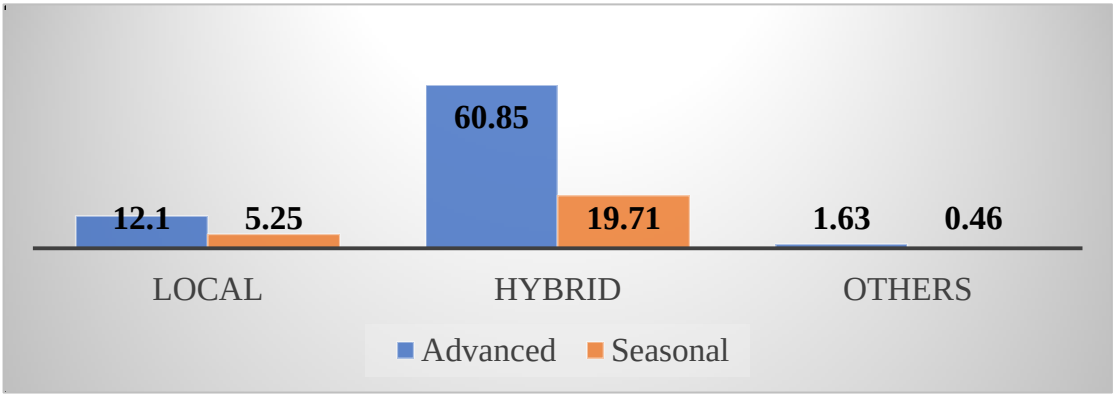

Figure: 1.3 Percentage distribution of varieties of cauliflower (area) by farming time

Source: BBS 2015

The graph also shows that the hybrid type cauliflower is grown the highest 75.53 percent in seasonal time and the lowest 24.47 percent in advance farming.

1.3 Economic importance of vegetables

Vegetable production is very suitable in Bangladesh due to fertile land and the environment. Vegetable contributes an important share of the total agricultural export in Bangladesh. Vegetables and crops sub-sector also contributes an important share to the agricultural GDP which is near about 9.71 % (Bangladesh Economic Review, 2018). More than 90 different vegetables are grown in Bangladesh. Vegetables are grown in about 0.452 million hectares of cultivated land in Bangladesh. The current production of vegetables is about 3.06 million MT (BBS, 2018). In the year 2016-2017, the national production of winter vegetables was 1.73 million MT and the production area was 1.96 lakh hectares. In the year 2016-17, the national production of cauliflower 277500 MT and the production area was 80195 acres, respectively, (BBS 2017). So, cabbage and cauliflower contribute 23.58% of the total winter vegetable production (Figure 1.4).

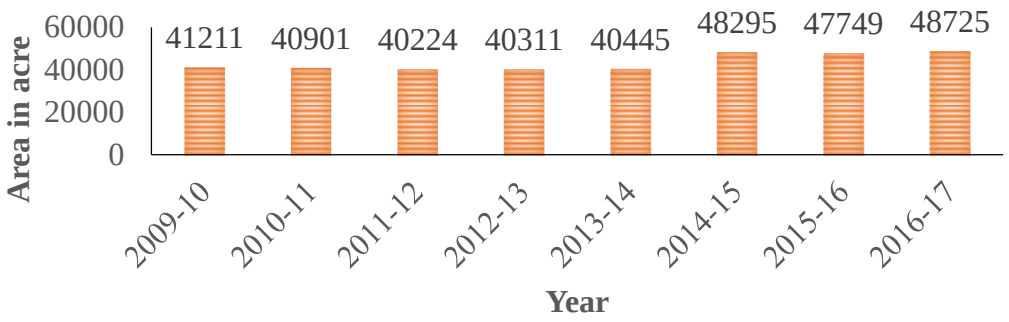

Figure 1.4: Area of cauliflower cultivation of Bangladesh.
Source: BBS: 2018

Vegetables play an important role in solving the problems of food production and providing a balanced diet. Vegetables not only meet home requirements but also the important source of income for the farmers and traders. To recover people from malnutrition, the consumption of vegetables needs to be increased. Vegetables play a significant role in nutritional improvement, employment

generation, food and financial security of the people of Bangladesh. Cauliflower production technology in homestead area by rural housewives is increasing day by day (Begum, 2001).

The figure 1.4 and 1.5 indicate that both area and the production is increasing every year to fulfill the demand of the population of the country. The cole crops reduce the risk of cancer, particularly cancer of the alimentary canal and respiratory tract. The cole crop, a very important group of winter season vegetables, includes cauliflower, cabbage, khol rabi, broccoli, brussels, sprouts, and chinese cabbage (Wadhwani and Bhogal, 2003).Potato and cauliflower are short day plant.The production of potato and cauliflower are labor intensive and take less water than cereal crops (Ahmed,2001). Cabbage and cauliflower are the important source of vitamin A, C, and K, iron, and calcium, etc. which are important to the consumer as a nutritional value. Production and marketing of such vegetables are labour intensive and these create more employment opportunities (Figure 1.5).

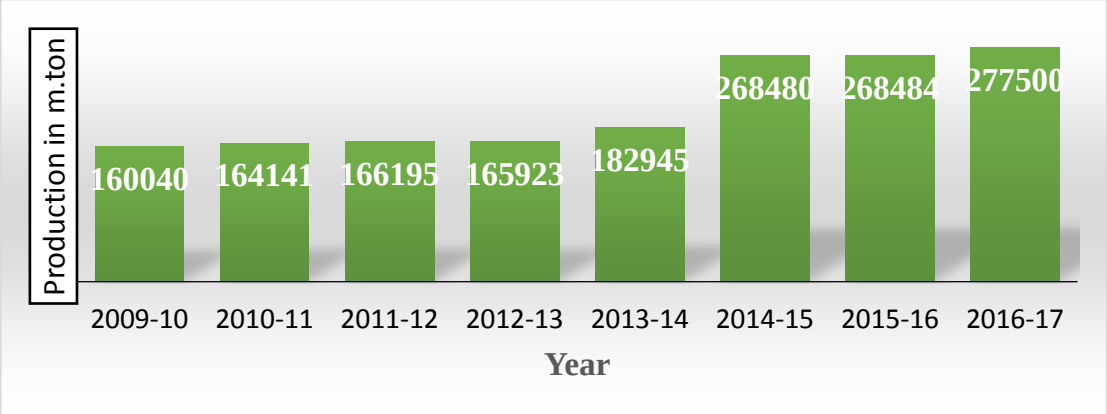

Figure 1.5: Production of cauliflower cultivation of Bangladesh.
Source: BBS: 2018

1.4 Justification of the study

The density of the population in Bangladesh is much higher compared to that of other countries of the world. There is the little scope of bringing more land

under cultivation due to limited cultivable areas. As the infrastructural and development activities are increasing, it makes the cultivable land smaller and smaller gradually. Realizing this situation, the government of Bangladesh has placed much emphasis on cauliflower production to meet the nutritional need for a growing population and for increasing employment opportunities and income of farmers. Cauliflower is an important diversified winter crops.

Before giving emphasis on the production of cauliflower, relevant and adequate information on different aspects of the production and marketing of cauliflower at farm level is required. Such knowledge of production is also necessary to make appropriate decisions by the growers especially when several alternatives are open to them. Few studies on cauliflower production are undertaken either by the government or private organization in order to satisfy the demand of extension workers, policymakers, research personnel, NGO officials and the farmers (see, Chapter II for details). Research on marketing issue of different vegetables is very limited in the context of Bangladesh. The present study is an attempt to determine the production and marketing of cauliflower and to identify the main constraint that affects marketing. Therefore, the individual farmers would be benefited from this study for effective operation and management of their farms. The result of this study will be helpful to the planner for making an effective and judicious plan. This study will be helpful to the research workers for further studies of similar nature and to extension personnel that are directly involved in the different agricultural development programs and help them to learn about various problems of the selected winter vegetables.

1.5 Objectives of the study

The specific objectives of the study are given below:

i. To determine the socio-economic characteristics of the cauliflower growers;
ii. To estimate the profitability and factors influencing production of cauliflower; and
iii. To determine the marketing channel and marketing margin of various intermediaries.

1.6 Outline of the study

The study consists of eight chapters. Chapter 1 describes the introduction of the study, Chapter 2 provides review of literature. Chapter 3 deals with the methodology of the study. In Chapter 4, the socioeconomic characteristics of the sample farmers, In Chapter 5 detects production cost and profit, BCR etc. In Chapter 6 deals with the influencing factors of cauliflower production. In Chapter 7 Marketing channel, cost and margin etc, are presented. Finally, the conclusion, and recommendations of the study are presented in Chapter 8.

CHAPTER II
LITERATURE REVIEW

2.1 Introduction

Review of literature is significantly imperative for any scientific research .It aids to identify prevailing information gap of any research area. Many Studies on profitability and marketing of different agricultural commodities have been made in Bangladesh. But a very few studies have been made to deal with the problems of marketing and suggest to measures for the improvement of Cauliflower production, profitability and marketing in Bangladesh. Some of the studies which are relevant to this study are reviewed in this section. This chapter also would discuss the previous study regarding vegetable cultivation in our country and the world. Significant studies regarding vegetable cultivation are discussed below.

Parajuli (2019) studied on a variety of *Brassica oleracea,* Pusa Kartiki which is an early season variety if grown commercially in Terai condition can give higher return to a farmer. The main objective was to observe the cauliflower production under the observation trail by FYM, vermicompost, biofertilizer, and NPK. Their aim was also to know about the commercial production of cauliflower and developing entrepreneurship skills among the students. Kabiraj et al. (2017) conducted a study on "A Study on Cauliflower (*Brassica oleracea* var. botrytis) Based Intercropping System". This study examined the performance of cauliflower based intercropping system. The experiment consisted of 7 treatments, where one with sole cauliflower as mono crop and in the remaining six French bean, pea, beet, carrot, palak and coriander were included as intercrops with the cauliflower. The experiment was laid out in the randomized block design with three replications. Sole crop of cauliflower recorded the highest performance for all the growth characters, yield attributes and yield. Whereas, inclusion of legumes in intercropping system was helpful

towards improvement of physical as well as bio-chemical properties of cauliflower curd. LER also improved with legume intercropping. However, the combined gross biomass production, net return in monetary value and B: C ratio were at a bit higher side with cauliflower + beet, cauliflower + carrot and cauliflower + coriander intercropping system. The study directed towards the fact that intercropping with root crops may be advocated for more return per unit area, while to get promising quality of cauliflower legume intercrops are always preferable.

Islam et al. (2018) conducted a research to examine the cost and return of vegetables farmer and trader, their problems in farming and trading in the context of Bangladesh's winter vegetables. Bean and Cauliflower are being taken purposively to unearth the real picture as both are widely cultivated in the winter season in rural Bangladesh. Mainly primary data, collected through a structured questionnaire, have used to carry out the research. According to the study, the average per unit net margin of a farmer from Bean and Cauliflower production was BDT. 17.76 and BDT. 2.93 respectively where per unit cost of Bean and Cauliflower was BDT. 10.76 and BDT. 5.66. The study found that the timely availability of fertilizer and insecticide, reasonable price of both fertilizer and insecticides can increase vegetable production. On the other hand, maximum vegetable traders recommended that infrastructure development can mobilize vegetable trading. The study also suggested that improving transportation facilities, timely availability of fertilizer and insecticide with reasonable price and transforming the traditional supply chain to commercial one would increase production so as to the net margin of both farmers and traders.

Sharmin et al. (2018) determined that winter vegetable production has increased tremendously in Bangladesh. Excessive supply of vegetables reduces the market price that leads to economic loss at the farm level. This study assesses the growth and trend of winter vegetable production, yield, and area in

Bangladesh. A semi log regression model was used to assess the growth and trend of winter vegetables while Winston Prais transformation was utilized to solve the autocorrelation problem. Data of some major winter vegetables like tomato, rabi brinjal, rabi pumpkin, water gourd, cauliflower, cabbage, radish, bean, green spinach were collected for this study. Results found that growth of tomato, cauliflower and cabbage production was about 5% which was much higher than other winter vegetables. The growth of the cultivated area is about 3% per annum for most of the vegetables. Production of winter vegetables increases because of yield and area growth. The government can attempt to increase export of tomato, cauliflower, and cabbage. Moreover, the yield growth of green spinach and radish is necessary to increase both production and export.

Kumar et al. (2017) found the importance of the vegetable crops in nutritional security and generating income and employment to the farm population a study on economics of cauliflower cultivation. A stratified purposive cum random sampling technique was applied to select the sample respondents' primary data were collected through the interview method. Tabular and function analysis was done to present the result. The overall average size of holding was 0.78 ha. which were 0.56 ha., 1.19 ha. and 2.76 ha. at marginal, small and medium size of farms respectively. The cost of cultivation and different income measures were also had a positive trend with the size of farms. Output – Input ratio were 1:1.98, 1:2.02, 1:2.11 on marginal, small and medium size group of farm which was recorded as 1:2.00 at overall farm. Cauliflower cultivation was found profitable on each size group of farms and it was characterized of decreasing returns to scale as the sum of elasticity was less than one in all categories of farms. The value of multiple coefficient of determination (R^2) shows 93.65, 80.67 and 95.87 percent variation in output due to all included input factors in study. At last cauliflower cultivation was found more suitable for the farmers of the study area.

Kumar (2017) conducted a study to know the gap between knowledge and adoption level regarding the package of practices of cauliflower cultivation. It was observed that higher knowledge found in fertilizer management with a mean percentage score of 86.66, was ranked first and lowest in soil treated with a mean percentage score of 50.41, it was ranked in fifteenth. The highest adoption was found in fertilizer management with a mean percentage score of 79.58, it was ranked in first and lowest adoption was found in soil treatment with mean percentage score of 47.08, it was ranked in fifteenth.

Shaheen (2011) conducted study on "technical efficiency of off season cauliflower production in panjab".maximum and minimum level of technical efficiency in off season 1 was 0.39 and 0.99 while in season 2 it was 0.48 to 0.99 repectively.The resuls of the study implied that the small farmers were more efficient due to better utilization of available resources as compared to medium and large farmers.

Somajpoti et al. (2016) attempted to examine the economic analysis of cauliflower and cabbage production in selected areas of Sylhet district. A total of 45 farmers were randomly selected from three villages namely Dighirpar, Basantagaon and Paschimdarsa at Sylhet Sadar Upazila in Sylhet district. The major findings of this study revealed that production of the selected homestead vegetables were profitable. Per acre gross cost of production of cauliflower and cabbage were Tk. 93860.55 and Tk. 92135.8, respectively and the corresponding gross returns were Tk. 229407.4 and Tk. 230800, respectively. Per acre net returns of producing cauliflower and cabbage were Tk. 135546.85 and Tk. 138664.2, respectively. Benefit-cost ratios of cauliflower and cabbage production acre-1 were 2.44 and 2.50, respectively. The farmers earned the highest profit from cabbage production. The results of Cobb-Douglas production function model indicated that acre-1 gross returns were significantly influenced by the use of human labour, tillage operation, seeds, fertilizers, manure, irrigation and insecticides. Some essential policy recommendations

have been arisen which are: input and price support, and motivation and training programmes should be arranged by different government and non-government organizations and public-private partnership should be emphasized for creating scope to improve the overall economic condition of the farmers through homestead vegetable farming.

Magsi et al. (2016) shredded in order to explore the profitability of Cauliflower crops grown in two different seasons. For the purpose, primary data were randomly collected from 120 Cauliflower farmers, including 60 respondents from each season. Results revealed that the majority of the growers were between 36-50 years of age, with 8-15 years of farming experience. Results further exposed that the majority of the growers (65 percent) were tenants and they used to pay the high marketing cost as compared to the production cost, because of the identical vegetable marketing system in the study area. Although, the physical productivity of the crop was perceived higher in the winter season, but the profitability in price per bag was recorded higher in summer season.

Shankar et al. (2016) studied to analyze marketed surplus and price spread for Cauliflower. Cluster sampling techniques was used to select the sample villages and respondents. Primary data were collected by personal interview of respondents. Simple statistical tools were employed to accomplish different objectives of the study. The marketed surplus of the medium category of farms have slightly higher surplus than marginal, large and small categories of farms. Their relative proportion was 94.84 percent, 94.51 percent, 94.49 percent and 94.48 percent respectively of the total production. The share of producer in consumer rupee is high in channel were there are less number of intermediaries. The marketing cost incurred by wholesaler in different channels were estimated 5.01 percent, 6.39 percent and 7.88 percent of the consumer price respectively and their corresponding net margins were 9.68 percent, 9.61 percent and 10.23 percent of the price paid by the consumer

Debnath et al (2015) conducted a study with four cauliflower genotypes to evaluate growth and yield of cauliflower genotypes and to identify suitable planting time in Sylhet conditions. Results showed that sowing dates and genotypes had significant influenced on growth and yield of cauliflower.

Ravekar et al. (2015) run a research on the Cole crops including Cauliflower, Cabbage, grower. With regard to marketing study, three types of marketing channels were observed like producer-consumer (Channel-I), Producer-Retailer- Consumer (Channel-II) and Producer – Commission agent cum Wholesaler – Retailer - Consumer (Channel-III). Maximum percentage of produce of cauliflower and cabbage was sold through Channel-III. Marketing cost was maximum in Channel-III as compared to other Channels. Producer's share in consumer's rupee was maximum in Channel-I while it was minimum in Channel-III. Constraints and suggestions of cauliflower and cabbage grower in the form of Frequency and percent were calculated on this present study. As regards to the land holding, In case of cauliflower growers the highest (68.34 %) of respondents were found in the land holding upto 2 ha, 23.33 per cent were in land holding 2 to 5 ha and 8.33 per cent were in land holding 5 and above. The average cost of cultivation of cauliflower was Rs.79478.62 and Cabbage is Rs.72462.99, respectively.

Hoq et al. (2014) investigated in two districts Comilla and Jessore to examine the marketing chain, marketing cost, and margin, problems and some probable solutions for cabbage and cauliflower marketing. A total of 92 respondents consisting of 20 vegetable growers and 72 vegetable traders were selected as sample for the present study. About 60% farmers used van to carry the vegetables to the market. The average cauliflower marketing cost of farmer was higher than cabbage which was Tk.36.59 per quintal due to its special transportation arrangement. On the basis of the intermediaries, seven marketing chain was identified as a dominant. The chain Farmer→Local Traders (Faria)

→ Bepari→ Aratdar (urban) →Retailer (urban) →Consumer was identified as most dominant. About 39.60% product runs through this chain. In cauliflower marketing local traders, Bepari, retailer (urban) and retailer (rural) incurred the highest marketing cost than cabbage which was averaged Tk.65.75, Tk.248.47, Tk.205.69, and Tk.78.21, respectively, due to its perishable nature. In the case of farmers, local traders (Faria) and Bepari transportation cost is the highest. Inadequate storage facilities and dominance of intermediaries were the major marketing problems identified by the farmers. Unstable price, barrier to entry in the terminal market, delays on ferry ghat and spoilage and damage were the major marketing problem faced by the different intermediaries.

Akter (2011) studied to assess the comparative profitability of selected winter vegetables: namely tomato, cauliflower, and cabbage. The major findings of the study revealed that the production of all the selected vegetables was profitable. The per hectare gross cost of production of tomato, cauliflower, and cabbage was Tk. 118000, 116977 and 120522, respectively and the corresponding gross returns were Tk. 217020, 210000 and 220000, respectively. The per hectare net returns of producing tomato, cauliflower and cabbage were Tk. 97000, 93023 and 99478, respectively. In other words, all the selected winter vegetables were highly profitable to the farmers. However, the farmers earned the highest profit from cabbage. The revenue type Cobb-Douglas production function analysis indicated that per hectare gross returns were significantly influenced by the use of human labor, tillage, seeds, fertilizers, irrigation and insecticides. These factors were directly or jointly responsible for influencing the per hectare gross returns of tomato, cauliflower and cabbage. The study reported some problems and constraints which are related to the production and marketing of these vegetables. Based on the findings of the study, some recommendations were made to improve cultural and management practices for selected winter vegetable farming with a view to increase the income and employment opportunities of the farmers.

Pokhrel (2010) explored that vegetable production and marketing related problems that could have hindered farmers from getting potential benefit, the study evaluates farm performances in selective vegetable. It describes farm strategies on pre and postharvest crop management, explores marketing channels and mechanisms of commodity transfer and price formation and assesses farm benefits of selective crops. Study method is based on exploration of processes and costs of production and marketing following observations and short interviews with local farmers in small groups, local traders in market centers and local informants. Marketing channels are explored, farm profits and shares on wholesale prices explained through cost-benefit assessments and prospects of vegetable production and marketing described.

2.2 Research Gaps

Although several studies have been conducted earlier to highlight the socio-economic consequences and problem and the prospect of different vegetables. But the number of marketing studies on the proposed vegetables is very scanty. Therefore, this study has been taken to estimate the profitability of cauliflower and the marketing channel and margin of various intermediaries. This study will also investigate the problems associated with cauliflower production and marketing in Bangladesh.

CHAPTER III
RESEARCH METHODOLOGY

3.1 Introduction

Methodology is an indispensable and integral part of any study. The reliability of a specific study finding depends to a great extent on the appropriate methodology used in the study. Improper methodology very often leads to misleading result. So, careful considerations are needed by an author to follow a scientific and logical methodology for carrying out the study. The author has great responsibility in describing clearly what sorts of method and procedure is to be followed in selecting the study areas, the sources of data and the analysis as well as interpretations to arrive at a meaningful conclusion.

This chapter presents a detailed sequential step of research work, for instance, selection of study areas, selection of study period, sources of data, processing of data and analytical techniques.

3.2 Selection of the Study Area

Selection of the study area is crucial for the acceptance of research findings. For this study two upazilas namely of Narsingdi district of Bangladesh were selected purposively. Two villages were randomly selected from each upazilas. The study areas are known for cauliflower cultivation. The primary data was collected from retailer, aratdar and wholesaler for marketing analysis. Data were also collected from the local market and agricultural extension office.

The area of Shibpur Upazila is 206.98 sq km, located in between 23°56' and 24°07' north latitudes and in between 90°38' and 90°50' east longitudes. It is bounded by Monohardi Upazila on the north, Raipura, Narsingdi Sadar and Palash Upazilas on the south, Belabo and Raipura Upazilas on the east, Polash and Kapasia Upazilas on the west covering total population is 265177 where

the male is 134255 and female is 130922. Average literacy is 49.3% where the male

is 51.1% and female 47.6%.Main sources of income are agriculture 54.55%, non-agricultural labourer 2.08%, industry 3.16%, commerce 15.07%, transport and communication 4.77%, service 8.21%, construction 1.55%, religious service 0.22%, rent and remittance 2.41% and others 7.79%. Ownership of agricultural land is landowner 67.42%, landless 32.58%. Main crops are rice, jute, ginger,

turmeric, cauliflower, vegetable etc (BBS 2017). Extinct or nearly extinct crops are sesame, mustard, sweet cauliflower, kaun, linseed, china, arahar. Main fruits are mango, jackfruit, banana, papaya, plum, guava, shaddock, kamranga.

Source: Banglapedia.com/map/narsingdi

The reasons for selecting this study area for the present study are given below:

- ❖ Comparatively higher concentration of cauliflower farming.
- ❖ These villages had some identical characteristics like homogeneous soil type, topographical and climatic condition for producing cauliflower.
- ❖ Easy accessibility and good communication facilities.
- ❖ Researcher's belief about getting well co-operation from the selected respondent and
- ❖ No such study was conducted in this area.

3.3. Study population and sampling strategy

The population of this study is all farm households residing in the selected villages (Table. 3.1). Thus there are many farm households. The standard statistical formula for selecting a sample size results in a huge number which is impractical for an individual researcher because of time and funding constraints (Blaikie 2010; Gilbert 2008). Since all the farmers in the area face similar socio-economic, environmental and climate conditions in their farming activities, they make up a mostly homogeneous group which validates the use of a small sample size which can be representative of the whole population (Alam, et. al. 2016; Blaikie, 2010; Gilbert, 2008). Therefore, the sample size is determined purposively depending on the context rather than a statistical formula. This study aimed to survey a sample of 80 cauliflower farming households and 25 respondents from intermediaries. Respondents were selected randomly within the villages. This was expected to reflect the farming features of all farmers in the villages.

A completed list of all rice farming households in the respective villages was collected from the Sub-Assistant Agricultural Officers (SAAOs) in the study areas. The numbered list provided names and addresses of farmers with their farm sizes. Afterward, a computer-generated random number table was applied

to the list to select 60 farm households. In this way, the random sampling procedure was ensured.

Table 3.1: Selected study areas for primary data collection

Upazilas	Villages
Shibpur	Shibpur Sadar,Mojlishpur
Polash	Shekandardi, Charsindur

Table 3.2: Respondents

Respondents	**No. of the respondents**
Farmers	80
Faria	5
Bepari	5
Aratdar	5
Wholesaler	5
Retailer	5
Total	105

3.4 Sources of Data

Data required for the present study were collected from primary and secondary sources. Primary data were obtained from farmers and secondary data were collected from various published sources. Secondary sources were Bangladesh Bureau of Statistics (BBS), Department Agricultural Extension (DAE), Department of Agricultural Marketing, and other related agencies in Bangladesh.

3.5 Preparation of the Survey Schedule

The preparation of survey schedules is of crucial importance in this study. A comprehensive survey schedule was prepared to collect necessary information from the concerned respondent in such a way that all relevant information needed for cauliflower farming could be easily obtained within the shortest possible time. The interview schedule was pretested for judging their suitability. After pre-testing, the schedule was finalized.

3.6 Collection of Data

To satisfy the objectives of the study, necessary data were collected by visiting each farm personally and by interviewing them with the help of a pretested interview schedule. Usually, most of the respondent does not keep records of their activities. Hence it is very difficult to collect actual data and the researcher has to rely on the memory of the respondent. Before going to an actual interview, a brief introduction to the aims and objectives of the study was given to each respondent. The question was asked systematically in a very simple manner and the information was recorded on the interview schedule. When each interview was over the interview schedule was checked and verified to be sure that information to each of the items had been properly recorded. In order to minimize errors, data were collected in local units. These were subsequently converted into an appropriate standard unit. The data collection period was 1st August to 31st August 2019. In order to obtain reliable data the researcher initially visited several times to introduces himself with the people of the study areas during the season. Secondary data were collected through literature and different publications. The study farmers are categorized as: landless farmers (less than 49 decimal), small farmer (50-249 decimal), medium farmer (250-749 decimal) and large farmer (above 750 decimal) (GOB, 2009).

3.7 Editing and Tabulation of Data

After the collection of primary data, the filled schedules were edited for analysis. These data were verified to eliminate possible errors and inconsistencies. All the collected data were summarized and scrutinized carefully. For data entry and data analysis, the Microsoft Excel programs and SPSS and STATA programs was used. It might be observed here that information was collected initially in local units and after checking the collected data, it was converted into standard units. Finally, a few relevant tables were prepared according to necessity of analysis to meet the objectives of the study.

3.8 Analytical Techniques

Data were analyzed with the purpose of fulfilling the objectives of the study. Both descriptive and statistical analysis was used for analyzing the data.

3.8.1 Descriptive Analysis

Tabular technique of analysis was generally used to find out the socio-demographic profile of the respondent, to determine the cost, returns and profitability of cauliflower farm enterprises. It is simple in calculation, widely used and easy to understand. It was used to get the simple measures like average, percentage etc.

3.8.2 Production Function Analysis

The production function represents the technological relationship between output and factor inputs. To estimate the production function, one requires development of its properties leading to specification of an explicit functional form. One of the most widely used production function for empirical estimation is the Cobb Douglas production. This function was originally used by C.W. Cobb and P.H. Douglas in twenties to estimate the marginal productivities of labor and capital in American manufacturing industries. Their main purpose was to estimate the shares of labor and capital in total product; hence they used this function with the constraint that the sum of elasticities or regression coefficients should total one. Later on, they relaxed this restraint. Cobb and Douglas originally fitted the function to time series 1930s and 1940s; the same form was used for cross section of industries. This form of the function was subsequently used in many production function studies for technical units (crops, livestock) and farm-firms in agricultures. The popularity of this function is because of the following characteristics of the function:

(i) It directly provides the elasticities of production with respect to inputs;

(ii) It allows more degrees of freedom than other algebraic forms (like quadratic function) which allow increasing or decreasing marginal productivities, and

(iii) It simplifies the calculation by reducing the number of regression to be handled in regression analysis. The original form used by Cobb and Douglas was

$$\mathbf{Q = aL^{\beta}K^{1-\beta}U}$$

This forces sum of elasticities to one. Their later modification was

$$\mathbf{Q = aL^{\alpha}K^{\beta}U}$$

Where, $\boldsymbol{\alpha + \beta} \neq 1$. In agriculture, this form of function has not been used in its original form. Neither the sum of elasticities is kept equal to one nor is the number of variables limited to two. Even then as the basic idea of functional form was provided by Cobb and Douglas, various forms of this function have continued to be called as Cobb-Douglas production function. The Cobb–Douglas production function, in its stochastic form, may be expressed as

$$Y_i = \beta_1 X_{2i}\, \beta_2\, X_{3i}\, \beta_3\, e^{ui} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3.1)$$

Where,

Y = output

X_2 = labor input

X_3 = Capital input

u = stochastic disturbance term,

e = base of natural logarithm.

From Eq. (3.1) it is clear that the relationship between output and the two inputs is nonlinear. However, if we log-transform this model, we obtain:

$$\ln Y_i = \ln\beta_1 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + u_i$$
$$= \beta_0 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + u_i \quad \ldots\ldots\ldots\ldots \quad (3.2)$$

Where $\beta_0 = \ln\beta_1$.

Thus written, the model is linear in the parameters β_0, β_2, and β_3

The properties of the Cobb–Douglas production function are quite well known and is therefore a linear regression model. Notice, though, it is nonlinear in the

variables Y and X but linear in the logs of these variables. In short, (3.2) is a log-log, double-log, or log linear model, the multiple regression counter part of the two-variable log-linear model.

The properties of the Cobb–Douglas production function are quite well known:

1. β_2 is the (partial) elasticity of output with respect to the labor input, that is, it measures the percentage change in output for, say, a 1 percent change in the labor input, holding the capital input constant.
2. β_3 is the (partial) elasticity of output with respect to the capital input, holding the labor input constant.
3. The sum (β_2+ $\beta_{3)}$ gives information about the returns to scale, that is, the response of output to a proportionate change in the inputs. If this sum is 1, then there are constant returns to scale, that is, doubling the inputs will double the output, tripling the inputs will triple the output, and so on. If the sum is less than 1, there are decreasing returns to scale—doubling the inputs will less than double the output. Finally, if the sum is greater than 1, there are increasing returns to scale— doubling the inputs will more than double the output.

Before proceeding further, note that whenever you have a log–linear regression model involving any number of variables the coefficient of each of the X variables measures the (partial) elasticity of the dependent variable Y with respect to that variable. Thus, if you have a k-variable log-linear model:

$$\ln Y_i = \beta_0 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \ldots \ldots + \beta_k \ln X_{ki} + u_i \ldots\ldots\ldots\ldots (3.3)$$

Each of the (partial) regression coefficients, β_2 through β_k, is the (partial) elasticity of Y with respect to variables X_2 through X_k. Assuming that the model (3.2) satisfies the assumptions of the classical linear regression model (Acharaya, 1988).

3.8.3 Specification of the Cobb-Douglas Production Function

The input-output relationships in cauliflower farming was analyzed with the help of Cobb-Douglas production function approach. To determine the contribution of the most important variables in the production process of cauliflower farming, the following specification of the model was used.

$Y = aX_1\ b_1X_2\ b_2X_3\ b_3X_4\ b_4X_5\ b_5X_6\ b_6\ e^{ui}$ …….. (3.4).

The Cobb-Douglas production function was transformed into following logarithmic form so that it could be solved by Ordinary Least Squares (OLS) method.

$\ln Y = \ln a + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + U_i$ ……(3.5)

Where, Y= Gross income from year round cauliflower (Tk/acre);
Y= Return per hectare (Tk/acre);
Ina= Intercept of the function
X_1= Cost of pesticide (Tk/acre)
X_2= Cost of seed (Tk/acre)
X_3= Experience (year)
X_4= Cost of MOP (Tk/acre)
X_5 = Cost of TSP (Tk/acre)
X_6 = cost of urea (Tk/acre)
$b_1, b_2 \ldots b_6$ = Coefficients of the respective input to be estimated; and
U_i = Error term. Coefficient of the respective variable; i= 1, 2…….6.

3.9 Multicollinearity Test

Economic variables usually exhibit a certain degree of interdependency mostly due to the general interdependence of economic phenomena. However, it becomes difficult to disentangle the effects of each of the explanatory variables on the explained variable where the explanatory variables are highly inter-

correlated. The practical question that needs to be asked is how these inter-correlations can be a problem in our inference about the individual parameters and what needs to be done to redress this problem. In case of two explanatory variables one can judge whether there is a colinearity problem by looking at the correlation coefficient between the two variables. When there are more than two explanatory variables, the simple correlations among them become meaningless. There are several rules of thumb that have been suggested in the literature to detect when multicollinearity can be treated as a serious problem. For instance Klein says, "An inter correlation of variables is not necessarily a problem unless it is high relative to the overall degree of multiple correlation."

3.10 Profitability Analysis

Cost and return analysis is the most common method of determining and comparing the profitability of different farm household. In the present study, the profitability of cauliflower farming is calculated by the following way

3.10.1 Calculation of Gross Return

Per hectare gross return was calculated by multiplying the total amount of product and by-product by their respective per unit prices.

Gross Return= Quantity of the product * Average price of the product + Value of byproduct.

3.10.2 Calculation of Gross Margin

Gross margin is defined as the difference between gross return and variable costs. Generally, farmers want maximum return over variable cost of production. The argument for using the gross margin analysis is that the farmers are interested to get returns over variable cost. Gross margin was calculated on TVC basis. Per hectare gross margin was obtained by subtracting variable costs from gross return. That is, Gross margin = Gross return – Variable cost.

3.10.3 Calculation of Net Return

Net return or profit was calculated by deducting the total production cost from the total return or gross return. That is,

Net return = Total return – Total production cost.

The following conventional profit equation was applied to examine farmer's profitability level of the cauliflower producing farms in the study areas.

Net profit, $\pi = \Sigma P_m Q_m + \Sigma P_f Q_f - \Sigma (P_{xi} X_i) – TFC.$

Where, π = Net profit/Net return from cauliflower farming (Tk/ha);

P_m = Per unit price of cauliflower (Tk/kg);

Q_m = Total quantity of the cauliflower production (kg/acre);

Q_f = Per unit price of other relevant cauliflower (Tk/kg);

P_f = Total quantity of other relevant cauliflower (kg/acre);

P_{xi} = Per unit price of i-th inputs (Tk);

TFC = Total fixed cost (Tk); and

X_i = Quantity of the i-th inputs (kg/acre);

i = 1, 2, 3,....., n (number of inputs).

3.10.4 Undiscounted Benefit Cost Ratio (BCR)

Average return to each taka spent on production is an important criterion for measuring profitability. Undiscounted BCR was estimated as the ratio of total return to total cost per hectare.

BCR= Total Return /Total Cost

3.10.5 Problem faced index

In study it was undertaken to identify the major problems faced by farmers. They faced various problems like lack of quality seed, lack of capital, lack of labor availability, higher price of inputs, storage problems, lack of fertilizer, perishability, lack of irrigation and price instability.

A three-point Likert-type scale was used to measure each activity. The scores of 1, 2 and 3 were assigned for low, medium, and high, respectively. For clear understanding problem index (PI) was computed using the following formula:

PI = (Plp x 1) + (Pmp x 2) + (Php x 3)

Where,

Plp= No. of farmers with low problem

Pmp = No. of farmers with medium problem

Php = No. of farmers with high problem.

3.11 Research Design

The below diagram (Figure 3.1) links the whole research processs, theories and approaches, data requirements, and major methods of analysis in this study.

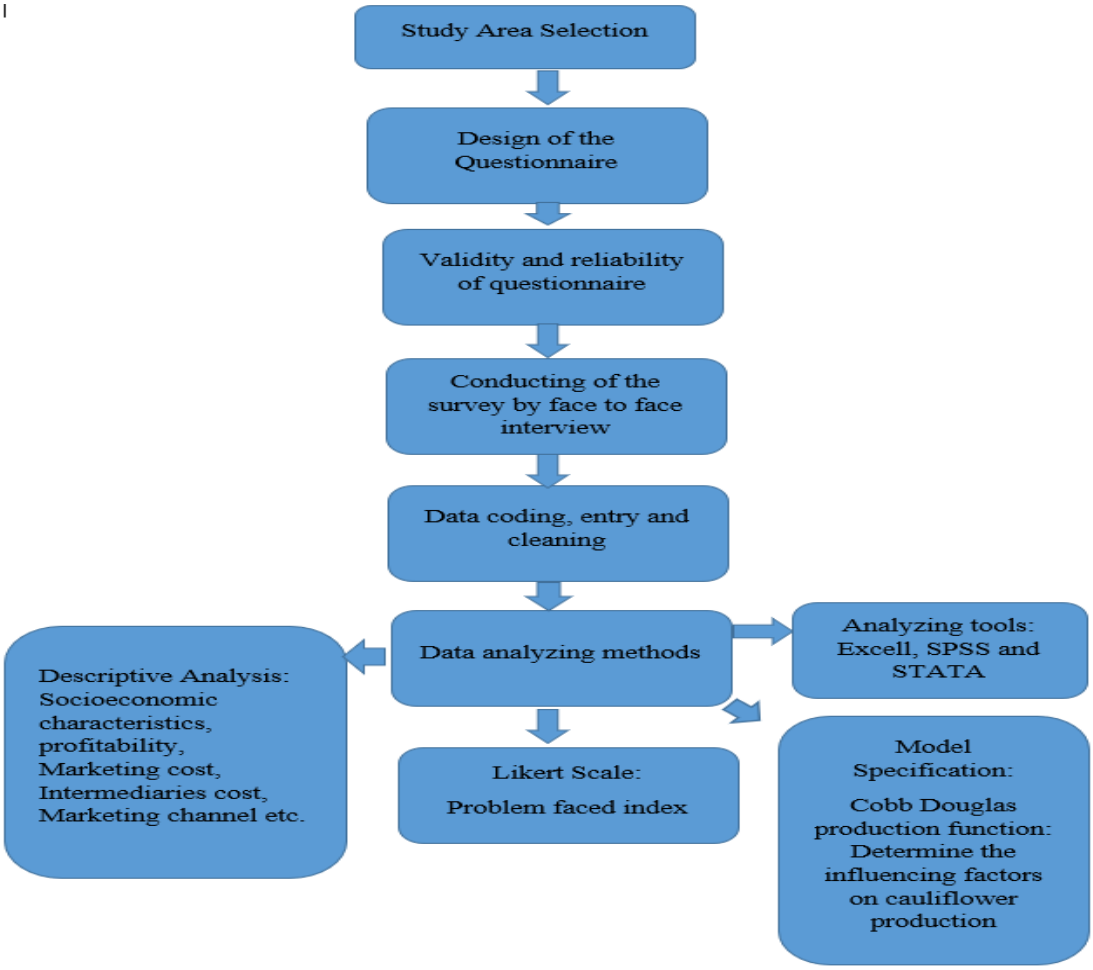

Figure 3.1: Research Design

3.12 Problem Faced in Collecting Data

During the period of data collection, the researcher faced the following problems:

i) Most of the farmers felt disturbed to answer questions since they thought that the researcher might use the information against their interest. To earn the confidence of the farmers a great deal of time was spent.

ii) The farmers do not keep records of their activities and day to day expenses. Therefore the author had to depend upon their memory.

iii) The farmers were usually busy with their filed works. So, the researcher sometimes also had to pay extra visits to meet the farmer.

CHAPTER IV
SOCIOECONOMIC CHARACTERISTICS

4.1 Introduction

The socioeconomic characteristics of sample farmers are covered in this section. In inferring the planning of production, the socioeconomic features of farmers are significant. The sample households finished by studying socioeconomic aspects. These included age distribution and family size. Occupation, employment, women's participation, pattern of land ownership, etc. These aspects are discussed briefly below.

4.2 Age Distribution

The study classifies all groups of farmers in the study area as set out in Figure 4.1. The Figure shows that the majority of farmers in the study area are middle aged. Out of the samples, 26.00% were in the 20-30-year age group, 51% belonged to the 31-50-year age group and, 23% fall into the over 51-year age group. This result suggests that the majority of sampling farmers were in the 31-50-year age group suggesting that they can provide more physical efforts for agriculture.

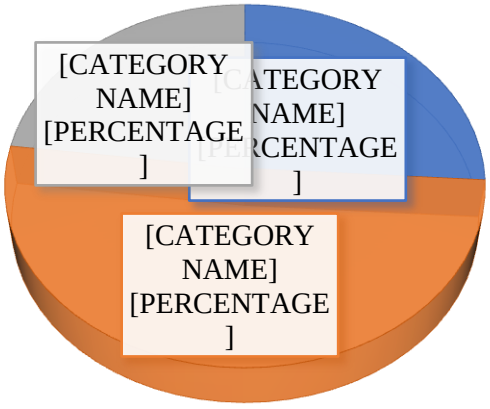

Figure 4.1: Age distribution of the respondent.

4.3. Educational status

Education improves people's effectiveness. Table 4.1 indicates that 9% of the farmers were iliterate, 43% had a primary school, 26% of the farmers had a J.S.C level education, 13% were secondary school graduates and 9% were HSC and 2% were graduation holder.

Table 4.1 Educational status of the respondent

Level of education	**Percentage (%)**
Illiterate	9
Primary school certificate	43
Junior school certificate	26
Secondary School Certificate	13
Higher Secondary School Certificate	7
Honors passed	2

Source: Field Survey, 2019.

4.4. Occupational Status of the Respondent.

Farmers are involved in different activities in this study area (Table 4.2). It was noted that agriculture was the primary occupation for cauliflower farmers (39%) followed by business (21%) and service (10%).

Table 4.2: Occupational status

Types of occupation	**Percentage (%)**
Agriculture (crop sector)	39
Fisheries	7
Livestock	11
Non-agricultural	
Service	10
Business	21
Rickshaw or van pulling	12
Total	100

Source: Field Survey, 2019.

4.5. Gender and marital status

Table 4.3 depicts that 92 percent of selected farmers were male and 8 percent were female. In the study respondents, 91 percent of the farmers were married and 9 percent were unmarried.

Table 4.3: Gender and marital status

Particulars	Percent (%)
Male	92
Female	8
Married	91
Unmarried	9

Source: Field Survey, 2019.

4.6. Farm size and ownership

The study farmers are categorized as: landless farmers (less than 49 decimal), small farmer (50-249 decimal), medium farmer (250-749 decimal) and large farmer (above 750 decimal) (GOB, 2009). The Figure 4.2 shows that in the sample, 33 percent were landless farmer, 52 percent were small farmer, 13 percent were medium farmer and only 2 percent were large farmer.

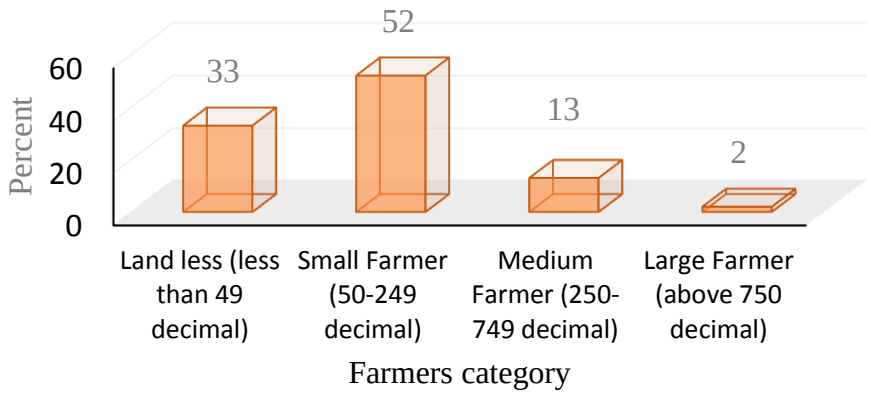

Figure 4.2: Farm size and ownership

Source: Field Survey, 2019.

4.7. Income status

In the study area, the farmers' incomes were divided into less than Tk.150, 000 from Tk.150, 000 to Tk.250, 000 and more than Tk.250, 000. It is evident from the Table 4.4 that most of the farmer's (47 %) yearly income belonged to the category of less than Tk.150, 000. About 44 percent of the farmers were earned Tk. 150,000 to 250,000 per year, 47 percent of the farmers were earned Tk. less than 150,000 per year and 9 percent farmers were earned Tk. above 250,000 per year.

Table 4.4: Income status

Level of income	**Percentage (%)**
Less than Tk. 150,000	47
Tk.151,000-250,000	44
Above Tk. 251,000	9

Source: Field Survey, 2019.

4.8 Access to medical services

Table 4.5 indicates that 22 percent farmers in the sample took treatment by the MBBS physician, 48 percent had access by the village doctor to the health service, 23 percent had access by the homeopathic medical services. Very few farmers had provided quack medicine.

Table 4.5: Access to medical services

Types of treatment	**Percentage**
MBBS doctor	22
Village doctor	48
Homeopathic doctor	23
Quack	7

Source: Field Survey, 2019.

4.9 Dependency Ratio

The dependency ratio is an age-population ratio in economics, geography, and demography of those usually not employed (the dependent portion) and those traditionally employed (the productive portion). The real (or effective) dependence ratio examines the ratio between economically active and inactive employees. The successful dependency ratio not only discusses the age profile but also whether people are economically active.

Each and every family is rationally composed of both income earners and dependents. Table 4.6 presents that the depending members per income earner. In this present study the average dependency ratio was found 1.34.

Table 4.6: Dependency ratio

Types of farmers	No. of members
Family members	288
Dependent members	165
Earning members	123
Dependency ratio	1.34

Source: Field Survey, 2019.

4.10 Sources of Credit Facilities of the Respondent

For all forms of agriculture, availability of fund is an important factor. Banks, NGOs, relatives and their own funds were the source of capital for cauliflower farmers. Around 10% of the farmers were borrowing from banks, 37% from NGOs and 12% from their family members. About 41% of farmers used their own money (Table 4.7).

Table 4.7 Sources of Credit Facilities of the Sample Farmers

Items No.	Percentage (%)
Bank	10
NGOs	37
Relatives	12
Own	41

Source: Field Survey, 2019.

4.11 Size of Land Holdings of the Sample Farmers

The scale of the land held by cauliflower farmers is listed in various categories in the present study. Size of land holdings includes cultivated land, fellow land, rented in rented out, mortgaged out and mortgage in as reported by the sample farmers. It is evident from the Figure 4.3 that the average area 78 decimal, 17 decimal, 24 decimals were cultivated land, rented in, rented out respectively held by the sample farmers on an average.

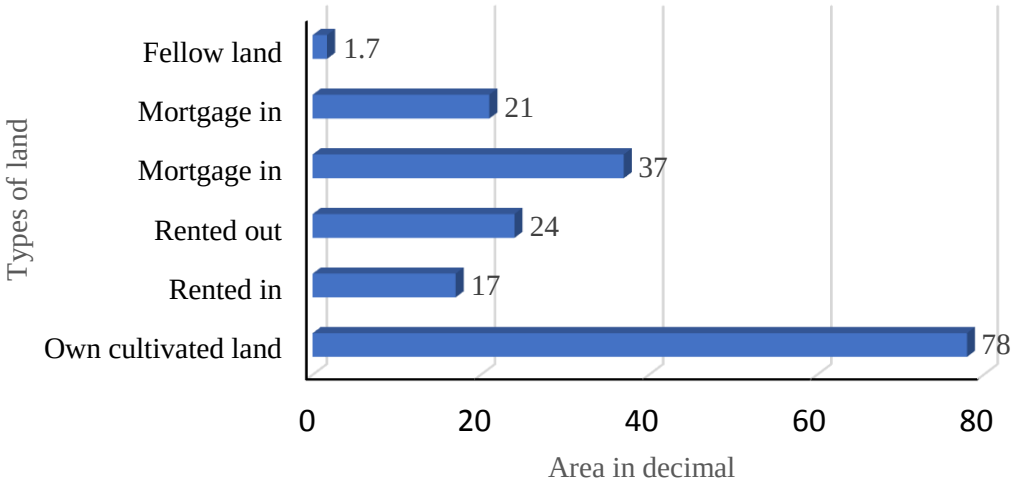

Figure 4.3: Size of Land Holdings of the Sample Farmers.

Source: Field survey.

CHAPTER V
COST AND RETURN OF CAULIFLOWER FARMERS

5.1 Introduction

The main aim of this chapter is to evaluate cauliflower costs and returns. In addition, the costs and returns of cultivation per acre of the cauliflower have been measured. Therefore, this chapter estimates cost and return for cauliflower. Cost items are divided into two categories for the cost estimation and return of cauliflower production: (1) variable cost and (2) fixed cost. Variable cost included the cost of all variable factors like human labor, tillage, seed, fertilizer, manure, irrigation water, and insecticides. On the other hand, fixed cost was calculated for interest on operating capital rental value of land. On the return side net return and undiscounted benefit-cost ratio (BCR) were determined in this chapter.

5.2 Variable cost

5.2.1 Labor cost

The most important and mostly used input for the development of cauliflower was human labor. As the cauliflower production is the labor-intensive work. It reduces the unemployment problem. Group based cauliflower cultivation in the selected area plays vital role for the reduction of the poverty. It contributed a large scale of the total cost of production of cauliflower.

Human labor, including preparing ground, weeding, fertilization, using insecticides and harvesting, is required for various activities and management. In the study area, there were two sources of work for human beings, one for families and one for hired labor. The appraisal of the hired labor was made as compensation of the farmers ' marginal cash salaries. The amount of work used for the production of cauliflower is 65-man days per acre from Table 5.1. Total human labor costs are equal to Tk. 22750 /acre.

The valuation of family supplied labour was done as the average wage of the

hired labour was taken as the opportunity cost of the family supplied labour. It can be observed that cauliflower growers used on an average 65 man-days/acre total human labour where on an average 31 man-days/acre was family supplied labour. In the study area on an average wage rate was Tk 350 per man-day without meal. So, total cost of family supplied labor for cauliflower amounted to Tk 10850 per acre. The number of hired labor was 34 and the hired labor cost was Tk. 11900.

Table 5.1: Human labor cost/acre

Items of returns/costs	**Hired labor**	**Family labor**	**Unit**	**Quantity**	**Price per unit (Tk)**	**Total value (Tk)**
Land preparation	10	5	Man -day	15	350	5250
Sowing	9	3	Man -day	12	350	4200
Weeding	5	8	Man -day	13	350	4550
Fertilizer	1	2	Man -day	3	350	1050
Harvesting	8	11	Man -day	19	350	6650
Pest Management	1	2	Man -day	3	350	1050
Total	**34**	**31**		**65**	**350**	**22750**

Source: Field Survey, 2019.

5.2. 2 Cost of tillage

For cauliflower production the average per acre tillage cost was Tk 5250 (Table 5.1)

5.2.3 Cost of seeds

The seed cost is the main cost item for the production of cauliflower. In the area under consideration, farmers were found to use both seeds supplied and bought at home. The total seed demand for cauliflower per acre was 0.65 kg / acre. The average prices of seeds were Tk. 6000 per kg for cauliflower production. Table 5.1 shows that the total cost of seeds for cauliflower production was Tk. 2925. To maintain the higher production high yield verity is required for the production.

Table 5.2: Variable cost/acre

Items of returns/costs	**Unit**	**Quantity**	**Price per unit (Tk)**	**Total value (Tk)**
Human (hired labor)	Man-day	34	350	11900
Human (family labor)	Man-day	31	350	10850
Tillage	Tk	N/A	N/A	6000
Seeds	Kg	0.65	4500	2925
Urea	Kg	91	20	1820
TSP	Kg	278	25	6950
MOP	Kg	120	18	2160
Gypsum	Kg	40	10	400
Zinc Sulphate	Kg	22	52	1144
Cowdung	Kg	2050	3	6150
Pesticides	Tk	N/A	-	5800
Irrigation	Tk	N/A	-	5650
Total	**Tk**	**-**	**-**	**61749**

Source: Field Survey, 2019

5.2.4 Cost of Urea

The cost of urea was TK 1820. It is very useful to get the bumper production.

5.2.5 Cost of TSP

The cost of TSP was TK 6950. It provides nutrient to plant to become more vigor.

5.2.6 Cost of MOP

The cost of MOP was TK 2160

5.2.7 Cost of Gypsum

The cost of Gypsum was TK 400.

5.2.8Cost of Zinc Sulphate

The cost of Zinc Sulphate was TK 1144.

5.2.9 Cost of cow dung

In this study total manure cost was Tk 6150 per acre when per unit manure cost was 3.00 Tk (Table 5.2).

5.2.10 Cost of irrigation

Irrigation water is an important input in winter cauliflower cultivation. Per acre cost of irrigation water was Tk 5650for cauliflower (Table 5.2).

5.2.11 Cost of insecticides

In the study area, farmers applied insecticides to protect from the attack of pests and diseases. Cost of insecticides amounted to Tk 5800 per acre for cauliflower (Table 5.2).

5.2.12 Total variable cost

Summation of the costs of variable inputs gave the total variable costs which were Tk 67583.00 per acre for cauliflower production.

5.3 Interest on operating capital

Interest on operating capital was calculated by taking into account all the operating costs incurred during the production period of cauliflower. Per acre interest on operating capital was Tk 2058.30 and rental value of one acre land was Tk. 12000.00 for cauliflower production. So total fixed cost was Tk. 14058.30

Table 5.3: Fixed cost

Items of returns/costs	Unit	Quantity	Total value (Tk)
Interest on OC for 4 months @ 10%	Tk	61749	2058.30
Rental value	Tk	12000.00	12000
Total	Tk	-	14058.30

Source: Field Survey, 2019.

5.4 Total cost

In order to estimate total cost per acre all the resources used in cauliflower production acres been recapture together. Per acre total cost of cauliflower production was Tk. 75807.30 (Tables 5.4).

Table 5.4: Total cost (Variable cost + Fixed cost)

Items of returns/costs	Unit	Variable cost	Fixed cost	Total (Tk)
Total cost	Tk	61749	14058.30	75807.30

Source: Field Survey, 2019

5.5 Gross returns

Here gross returns of the cauliflower production is = (Main product+ By-product). Total value of by-products is Tk. 9500. The quantity of main product is 9500Kg. If the cauliflower per unit is 15.5 then it becomes the total value of cauliflower main product is Tk.147250. So the gross return of the cauliflower production is = (147250 + 5000) = 152250.

Table 5.5: Gross return

Items of returns/cost	Unit	Quantity	Price per unit (TK)	Total Value (Tk)
Main product	Kg	9500	15.5	147250
By-product	TK	-	-	5000
Gross returns	TK	-	-	152250

Source: Field Survey, 2019

5.6 Net Return

The net return of cauliflower production is depending on both gross return and total cost of the cauliflower production. Net return was Tk. 76442.70

Table 5.6: Net return (Gross return – Total cost)

Items of returns/costs	Unit	Gross return	Total cost	Total value (Tk)
Net return	Tk	152250	75807.30	76442.70

Source: Field Survey, 2019

5.7 Undiscounted BCR

Benefit cost ratio was calculated by dividing gross return by gross cost or total cost. It implies return per taka invested. It helps to analyze financial efficiency of the farm. It was evident from the study that the benefit cost ratio of cauliflower farming was accounted for 2.04 implying that Tk. 2.04 would be earned by investing Tk. 1.00 for cauliflower production. So, the cauliflower farming was found to be profitable for farmers (Table 5.7).

Table 5.7: Undiscounted BCR

Gross Return	Gross cost	Undiscounted BCR
152250	75807	2.04

Source: Field Survey, 2019

5.8 Concluding Remarks

It was evident from the results that Cauliflower cultivation provides higher returns to the farmers. Sample farmers showed their opinion that higher yield and income encouraged them to continue cauliflower production.

CHAPTER VI
FACTORS AFFECTING OF CAULIFLOWER PRODUCTION

6.1 Introduction

In this Chapter, the effects of main variables on cauliflower production are identified and measured. In order to assess the contribution of the major variables to the cauliflower production process the Cobb-Douglas production function acres been chosen. Table 6.1 presents the estimated values of the model.

6.1 Functional Analysis for Measuring Production Efficiency

Output function is a relationship or mathematical function, which indicates the total output to be achieved with certain inputs to a certain technological level. In order to estimates the effect of the inputs on output seven explanatory variables are selected taking into account the objectives of the study and considering the effects of explainable variables on production of cauliflower . Other independent variables like water quality, soil condition, time etc., which might have affected production of farm enterprises, were excluded from the model on the basis of some preliminary estimation. A brief description is presented here about the explanatory variables included in the model.

6.2 Estimated Values of the Production Function Analysis

- F-value was used to measure the goodness of fit for different types of inputs.
- The coefficient of multiple determinations (R^2) indicates the total variations of output explained by the independent variables included in the model.
- Coefficients having sufficient degrees of freedom were tested for significance level at 1 percent, 5 percent and 10 percent levels of significant.

Table 6.1: Estimated Values of Coefficients (Cobb-Douglas Production Function).

Explanatory variables	Values of coefficients	Standard Error	P-value
Intercept	12.003***	1.315	0.000
Human labor	0.021	1.011	
Seed	0.258**	0.102	0.100
TSP	0.176*	0.089	0.020
Urea	0.159	0.088	0.075
Pesticide	0.031*	0.016	0.882
Irrigation	1.007	1.345	
Experience	0.036***	0.012	0.067
F	27.145		
R^2	0.658		

Note:

*p< 0.10

**p< 0.05

***p< 0.001

Source: Authors Estimation

6.4 Interpretation of the results

Seed

The magnitude of the seed cost regression coefficient was 0.258 with a positive sign and significant at 5% level. This means that one percent increase in seed costs will lead to an increase of 0.258 percent in gross revenue for cauliflower , holding other factors constant (Table 6.1).

TSP and Pesticide

It can be seen from Table 6.1 that the magnitude of the regression coefficient of TSP and pesticides were 0.176 and 0.013 respectively for cauliflower. It was positive and statistically significant at ten percent probability level. This indicates that an increase in one percent of TSP and pesticides cost remaining other factors constant, would result in an increase in the gross return by 0.1761 percent and 0.013 percent respectively.

Farmers' experience

The coefficient of farmers' experience was 0.036 with a positive sign and significant at 1% level. This means that one percent increase in farmers' experience will lead to an increase of 0.036 percent in gross revenue for cauliflower holding other factors constant (Table 6.1).

Coefficient of multiple determinations (R^2)

It is evident from Table 6.1 that the value of the coefficient of multiple determinations (R^2) was 0.658 for cauliflower. It indicates that about 65 percent of the total of the gross returns are explained by the explanatory variables included in the model.

Goodness of fit (F - value). The F-value was 27.145 for cauliflower, which implies good fit of the model that is, all the explanatory variables included in the model were important for explaining variation of cauliflower production.

6.5 Concluding Remarks

It is evident from the Cobb-Douglas production function model that seed, TSP and farmer's experience had significant and positive impact on cauliflower production.

CHAPTER VII
MARKETING CHANNELS AND PROBLEMS

7.1 Marketing cost of Cauliflower for farmers

Marketing cost of farmers are dispersed into various ways such as transport, commission of dalal, tax and market toll as well as personal expense. The table 7.1 exhibited that transportation cost, commission of dalal, tax and marketing cost and personal expense were Tk. 23.25, Tk. 27.60, Tk. 17.50 and Tk. 20.45 respectively. They employed more marketing cost foe commission of dalal compared to others.

Table 7.1: Marketing cost of Cauliflower for farmers (Tk./quintal)

Item of cost	Amount (Tk)
Transportation	23.25
Commission of dalal	24.60
Tax and Market toll	17.50
Personal	20.45

Source: Field Survey, 2019.

7.2 Mode of Transport used

Mood of transportation of farmers, intermediaries and retailers in the study area were bullock cart, van/ rickshaw and truck etc. Most of the farmers transported their cauliflowers by van/rickshaw which was 74 percent. 59 percent intermediaries transported their products by truck and 68 percent retailers carried their products by van/rickshaw (Table 7.2).

Table 7.2: Mode of Transport used

Amount of cauliflower	**Mode of transport**		
Particulars	Bullock cart	Van/rickshaw	Truck
Farmers	12%	74%	14%
Intermediaries	4%	37%	59%
Retailers	18%	68%	14%

Source: Field Survey, 2019.

7.3 Channels of Cauliflower marketing

Marketing channel is the process through which a product flows on its way to the ultimate consumers. A number of intermediaries were found in cauliflower marketing channels. They were faria, bepari, aratdar, wholesaler and retailer. They performed the marketing function of buying and selling, assembling, grading, storage, transportation, risk bearing etc. Channel 1(Producers→ Faria→ Aratdar→ Retailer→ Consumer) were followed for marketing.

The typical model of cauliflower marketing channels in the study areas are shown below:

Channel 1: Producers→ Faria→ Aratdar→ Retailer→ Consumer.

Channel 2: Producers→ Wholesaler→ Retailer→ Consumer.

Channel 3: Producers→ Bepari→ Wholesaler→ Retailer→ Consumer.

Channel 4: Producers→ Retailer→ Consumer.

Channel 5: Producers→ Wholesaler→ Retailer→ Consumer.

Channel 6: Producers ⟶ Consumer.

7.4 Marketing cost of Cauliflower for Intermediaries

Table 7.3 shows the marketing costs of Faria (local traders), Bepari, Aratdar, Wholesaler and Retailer of cauliflower. Labour changes (loading, Unloading and grading), Tolls and Taxes (market and road taxes) Transportation, Cost due to spoilage, Commissions of dalal, Establishment/ Rent, Personal expenses were the major cost items of the local traders (Faria). The average marketing cost of cauliflower were Tk.68.72, Tk.161.37, Tk.135.09, Tk.155.66, Tk. 154.39 per quintal by Faria, Bepari, Aratdar, Wholesaler and Retailer respectively. Among the cost items, transportation cost and commission of dalal were the highest. Beparies incurred the highest marketing cost than other intermediaries due to their large business volume and transportation cost.

Table 7.3 Marketing cost of Cauliflower for Intermediaries (Tk./quintal)

Cost of Item	**Faria**	**Bepari**	**Aratdar**	**Wholesaler**	**Retailer**
Labour changes (loading, Unloading & grading)	21.15	14.72	10.75	15.14	17.41
Tolls & Taxes (market &road taxes)	8.27	6.87	8.14	6.15	5.41
Transportation	22.71	41.12	30.23	42.17	13.40
Cost due to spoilage		20.61	27.64	31.81	35.47
Commissions of dalal	-	41.48	37.42	43.38	70.15
Establishment/ Rent	7.14	17.42	8.90	9.71	8.35
Personal expenses	4.27	12.37	7.51	3.56	2.45
Others	5.18	6.78	4.50	3.74	1.75
Total	**68.72**	**161.37**	**135.09**	**155.66**	**154.39**

Source: Field Survey, 2019.

7.5 Marketing margins

Marketing margin is considered to be the difference between the price paid by the consumers and that obtained by the producers.

Or Marketing margin, $M = P_R - P_F$

Where P_R= Sale price

P_F=Purchase price

Marketing margin in a sense is the price of all-utility adding activities and functions that are performed by the intermediaries.

7.6 Marketing Margins of the Cauliflower Intermediaries

It was revealed from Table 7.4 that margin or profit of the Faria, Bepari, Aratdar, Wholesaler and Retailer was Tk.170, Tk.210, Tk.240, Tk. 260 and Tk. 410 per quintal, respectively. The margin of retailer was the highest, which was Tk.410 per quintal followed by Faria, Bepari, and Wholesaler.

7.6.1 Marketing margin of faria

Faria purchased cauliflower at Tk.1550 per quintal and sold those at Tk. 1720.So, gross margin for faria was Tk.170 per quintal. The total marketing cost of faria was Tk.68.72 per quintal and therefore, their net margin was Tk.101.28 per quintal (Table 7.4).

7.6.2 Marketing margin of Bepari

Bepari purchased cauliflower at Tk.1720 per quintal and sold those at Tk. 1930.So, gross margin for Bepari was Tk.210 per quintal. The total marketing cost of Bepari was Tk.161.37 per quintal and therefore, their net margin was Tk.48.63 per quintal (Table 7.4).

7.6.3 Marketing margin of Aratdar

Aratdar purchased cauliflower at Tk.1940 per quintal and sold those at Tk. 2170.So, gross margin for Aratdar was Tk.240 per quintal. The total marketing cost of Aratdar was Tk.135.09 per quintal and therefore, their net margin was Tk.104.91 per quintal (Table 7.4).

7.6.4 Marketing margin of Wholesaler

Wholesaler purchased cauliflower at Tk.2170 per quintal and sold those at Tk.

2430.So, gross margin for wholesaler was Tk.260 per quintal. The total marketing cost of wholesaler was Tk.155.66 per quintal and therefore, their net margin was Tk.104.34 per quintal (Table 7.4).

7.6.5 Marketing margin of Retailer

Retailer purchased cauliflower at Tk.2430 per quintal and sold those at Tk. 2840.So, gross margin for retailer was Tk.410 per quintal. The total marketing cost of retailer was Tk.154.39 per quintal and therefore, their net margin was Tk.255.61 per quintal (Table 7.4)

Table 7.4: Marketing Margins of the Cauliflower Intermediaries (Tk. /quintal)

Intermediaries	Sale price	Purchase price	Marketing Margin	Marketing Cost	Net Margin
Farmer	1550				
Faria	1720	1550	170	68.72	101.28
Bepari	1930	1720	210	161.37	48.63
Aratdar	2170	1940	240	135.09	104.91
Wholesaler	2430	2170	260	155.66	104.34
Retailer	2840	2430	410	154.39	255.61

Source: Field Survey, 2019.

7.7 Problems of Cauliflower production faced by farmers

This study also tried to identify the major problems faced by farmers. They faced various problems like lack of quality seed, lack of capital, lack of labor availability, higher price of inputs, storage problems, lack of fertilizer, perishability, lack of irrigation and price instability. The Table 7.5 showed that higher price of input is the number one problem among the problems. It indicated that higher price of inputs influenced their whole system of production in the study area. After this problem they felt that storage problem and perishability of cauliflower were also crucial problems.

Table 7.5: Problems of Cauliflower production faced by farmers.

Items	High	Medium	Low	Index	Rank
Lack of quality seed	123	68	17	208	9
Lack of capital	141	58	16	215	5
Lack of labor availability	105	54	30	189	7
Higher price of some inputs	156	64	8	228	1
Storage problems	171	42	14	227	2
Lack of fertilizer	108	94	9	211	6
Perishability	141	78	6	225	4
Lack of irrigation	72	74	31	177	8
Price instability	147	72	7	226	3

Source: Field Survey, 2019.

7.8 Problems of Cauliflower marketing faced by farmers

In the study area farmers suffered with some problems in marketing such as poor communication & transport facilities, dominance of intermediaries, high rate of brokerage, lack of capital, lack of adequate storage facilities, lack of market facilities and low price in harvesting season. The following Table 7.6 indicated the ranking of the problems of marketing of farmers. Among the problem's farmers reported that low price of cauliflower in harvesting season is the most critical problem. It explored that farmers did not get fair price and they became looser every year. Poor communication and transport facilities is major problem after low price in harvesting season.

Table 7.6: Problems of Cauliflower marketing faced by farmers

Items	High	Medium	Low	Index	Rank
Poor communication & transport facilities	171	52	9	232	2
Dominance of intermediaries	102	74	21	197	6
High rate of brokerage	93	76	23	192	7
Lack of capital	168	52	10	230	3
Lack of adequate storage facilities	153	48	17	218	5
Lack of market facilities	144	62	13	219	4
Low price in harvesting season	189	52	3	244	5

Source: Field Survey, 2019

CHAPTER VIII

CONCLUSION AND RECOMMENDATIONS

8.1 Introduction

This chapter attempts to summarize the major findings of the study. Conclusion, policy recommendations, limitation and scope for the further study are given in Sections 8.2, 8.3, 8.4 and 8.5 respectively.

8.2 Conclusion

The present study is an attempt to determine the profitability and marketing channel and margin of cauliflower. Data were collected from 105 respondents from Narsingdi district of Bangladesh. The result reveals that about 33 percent were landless farmer, 52 percent were small farmer, 13 percent were medium farmer and only 2 percent were large farmer. Out of the samples, 26 percent were in the 20-30-year age group, 65 percent belonged to the 31-50 year age group and, 23 percent fall into the over 45-year age group. It is evident that 74% of income came from agriculture where 40%, 24%, 6% and 4% income earned from cauliflower cultivation, others agricultural crops, fisheries and livestock respectively. Non-agricultural agricultural income was 26% that came from service, business, rickshaw-van pulling and others. About 44 percent of the farmers were earned Tk. 150,000 to 250,000 per year, 47 percent of the farmers were earned Tk. less than 150,000 per year and 9 percent farmers were earned Tk. above 250,000 per year.

For all forms of agriculture funding is an important factor. Around 10% of the farmers borrowed from banks, 33% from NGOs and 12% from their family members. About 41% of farmers used their own money. It is evident that about 78 decimal, 17 decimal, 24 decimals were cultivated land, rented in, and rented out respectively held by the sample farmers on an average. Total human labor costs were equal to Tk. 22750 /acre. An average 65 man-days/acre were used where on an average 31 man-days/acre was family supplied labour. For

cauliflower production total cost of seeds was Tk. 2900. Per acre total cost of cauliflower production was Tk. 75807.30.

The quantity of main product on an average was 9500Kg and per unit price was Tk. 15.50. Gross return was Tk. 152250 and the net return of cauliflower production was Tk. 76442.70 and the benefit cost ratio was 2.04.

It is revealed from the Cobb Douglas production function that among the variables four variables like seed, TSP, pesticides and farmers' experience were statistically significant which indicates that these factors influenced in the production of cauliflower positively. The value of the coefficient of multiple determinations (R^2) was 0.538 for cauliflower and the F-value was 18.145 for cauliflower, which implies good fit of the model that is, all the explanatory variables included in the model were important for explaining variation of cauliflower production.

The study exhibited that transportation cost, commission of dalal, tax and marketing cost and personal expense were Tk. 23.25, Tk. 27.60, Tk. 17.50 and Tk. 20.45 respectively. Mood of transportation of farmers, intermediaries and retailers in the study area were bullock cart, van/ rickshaw and truck etc. Most of the farmers transported their cauliflowers by van/rickshaw which was 74 percent. About 59 percent intermediaries transported their products by truck and 68 percent retailers carried their products by van/rickshaw. The marketing costs of Faria (local traders), Bepari, Aratdar, Wholesaler and Retailer of cauliflower were Tk.68.72, Tk.161.37, Tk.135.09, Tk.155.66, and Tk.154.39 per quintal respectively. Among the cost items, transportation cost and commission of dalal were the highest. Beparies incurred the highest marketing cost than other intermediaries due to their large business volume and transportation cost. It was revealed that marketing margin of the Faria, Bepari, Aratdar, Wholesaler and Retailer was Tk.170, Tk.210, Tk.240, Tk. 260 and Tk. 410 per quintal, respectively.

Farmers faced various problems like lack of quality seed, capital, and fertilizer, higher price of inputs, storage problems and price instability. Higher price of input is number one problem among the problems. In the study area farmers suffered with some problems in marketing like poor communication and transport facilities, dominance of intermediaries, high rate of brokerage, lack of capital, lack of adequate storage facilities, lack of market facilities and low price in harvesting season. Among the problems farmers reported that low price of cauliflower in harvesting season is the most critical problem.

8.3 Recommendations

Based on the findings of the study the following recommendations were concluded to improve the present production and marketing system.

- Farmers reported that they feel the lack of quality of seed. In this situation the government organization like BADC can regulate this system and they can provide good quality of seed where it is also a responsibility to monitor the seed company.
- Low price of cauliflower in harvesting period is also a common phenomenon of our country. Farmers did not get fair price mostly in harvesting season. To ensure the fair price government should be more attentive to farmers and they must active agricultural price related institution like department of marketing (DAM), only this institution can monitor the price system of agricultural products.
- Most of the farmers of our country have not enough finance to continue his jobs. So government should provide institutional credit on easy terms for the solution of the problem of capital shortage. Poor farmers have limited access to bank and other financial institutions.
- For storage problem farmers have to pay a lot of financial damage. Modern storage facilities (such as cold storage) should be developed

considering the economic feasibility at important assemble center.

- Transportation facilities should be improved in the rural areas. On the basis of priority village roads should be developed at least brick bedded road should be made so that the rickshaw, van, truck and other vehicles could move easily. It would also help reducing the transportation cost.
- In the developed country we see the farmers organization but in our country it is very rare in visible. Farmer's organization should be established which might improve the bargaining power of the farmers, enabling them to face the intermediaries and ensuring better return for their produce.

8.4 Limitation of the study

- The present study suffers from a number of limitations. Due to a shortage of funds and time, the study could not cover wide areas for collection of the necessary information from the farmers; only 105 respondents were selected for the purpose of the study.

- The researcher had to depend on the memory of the farmers for collecting necessary information because many of them did not keep any written record or kept record partially.

Despite a few limitations, the findings of the present study may provide some valuable information for the farmers, extension workers and researchers.

8.5 Scope of further research

Although the present study provides some useful information for researchers, policy makers as well as farmers, it is not free from criticisms. The weaknesses of the present study, of course, open up scopes for further research which are outlined below:

- It could be mentioned here that the future researchers could take up a broad - based study with large samples.
- A further study can be undertaken by taking into account different farm sizes to assess the impacts on income generation through other horticultural crops cultivation.
- Acreage response, growth and instability of strawberry can be studied with respect to Bangladesh.

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APPENDIX

Department of Agricultural Economics
Sher-e-Bangla Agricultural University

An Interview Schedule on
Production and Marketing of Cauliflower Cultivation in Narsingdi District

Addres: **Contact Number:** _____ **Serial No.:**

Village: _____ **Union/Pourashova:** _____ **Upazilla:** _____

1. General information of the Respondent.

Name of the Respondent:	
Gender: Male/Female	**Age:**
Education:	
Marital status: Unmarried= 1, Married = 2, Widow = 3, Divorced = 4	
Family Size: Male- Female- Children- Old (60)- Earning members:	
Main occupation:	**Secondary occupation:**

Farming experience: ……Years

2. Land Ownership pattern.

Types of land	Area (acres)
a. Own Cultivated Land	
b. Rented In	
c. Rented Out	
d. Mortgaged In	
e. Mortgaged Out	
f. Fellow Land	
Total land	

3. Annual Income

Sector of Income	Source of income	Annual income
Agriculture	1.Rice	
	2.Wheat	
	3.Fisheries	
	4.Livestock	
	5.Others farm	
	6. Fruits	
	7.Vegetables	
	8.Homestead	

	9.Forest	
	10.others	
Total income from agriculture		
Non-Agriculture	1.Service	
	2.Business	
	3. Remittance/Pension	
	3.Others (selling labour, rickshaw pulling etc)	
Total annual Income from non-agricultural sector		

4. Household yearly expenditure (inTaka)

Expenditure head	Total expenditure (Tk)	Expenditure head	Total expenditure (Tk/Month)
Crop farming		Food (1)	
Clothing		Rice	
Children education		Wheat	
Health care		Fish	
House making/repairing		Meat	
Festivals		Egg	
Livestock rearing		Milk	
Poultry keeping		Pulse	
Other costs		Species & Oil	
		Fruits & Vegetables	

5. Overall livelihood status of the households.

Questions on livelihood status	**YES**	**NO**	**If NO, why ?**
Does your family use sanitary toilet?			
Does your family use tube well water?			
Does your family use electricity?			
Does your family buys new clothes during festivals?			
Does your family offers gifts to relatives during different social events?			
Do you adopt any contraceptive method?			
What type of doctors do you normally visit while you are sick?	(a) MBBS, (b) Village doctor (c) Homeopathic, (d) Quack		
Does your family send children to school?			
Are you a member of any cooperative society?			
Have you any saving accounts?			
Are your family members a member of cooperative society?			
Do you explore and utilize information technology for professional, health and family planning activities			
Have you received any training in your profession			

Do you get cooperation from other village people in case of your need?			
Do you adopt zero tillage cultivation			
Do you adopt new cropping practice			
Do you adopt improved management of weeds			
Do you adopt improved management of manure			
Do you adopt IPM			
Do you cultivate multiple crops			
Do you allow women in decision making process			
Do you have contract with NGO Workers?			
How do you get information related to Agriculture? A. Radio B. TV C. NGO Workers D. Extension Workers E. Neighbors F. Local Elite G. Own			
Year of experience in main profession	……Years		

6. Land under Cauliflower cultivation:----------decimal

7. Human labor used in different operation

Name of items		Cauliflower production			
		No. of labor		Taka/labor	Total (Tk)
		Own(family)	Hired		
Land preparation	M				
	F				
Manure & fertilizer	M				
	F				
Weeding	M				
	F				
Irrigation	M				
	F				
Pest management	M				
	F				
Harvesting	M				
	F				
	F				
Total	M				
	F				

8. Cost of animal or mechanical powers used

Name of practices	Cauliflower production				
	Name of Machine/ Animal			Rent per machine/animal (Taka)	Total (Tk)
		Own	Hired		
Tillage					
Weeding					

Spraying					
Total					

9. Materials inputs cost of production

Inputs	Unit Price	
	Own	Hired
Seed		
Manure		
Fertilizer		
a. Urea		
b. TSP		
c. MP		
d. Gypsum		
e. Zinc		
Pesticide		
Irrigation		
Others (specify)		
Total		

10. Total Production.

Items	Quantity	Price/Return
Main product		
By product(leaf)		
Total		

11. Distribution of product

Items	Amount (Kg)
Total Production	
Consumption	
Distribution	
Wastage	
Total sales	

12. Where and to whom did you sale your Cauliflower?

Place of sale	Percentage	Price/unit	Reason of sale*	Actors	Percentage	Price/ unit	Reason of sale*
Farm gate				Bepari			
Local market (Village)				Paiker			

Upazila Market				Retailer			
				Consumers			
				Restaurants			

*** a)** Distance of market is high b) Volume of sale is low, C) Transportation cost is high, D) Lack of market information e) Lack of price information

13. Marketing cost of Cauliflower for farmers.

Item of cost	Amount(tk)
Transportation	
Commission of dalal	
Tax and Market toll	
Personal	
Others (specify)	

14. Mode of Transport used

Amount of cauliflower		Mode of transport		
	Own (%)	Bullock cart???(%)	Van/rickshaw (%)	Truck (%)
Farmers				
Intermediaries				
Retailers				

15. Marketing cost of Cauliflower for Intermediaries.

Cost of Item	Faria	Bepari	Aratdar	Wholesaler	Retailer
Labour changes(loading, Unloading & grading)					
Tolls & Taxes (market & road taxes)					
Transportation					
Cost due to spoilage					
Commissions of dalal					
Establishment					
Personal expenses					
others					

16. Marketing Margins of the Cauliflower Intermediaries.

Intermediaries	Purchase price	Sale price
Faria		

Bepari		
Aratdar		
Wholesaler		
Retailer		

17.What is your source of capital?

Source	Interest rate	Source	Interest rate
Own fund = 1	Nil	NGO = 5	
Bank loan = 2		Friends and relatives = 6	
Money lenders = 3		Other (Specify) = 7	
Traders (Aratdar) = 4			

18. Other issues

I. Do you get loan from Bank for your agricultural activities/production of Cauliflower? Yes = 1, No = 0

II. If no, why: Lending institution is far (distance) = 1, Lack of guarantees/collateral = 2, Non-cooperation from the financial institutions = 3, Others (specify) = 4

III. Do you use market information to sale your product? Yes = 1 , No = 0

IV. If yes, how do you get price information of your product?

Local market =1, Traders = 2, Friends =3, Govt = 4, NGO = 5, Others (specify) = 6

V. Do you have mobile phone? Yes = 1 , No = 0

VI. Do you get market information through mobile phone? Yes = 1 , No = 0

VII. Do you like to get market/ price information of your product through mobile phone? Yes = 1 , No = 0

VIII. Distance of market (km)? (i) Local market ----------(ii) Upazila market-------

19. Problems of Cauliflower production faced by farmers.

Items	Rank
Lack of quality seed	
Lack of capital	
Lack of technical knowledge and market information	
Lack of labor availability	
Lack of bullock availability	
Higher price of inputs	
Storage problems	
Lack of fertilizer	
perishability	
Lack of irrigation	
Price instability	

Low price in harvesting season	
Lack of desire quality	

Code: Problems: high=1, moderate=2, low=3

20. Problems of Cauliflower marketing faced by farmers.

Items	Rank
Poor communication & transport facilities	
Dominance of intermediaries	
High rate of brokerage	
Lack of capital	
Lack of adequate storage facilities	
Lack of market facilities	
Low price in the peak period of harvesting season	

21. Problems faced by Cauliflower intermediaries.

Items	Faria	Bepari	Aratdar	Wholesaler	Retailer
Storage of operating capital					
Poor communication and transportation facilities					
Absence of storage facility					
High rates of commission					
Lack of adequate market information					
Lack of undeveloped marketing places					
Lack of processing industry					
Perishability					
Lack of government interference					

22. Suggestions for improving the efficiency of production and marketing of Cauliflower.

1.
2.
3.
4.

Thank you for your kind co-operation

Date…….. Signature of the interviewer