FACTORS DETERMINING PROFITABILITY OF COUNTRY BEAN PRODUCTION IN NARSINGDI DISTRICT OF BANGLADESH

S. M. ABU JOBAER

DEPARTMENT OF AGRIBUSINESS AND MARKETING
SHER-E-BANGLA AGRICULTURAL UNIVERSITY
DHAKA- 1207

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BY

S. M. ABU JOBAER

Reg. No. 14-06170

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APPROVED BY:

Dr. Sharmin Afrin
Associate Professor
Department of Agribusiness and Marketing
Sher-e-Bangla Agricultural University
Supervisor

Sauda Afrin Anny
Assistant Professor
Department of Agribusiness and Marketing
Sher-e-Bangla Agricultural University
Co-Supervisor

Md. Rashidul Hasan
Chairman
Examination Committee
Department of Agribusiness and Marketing
Sher-e-Bangla Agricultural University
Dhaka-1207

DEPARTMENT OF AGRIBUSINESS AND MARKETING
Sher-e-Bangla Agricultural University
Sher-e-Bangla Nagar
Dhaka-1207

CERTIFICATE

This is to certify that the thesis entitled '**FACTORS DETERMINING PROFITABILITY OF COUNTRY BEAN PRODUCTION 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 Agribusiness And Marketing,** embodies the result of a piece of bona fide research work carried out by **S. M. ABU JOBAER**, Registration Number:14-06170, under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated:

Dhaka, Bangladesh

.....

Dr. Sharmin Afrin
Supervisor
Associate Professor
Department of Agribusiness and Marketing
Sher-e-Bangla Agricultural University Sher-e-Bangla Nagar, Dhaka-1207

DEDICATED TO MY BELOVED PARENTS

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ABSTRACT

The research aims to determine the profitability of country bean production in Narsingdi area and to identify the factors influencing profitability. A total of 125 rural bean farmers were randomly chosen from Narsingdi district's Raipura Upazila in 2020. The results indicated that production of country bean was lucrative. The estimated variable cost and fixed cost Tk. 151209 and Tk. 12338 per acre respectively, where the total return were Tk. 224977. The benefit-cost ratio was 1.375. Additionally, the functional analysis showed that the cost of MoP and labor had a major influence in determining the degree of profit gained from country bean production out of 10 explanatory factors. Farmers encountered many difficulties during production, including low prices for products, high costs for water, seed, and fertilizers, inadequate storage facilities, and insect and disease attacks, long chain of middlemen, malpractices in the market, lack of transportation facilities are the major concerns. Lowering input prices, easy access to credit, and adequate training facilities should be organized by various government and non-government organizations to create opportunities for farmers to improve their overall economic condition through country bean production.

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ABBREVIATION

Agril.	=	Agricultural
BADC	=	Bangladesh Agricultural Development Corporation
BARI	=	Bangladesh Agricultural Research Institute
BBS	=	Bangladesh Bureau of Statistics
BCR	=	Benefit Cost Ratio
DAE	=	Department of Agriculture Extension
DAM	=	Department of Agricultural Marketing
GDP	=	Gross Domestic Product
Et al.	=	All Others
FAO	=	Food and Agriculture Organization
FY	=	Fiscal Year
Ha	=	Hectare
HYV	=	High Yielding Variety
Kg	=	Kilogram
M	=	Million
MoA	=	Ministry of Agriculture
MS	=	Master of Science
Mt	=	Metric tons
NGO	=	Non-Government Organization
No.	=	Number
ILO	=	International Labor Organization
SAARC	=	South Asian Association of Regional Co-Operation
SAU	=	Sher-e-Bangla Agricultural University
SD	=	Standard Deviation
%	=	Percent
UAO	=	Upazila Agricultural Officer

CHAPTER I

INTRODUCTION

Bangladesh is a mostly agricultural nation. Agriculture's development and stability are critical to the economy's growth and stability. Farm contributed 12.68 percent to Bangladesh's gross domestic product in 2019 (BBS, 2019), while agriculture employment (as a percentage of total employment) was estimated to be 37.75 percent in 2020 (modeled ILO estimate) (World Bank, 2020). Agriculture include crops, livestock, forestry, and fisheries, with crops and horticulture accounting for around 8.99 percent of GDP (BBS, 2016). Only 6.73 percent of the country's 13.3 million hectares of arable land is devoted to horticulture crops. When potatoes and spices are omitted, the area is reduced to only 3.22 percent (Hossain, 2004). However, commercial vegetable cultivation is gaining popularity among certain farmers today. Beans have a significant role in the vegetable world. They come in a variety of forms, sizes, and colors, and are very adaptable and practical to store because to their ability to be dried and preserved for years. Beans may be consumed raw, sprouted, cooked, or processed to make flour. The beans contain calories 131.98 (k cal/100 g), carbohydrates 23.72 g, protein 8.84 g, fat 0.52 g, vitamins 6.86 mg, mineral 596.99 mg, water 65.7 g per 100 g of beans (USDA, 2012). Beans have the fewest fats, oils, and carbohydrates. The majority of beans have just around 2-3% fat. They are the ideal meal for a low-fat diet. It has no cholesterol, and they may assist in lowering your cholesterol level due to its high fiber content. In Bangladesh beans are cultivated in about 69013 ha of lands with production of 144050 metric tons (BBS, 2019). A large number of farmers in Narsingdi district are now engaged in commercial bean cultivation as the profitable farming has changed the lives of many people in the region.

The bean farming area of Narsingdi districts was 3500 hectares in 2017 (BBS, 2017). Thousands of farmers in different upazilas of Narsingdi district are now engaged in bean cultivation as it proved profitable, and farming of it has changed the lot of farmers in that area. For getting the improved practices adopted by the farmers in bean cultivation, at least two things are necessary. Firstly, the bean farmers must be aware of the benefits of the vegetables as well as the bean cultivation and secondly, the bean farmers should not face difficulty in obtaining necessary conditions and services to adopt the improved practices for bean cultivation. Generally bean farmers confront

many problems during bean cultivation. In general, problem refers to some difficulties when a bean farmers experiences from practical situation and wants to get a solution for the same. So long the problem confrontation, researchers used to find out problems with degree of severity as perceived by the concerned respondents. But the researcher of this study had a research design to describe how each of the problems was tackled by them during bean cultivation.

1.1 Present status of vegetables in Bangladesh

Vegetable production has exploded in Bangladesh over the past decade, creating new employment, boosting income, and lowering poverty. Bangladesh has overtaken China and India as the world's third biggest vegetable producer. Farmers earn handsomely from vegetable growing, which has inspired the youth, particularly the educated young generation, to join the agricultural industry via the use of contemporary technology and new marketing strategies.

According to Agriculture Ministry statistics, the nation produced 159.543 lakh tones of vegetables in the 2017-18 fiscal year on 8.613 lakh hectors of land. The Department of Agriculture Extension (DAE) set the country's vegetable output goal for the current fiscal year at 164.59 lakh tones on 8.72 lakh hectors of land. On 8.24664 lakh hectors of land this year, farmers are planting vegetables.

According to United Nations Food and Agriculture Organization (FAO) data, the country produced 3,62,128 tons of vegetables in 1961, 4,98,078 tons in 1971, 5,65,127 tons in 1990, 6,40,000 tons in 1995, 9,11,000 tons in 2000, 10,31,000 tons in 2005, 12,90,000 tons in 2010, and 14,81,000 tons in 2015.

Farmers may easily double or triple their revenue in two to three months by growing vegetables. Tomatoes, cabbage, cauliflower, water gourd, pointed gourd, ridge gourd, bitter gourd, ash gourd, snake gourd, teasel gourd, green chili, sponge gourd, pumpkin, lady's finger, cucumber, water pumpkin, radishes, beans, carrots, spinach, red amaranth, stem amaranth, yard long beans, sweet potato, drumstick, French bean, coriander leaf,

Bangladesh exports over 52 different varieties of vegetables to approximately 50 nations worldwide. To improve exports, the government has launched a number of programs to encourage pesticide- and other dangerous chemical- and bacteria-free vegetable growing.

Table 1.1. Total production of different vegetables in Bangladesh

Vegetables	Total production (tones)				
	2015	2016	2017	2018	2019
Tomatoes	413610	368121	388725	385038	387653
Spinach	46394	50555	66292	55609	57616
Pumpkins, squash and gourds	278392	290835	594682	600141	634951
Potatoes	9254285	9474099	10215957	9744412	9655082
Cabbages and other brassicas	258608	295744	311650	321719	331020
Beans	122091	128676	137495	134860	144050

Source: BBS, 2019

According to Table 1.1, total production of tomatoes, spinach, potatoes, and beans was 387653, 57616, 9655082, and 144050 tons in 2019. In 2019, total pumpkin, squash, and gourd output was 634951 tons, up from 600141 tons in 2018. Apart from that, overall cabbage and other brassicas output was 331020 tons, up from 321719 tons in 2018.

1.2 Present status of country beans in Bangladesh

Country bean (*Lablab purpureus)* is a major leguminous vegetable cultivated in Bangladesh during the rabi or winter season. Country bean is a high-protein legume that grows well on roofs and trellises. Additionally, it is delectable and may help improve soil fertility. As a result, Bangladeshi farmers and home gardeners have been cultivating it for over a century. The traditional indigenous cultivars, on the other hand, have a lengthy vegetative phase, low yield potential, and are often affected with mosaic virus disease. Winter is the prime harvest season for local cultivars, and oversupply is typical in markets. This leads in sales at low prices that are insufficient to cover the cost of manufacturing.

According to FAO (2019), bean cultivation occupied 20594 hectares in 2018 and 20873 hectares in 2019. In 2018, the average yield of bean was 65485 hg/ha; in 2019, it was 69013 hg/ha. Total output was 134860 tons in 2018 and will increase to 144050 tons in

2019. According to FAO statistics on bean farming, Bangladesh's yield, output, and area under cultivation are growing each year.

Table 1.2. Present status of country beans in Bangladesh

Particular	Unit	2015	2016	2017	2018	2019
Area harvested	Ha	19907	20211	20880	20594	20873
Yield	hg/ha	61331	63666	65850	65485	69013
Production	Tones	122091	128676	137495	134860	144050

Source: FAO, 2019

However, demand for country bean is great throughout the offseason, and prices are three to four times what they are during the winter. Country bean is tolerant to high soil moisture and brief periods of waterlogging. When summer-adapted country bean varieties become commercially available, farmers in low-lying regions grow them in late monsoon season on dirt piles or raised beds in wet terrain with trellis support. Farmers get a better revenue from this unique method because to the lesser supply and higher pricing in the marketplaces at the time. Additionally, with the cost of many agricultural inputs increasing lately, farmers are increasingly planting crops during the off-season to maximize income.

1.3 Background of the study

Agriculture is critical to the economic development and prospects of the great majority of emerging nations, including Bangladesh (WTO, 2000). The industry accounts for around 16.65 percent of Bangladesh's Gross Domestic Product and employs 37.75 percent of the country's active labor force (BBS, 2019 & World Bank, 2021).

Beans are a significant component of agricultural food crops in developing nations, serving as a source of protein and minerals in addition to cereal crops, particularly in Asia (Akibode, 2011). Grain legumes may also be used in rotation with cereals, helping to control soil diseases and providing nitrogen to the cereal crop (Beebe, undated). Food legume crops are regarded as critical crops for attaining food and nutritional security for both farmers and consumers in developing countries. Furthermore, country beans are more expensive than cereals and are increasingly cultivated to support farmers' earnings.

The research on country bean production may assist farmers in Bangladesh, as well as policymakers, in increasing output and improving the farmers' overall economic situation via country bean production.

1.4 Justification of the study

Country bean is an important source of protein, carbs, critical nutrients, and vitamins for both rural and urban populations. Fresh pods and green seeds are consumed raw or added to curries; mature seeds are also used as pulses, often as soup "dal" (Sultana, 2001); mature seeds are periodically sun-dried and preserved for use as veggies. In 100 g of edible bean portions, it includes 4.2 g protein, 110 mg calcium, 4.7 mg iron, 2.4 mg vitamin A, and 35 mg vitamin C. (Anonymous, 2013). Indeed, as health concerns grow, the majority of people, particularly the urban population, are limiting their intake of animal proteins in favor of pulses such as common bean and country bean owing to their low fat content. Thus, the need for more country bean research is self-evident.

Numerous research and development activities have been initiated and are continuing. These include the following: 1) improving bean varieties; and 2) enhancing the functionality of seed systems and accelerating the spread of related technologies. The study's findings will assist the agriculture sector in developing appropriate and consistent strategies that will raise widespread awareness among stakeholders, including policymakers, farmers, researchers, NGOs, input suppliers, buyers, and transporters, to work together to alleviate extreme poverty and hunger in the country. Additionally, it contributes to the corpus of information on bean production, assisting government and non-governmental organizations not just in Bangladesh, but also globally, in improving bean yield and resolving other technical challenges in agriculture. This will be achievable if this research is seen favourably and so significantly contributes to farmers' agricultural policies by influencing and reorienting the national bean industry stakeholders' decision-making in a farmer-beneficial direction.

1.5 Research objectives

1.5.1 Objectives

The specific objectives of the study were as follows:

1. To study the socioeconomic characteristics of the country bean growers;
2. To determine the profitability of country bean production and
3. To determine the factors affecting the profitability of country bean production.

1.5.2 Research questions

1. What are the socioeconomic characteristics of the country bean growers in Narsingdi district?
2. What are the factors affecting the profitability of country bean production?
3. What are the problems faced by the country bean farmers and necessary recommendations to increase production and profitability of country bean?

1.6 Scope of the study

The study's results will be especially relevant to the Raipura upazila in the Narsingdi district. These results may also be relevant to other regions of Bangladesh with comparable environmental, cultural, and socioeconomic characteristics to the research area. Thus, the research may benefit policymakers, planners, extension employees, and field workers in developing effective strategies for increasing the profitability of country bean growers.

1.7 Assumptions of the study

a. While conducting the study, the researcher prioritized these assumptions: the respondents included in the sample were really representative of the targeted demographic.
b. The respondents included in the study's sample were adequately competent of responding to the questions and expressing their thoughts.
c. The respondents' responses were significant and trustworthy.
d. The researcher, the interviewer, was socially and culturally acclimated to the study location. The responses were objective.
e. Farmers were very cooperative throughout the interview.

1.8 Organization of the thesis

This report will be divided into eight sections. The first chapter will summarize the current state of the study, its context, rationale, research questions, goals, scope, and assumptions. The second chapter will be devoted to a review of prior research. The third chapter will describe the research technique. The fourth chapter will discuss the socioeconomic features of rural bean growers. Chapter five will examine bean producers' profitability. Chapter six will examine the elements impacting country bean profitability in the research region. Chapter seven will explore a variety of issues and ideas. Finally, chapter eight will summarize the major results, draw a conclusion, and provide recommendations.

1.9 Limitations of the study

Several limitations were noted throughout the research period, including the following:

- To begin, this investigation was confined to a small area, the region where the greatest amount of country bean was farmed.
- Second, the researcher was forced to deal with tiny sample sizes due to time and other resource restrictions. Although the data were thoroughly evaluated, a larger sample size may have bolstered the conclusions.
- Thirdly, due to time and cost constraints, all data and other relevant information were gathered as quickly as feasible.
- Fourthly, a significant weakness of the study was that the researcher had to rely entirely on the producers' recollection since they did not preserve written records of their on-farm operations throughout production. As a result, growers were probed within the confines of their memory in order to recall the right responses to the queries posed.
- Additionally, certain challenges were encountered during data collecting in getting responses from a number of country bean growers. At first, individuals are hesitant to provide accurate facts. They were eventually persuaded to report the facts.

Throughout the research period, numerous restrictions were addressed with deliberate attention in order to reduce any voice faults.

CHAPTER II

LITERATURE REVIEW

Country bean is an important vegetable-cum-pulse, food-secure and nutritious crop. Bean is a member of Leguminosae, sub-family Papilionaceae. This bean is well known as "Sheem" and the scientific name is *Lablab purpureus, Dolichos lablab* or *Dolichos niger*. It is reported to be originated in India (Sibiko *et al*. 2013; Chowdhury *et al*.1989) and then spread to other parts of the world. It is grown in a significant acreage after brinjal and tomato in Bangladesh. Generally, it is also known as income generating crop in our country. It is widely grown in Narsingdi, Cumilla, Noakhali, Sylhet, Kishoregonj, Tangail, Jashore, Pabna, Dinajpur, and Chattogram intensively but for the last ten years it has been extended to Khulna and Barisal regions (Singh *et al*. 2019; Aditya, 1993). This crop fixes atmospheric nitrogen in a symbiotic relationship with rhizobium bacteria in the soil (Karla, 2009). Protein percentage of country bean is 4.5% in green pod and 25% in dry seed and has a great demand for both young pods and mature seeds irrespective of rich and poor. It also contains significant amounts of thiamin, riboflavin, niacin, vitamin C, and iron (0.1, 0.06, 0.7, 9.0, and 4 1.7 mg/100gm) respectively (Rehana, 2006). The green pods and developed unripe seeds serve as delicious protein rich vegetables (Wortman *et al*. 2004) and antifungal protein (Ye *et al*. 2000), good source of iron and zinc (Buruchara *et al*. 2011) and have a low glycemic index (Widers, 2006). However, its production is hampered due to attack of a number of insects, diseases, weeds (especially in summer season) and cause severe damage to country bean. In view of above facts, the present study was undertaken to review the information on the effect of insect, diseases, weeds and soil nutrients of the country bean production.

Tschering (2002), conducted a profitability analysis of bean production in Honduras ,the focus of the study was on record keeping data collected from Honduran bean farmers in the main bean-growing regions during the period 1998- 2000. In the study, Tschering identified ways to improve record keeping to reduce the cost of future data collection. An assessment of the cost pattern of input and labor and consequently a profitability analysis of bean production for farmers growing traditional and improved bean varieties was conducted. It was observed that farmers growing modern varieties

had higher average yields and earned higher profits or suffered less loss than the farmers growing traditional varieties.

Akhter *et al*. (2011) conducted a study on the production of winter vegetables in selected areas of the Narsingdi district. Studies have shown that the production of all selected vegetables was profitable. The gross cost per hectare of tomato, cauliflower and cabbage production were Tk. 118000, Tk. 116977 and Tk. 120522 respectively and the corresponding gross returns were Tk. 217020, Tk. 2110000 and Tk. 220000 respectively. The net yield per hectare of tomato, cauliflower and cabbage was Tk. 97000, Tk. 93023 and Tk. 99478 respectively.

Chowdhuri *et al*. (2014) found per hectare profitability of growing vegetables from the viewpoints of individual farmers was measured in terms of gross return, gross margin and value addition. Per hectare gross costs of brinjal, country bean and cabbage production were Tk. 241277, Tk. 162337 and Tk. 204152 respectively, and per hectare average yields of brinjal, country bean and cabbage were estimated at 24175 kg/ha 15774 kg/ha, and 24707 kg/ha respectively. Per hectare gross returns of brinjal, country bean and cabbage were Tk. 483500, Tk. 347028 and Tk. 494140 respectively. Per hectare net returns of brinjal, country bean and cabbage were Tk. 242223, Tk. 184691, and Tk. 289988, respectively. It shows that cost of production per hectare was higher for brinjal than for cabbage and country bean. The study also shows that per hectare yield, gross returns, gross margin, net return and benefit cost ratio of cabbage were higher than those of country bean and brinjal.

Hasan *et al.* (2014) showed that total cost of bean was higher in Comilla than Mymensingh while net farm income was higher in Mymensingh than Comilla. On the other hand, total cost of cauliflower was higher in Comilla than Rajshahi while net farm income was higher in Rajshahi than Comilla. The results indicate that cauliflower and bean productions were profitable in the case study areas.

Hasan *et al*. (2014) conducted a profitability analysis of important summer vegetables in Keranigonj upazila, Bangladesh, and found that summer vegetable cultivation was profitable. In addition, they found that the benefit from summer vegetable production was higher than that of other competitive crops such as bottle gourd and cucumber.

Aslam (1995) conducted a study on a comparative economic analysis of winter crop production in an area under Gauripurthana in the district of Mymensingh. He studied

economic aspects of winter crop such as potato, bringal, bottle gourd, bean, cucumber, sweet potato, mustard and ground nut. He found that the per hectare gross expenses of HYV potato, LV potato, brinjal, bottle gourd, bean, cucumber, sweet potato, mustard and ground nut were Tk.43956, Tk. 34892, Tk. 41893, Tk. 45219, TK. 42224, Tk.27362, Tk.20475 and Tk. 11970 respectively while the per hectare gross return and net return were Tk.77000 and Tk.3303, Tk. 53648 and Tk.18756, Tk.72061 and Tk.30168, Tk.80261 and Tk.12524, respectively. He also found that the variation in yield was greatly influenced by the use of human labour, animal labour, application of fertilizers and date of transplanting and sowing. The factors were directly or jointly responsible for variation in winter crop yields.

Mawla (1998) conducted a research on some selected winter vegetables in a in a selected area of Narshingdi district. He included winter vegetables namely cauliflower, cabbage, tomato, radish, bean and bottle gourd. He conducted his study in three villages namely Jalalabad, Baroycha and Hossen Nagar of Narayanpur union under Belabo thana of Narshingdi district. He found that per hectare gross expense of cauliflower were Tk. 50875, while the per hectare gross return, net returns above gross expenses and cash expenses were Tk. 68580, Tk.17750 and Tk. 43665 respectively. Gross expense for producing per hectare of cabbage was Tk. 51794, of which cash and non-cash expenses shared 49 percent and 59 percent respectively. Net return above gross expenses and net return above cash expenses were Tk. 69848, Tk.18052 and Tk. 44509 per hectare respectively. Gross expense for producing per hectare of tomato was Tk. 5505, while the per hectare gross return, above cash expenses were Tk. 46200, Tk. 12500, and Tk. 30220 respectively. Per hectare gross expense and gross return of bean production were estimated at Tk. 38772 and Tk. 47513 while per hectare net returns above gross and cash expenses amounted to Tk. 8741 and Tk. 35475 respectively. Gross expenses for producing bottle gourd per hectare were Tk. 43614 while the per hectare gross return, net returns above gross expenses and net return above cash expenses were Tk. 58480, Tk.14866, and Tk. 40989 respectively.

Hasan (2005) conducted a study on an economic analysis of contract farming for production and export of high value vegetables in Bangladesh. The overall findings of the study was that the export quality of fresh vegetables was significantly affected by price. Per hectare gross margin for contract bean, bitter gourd and okra production were Tk. 181548, Tk. 261395 and Tk. 95057 while it was Tk. 88070, Tk. 92053, and Tk.

18522 for non-contract bean, bitter gourd and okra production, respectively. The study also identified the problems and constrained associated with supply and marketing chain management for production and export of high value vegetables.

Pramanik (2008) carried out a research on vegetables production strategy in Rajshahi region of Bangladesh. This study was conducted at six villages namely Tonapara, Mypara, Noapara, Shakepara, Bharuahra and Tarapur of Puthiaupazilla under Rajshahi district of Bangladesh during the period from January to June 2008 to find out the profitability of vegetables production, to examine the input use pattern in vegetables production, identify the problems lies in production of vegetables in Rajshahi Region. The gross return and margin was the highest in tomato (Tk. 510000/ha and Tk. 338630/ha) followed by brinjal (Tk. 495000/ha and Tk. 324080/ha) and cauliflower (Tk. 440000/ha and Tk. 274640/ha) and the lowest in white gourd (Tk. 220000/ha and Tk. 59638/ha) and sweet gourd (Tk. 225000/ha and Tk. 63240/ha). The total cost was highest in potato (Tk. 183760 /ha) followed by tomato (Tk. 171370/ha) and brinjal (Tk. 170920/ha) and red amaranth (Tk. 38650/ha) and spinach (Tk. 89830/ha). Among the vegetables crop, tomato gave higher benefit cost ratio (2.98) followed by brinjal (2.90), cauliflower (2.66), white gourd (1.37) and sweet gourd (1.39). Considering the yield cost and return, tomato, brinjal, cauliflower, cabbage and bottle gourd cultivation were more profitable in Rajshahi region of Bangladesh.

Haque (2001) noted that, in most of the vegetable production, human labor MVP was greater than one, and it was also noteworthy to say that it was a very necessary input and that there was a great chance of creating jobs. The literature found lots of study on profitability of different vegetables except country bean in Bangladesh.

It may be concluded from the literature that there are large number of studies conducted on vegetables production but a little research conducted on profitability on bean cultivation and the factors influenced the profitability. The present study aims to examine the profitability of bean cultivation and identify the most influencing factors to its production. Thus, the results of the study are expected to provide useful information which would help farmers and researchers.

CHAPTER III

METHODOLOGY

3.1 Introduction

This chapter details the methodologies used at various phases of the research. Methodology is a fundamental and necessary component of every study. This chapter discussed the research region, sample selection, survey schedule preparation, data collecting method, survey duration, data editing and tabulation, and analytical tools. The techniques and procedures utilized and followed in the research are listed below, along with their associated goals.

3.2 Research design

The research's primary purpose was to ascertain the profitability of bean production in the study region and the variables impacting it. To assess the profitability benefit cost ratio, and to discover the variables impacting nation bean production, various socioeconomic parameters were chosen. Additionally, the study's purpose is to identify the issues confronting bean growers and to present their solutions.

3.3 Selection of study area

The study area selection process is critical for farm management research. "The region in which a farm business survey is to be conducted is determined by the survey's specific objectives and the extent to which farmers cooperate" (Yang, 1965).

As the research area selection is a critical phase that is highly dependent on the study goals. As a result, the research area was chosen with caution. The research was done in Raipura upazila of Narsingdi district to determine profitability and the variables impacting profitability.

Source: Dhaka Tribune

Figure 4.1. Map of Narsingdi district

Narsingdi District has an area of about 1140.76 square kilometers and is situated between 23'46' and 24'15' north latitudes and 90'34' and 90'59' east longitudes. It is flanked on the north by Kishoreganj district, on the south by Narayanganj and Brahmanbaria districts, on the east by Kishoreganj and Brahmanbaria districts, and on the west by Gazipur district. Agriculture is the primary source of income for 42.73 percent of this district's population.

Source: Wikipedia

Figure 4.2. Map of Raipura upazila under Narsingdi district

Raipura Upazila has an area of 312.77 square kilometers. It is flanked on the north by the Belabo and Bhairab Upazilas, on the south by the Narsingdi sadar, Banchharampur, and Nabinagar Upazilas, on the east by the Brahmanbaria sadar and Nabinagar Upazilas, and on the west by the Shibpur and Narsingdi Sadar Upazilas.

The following are the primary reasons for selecting the aforementioned Upazila as the research area:

1. There are several bean growers accessible, the bean grows well, and farmers in this research region devote a significant amount of their land to vegetable production.
2. These settlements had several traits, such as topography, soil composition, and meteorological conditions conducive to vegetable production.
3. This community has easy access and excellent communication facilities.

Bean growing is gaining traction in Narsingdi area; a good production of bean generates a considerable profit for farmers. In recent years, a considerable number of farmers in Narsingdi district have taken up bean cultivation. Due to the economic benefits, farmers often produce bean on abandoned lands and on the premises of their homes. Many farmers are also accustomed to cultivating bean on a commercial basis.

As a result, the district of Narsingdi was chosen as the research region due to the presence of bean producers.

3.4 Selection period of study

The current research was conducted over a six-month period, from November 2019 to April 2020. Between February and April 2020, data were gathered through face-to-face interviews with bean producers utilizing a predefined survey schedule. The researcher personally visited the region to obtain further data.

3.5 Selection of samples

For the purposes of this study, the population is classified as farmers engaged in bean production in the Raipura Upazila of the Narsingdi district. To accomplish the aims, a convenience sampling strategy was used. From the research region, 125 country bean producers were chosen.

3.6 Preparation of the survey schedule

The data collection instrument specifies the instruments used to acquire the data. To perform the study, data were gathered using a researcher-prepared interview schedule. The schedule included questions regarding the farmer's socioeconomic traits and various production expenses. Additionally, the timeline covered several issues they encountered throughout manufacturing and their possible solutions. The interview

schedule was developed in accordance with the study's unique goals, pretested, and eventually finalized after several revisions.

3.7 Data collection procedure

Face to face interviews were used to acquire pertinent data from the chosen subjects. Prior to conducting real interviews, the sample farmers and dealers were informed of the study's academic goal. They were first hesitant to respond to the questions, but after being persuaded that the study was strictly academic and would have no impact on them, they agreed to collaborate with the researcher. During the interview, the researcher addressed questions in a methodical manner and clarified them where appropriate. Farmers were urged to supply accurate information to the extent practicable. Many respondents said that they lacked records on manufacturing input costs. Memory remembering approach was used to address this issue. Along with primary data, secondary data were gathered from a variety of sources including journals, various organizations such as the Department of Agricultural Marketing of Bangladesh, and online searches.

3.8 Tabulation and analysis of data

The first stage was to evaluate the data for each schedule to identify inconsistencies or omissions in the data gathering process and to eliminate extraneous data. The data were meticulously adjusted to remove any inaccuracies introduced by the schedules used to capture the information. The processed data were imported into an SPSS spreadsheet and collated to facilitate tabulation. Initially, information was gathered in local units. Following their verification, they were translated to quantitative form using appropriate grading. Tables were created as necessary by summarizing the data. The acquired data were examined in accordance with the study's goals. SPSS was used to conduct the analysis.

3.9 Analytical technique

The suitable analytical approach may be used to evaluate an agricultural research. The data were evaluated in order to accomplish the study's goals. The following procedures were most likely used:

3.10 Profitability analysis

Country bean's net returns were assessed using a set of financial pricing. The financial prices were the market prices obtained by farmers for products and inputs acquired during the research period. The following cost elements were found for the study:

i. Land preparation
ii. Human labor
iii. Seedlings
iv. Urea
v. TSP
vi. MoP
vii. Insecticide
viii. Irrigation
ix. Interest on operating capital
x. Land use cost

Crop returns were evaluated using the market value of the major goods. Variable cost, fixed cost, and total cost were all discussed in this research. TVC includes land preparation, human labor, seedlings, organic manure, urea, TSP, MoP, pesticides, and irrigation. Fixed costs (FC) were comprised of interest on operating capital and land rental value. The total cost (TC) included in both variable and fixed costs.

3.10.1 Cost of land preparation

Land preparation is a critical component of the industrial process. Plowing, laddering, and other actions necessary to prepare the soil for seed sowing were included in land preparation for country bean production. It was discovered that the number of ploughings varied considerably across farms and between locations.

3.10.2 Cost of human labor

Human labor was once seen as a significant cost component of the manufacturing process. It is often necessary for a variety of tasks including land preparation, seeding, weeding, fertilizer and pesticide treatment, irrigation, harvesting and hauling, cleaning, and storage. To assess the cost of human work, we multiplied the recorded man-days per hectare by the pay per man-day for a specific activity.

3.10.3 Cost of seed

The price of seed varied significantly according on its quality and availability. The market price of the respective bean's seeds was used to determine the cost of seed. To determine the cost of seeds in the research region, the total amount of seed required per hectare was multiplied by the market price of seed.

3.10.4 Cost of urea

Urea was a critical component in bean production. The cost of urea was determined using market prices. To determine the cost of urea, we multiplied the reported unit of urea per acre by the market price of urea.

3.10.5 Cost of TSP

The cost of TSP was also determined using market prices. To determine the cost of TSP, we multiplied the reported unit of TSP per hectare by the market price of TSP.

3.10.6 Cost of MoP

MoP was one of the three primary fertilizers used in bean cultivation. To get the cost of MoP per hectare, we multiplied the market price of MoP by the unit cost of that input per hectare for a certain operation.

3.10.7 Cost of insecticides

Farmers applied a variety of pesticides 5-7 times to maintain their crop pest- and disease-free. The cost of pesticides was determined using the market price of the insecticides employed in the research region on a per-hectare basis.

3.10.8 Cost of irrigation

Irrigation costs vary considerably amongst farms. It was determined by the number of times irrigation was required per hectare and the associated expense.

3.10.9 Interest on operating capital

The interest rate on operational capital was calculated using the opportunity cost concept. Because not all expenditures were incurred at the start or at any one point in time, the operating capital really reflected the average operating cost across the period. Costs were incurred during the manufacturing process.

Thus, interest on working capital for four months was calculated at a rate of 9% per year. The following formula was used to compute interest on operating capital:

IOC= AIit

Where,

IOC= Interest on operating capital

i= Rate of interest

AI= Total investment / 2

t = Total time period of a cycle

3.10.10 Land use costs

Land usage costs were determined on the basis of the opportunity cost of land use per hectare during a four-month cropping cycle. Thus, the cash rental value of land was utilized to calculate the cost of land usage.

3.10.11 Gross return

The gross return per hectare was determined by multiplying the entire quantity of product and by-product by their respective per-unit pricing.

Gross return= Quantity of the product * Average price of the product + Value of by-product.

3.10.12 Gross margin

The phrase "gross margin" refers to the difference between the gross return on investment and the variable expenses associated with the venture. Farmers, in general, strive to maximize their return on their variable cost of production. Farmers are encouraged to achieve a profit on their variable expenses, which is why gross margin analysis is used. Gross margin was calculated on the basis of television commercials.

After subtracting variable expenditures from gross return, gross margins per hectare were computed. That is,

Gross margin = Gross return – Variable cost

3.10.13 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.

3.10.14 Undiscounted Benefit Cost ratio (BCR)

The average return on each taka invested in manufacturing is a critical metric for determining profitability. The ratio of total return to total cost per hectare was used to calculate the undiscounted BCR.

BCR = Total return (Gross return)/ Total cost

3.11 Cobb-Douglas production function

Due to its mathematical features, ease of comprehension, and computational simplicity, the Cobb-Douglas production function is arguably the most extensively used form for fitting agricultural production data (Heady and Dillion, 1969; Fuss and Mcfadden, 1978). The Cobb-Douglas approximation may be a suitable fit for production processes in which components are imperfect replacements throughout the whole range of input values. Additionally, the Cobb-Douglas is reasonably straightforward to estimate since it is linear in parameters in logarithmic form; it is parsimonious in parameters (Beattie and Taylor, 1985).

Considering two variable inputs for example one is labor and another is capital, then the function can be expressed as

$$Y = AL^{\beta}{}_1K^{\beta}{}_2e^{v_i - u_i}$$

Where Y = level of output, L and K = Labor and Capital are variable inputs, A = multiplicative constant, β_1 and β_2 are the coefficient of L and K and they represent elasticity of the respective factors of production, and e = error term.

3.12 Specification of production model:

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

$$\text{Ln } Y_i = \beta_0 + \beta_1 \ln X_{1i} + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \beta_4 \ln X_{4i} + \beta_5 \ln X_{5i} + \beta_6 \ln X_{6i} + \beta_7 \ln X_{7i} + \beta_8 \ln X_{8i} + \beta_9 \ln X_{9i} + \beta_{10} \ln X_{10i} + \beta_{11} \ln X_{11} + v_i - u_i$$

Where,

Y = Net return (BDT/ha)

X_1 = Cost of land preparation (BDT/ha)

X_2 = Cost of seed (BDT/ha),

X_3 = Cost of manure (BDT/ha)

X_4 = Cost of urea (BDT/ha)

X_5 = Cost of TSP (BDT/ha)

X_6 = Cost of Gypsum (BDT/ha)

X_7 = Cost of MoP (BDT/ha)

X_8 = Cost of irrigation (BDT/ha)

X_9 = Cost of pesticides (BDT/ha)

X_{10} = Cost of hired labor (BDT/ha)

X_{11} = Cost of family labor (BDT/ha)

v_i -u_i = error term.

3.13 Null hypothesis

On bean production, marital status, education of the household head, occupation of the household head, female head's occupation, occupation of other family members, family size, major source of income, average annual savings, average monthly income, size of land holdings, and having storage space for crops have no effect.

CHAPTER IV

SOCIOECONOMIC CHARECTERSTICS OF COUNTRY BEAN FARMER

This chapter will demonstrate socioeconomic characteristics of the country bean farmers of Narsingdi district to fulfill the first objective. Selected characteristics of the farmer are marital status, household head's education, household head's occupation, female head's occupation, other family member's occupation, family size, major income source, average annual savings, average monthly income, size of land holdings and storage place for crops.

4.1 Farmer's family characteristics

The table 4.1 shows frequency and percentage distribution of the marital status, family type and family size of the respondents.

It is seen that the majority of the respondents were married (94.4%) followed by a single (5.6%).The table also indicates that the majority (56%) of respondents had a nuclear family, while 44% had a joint family. The family size of the farmers of the study ranged from 1 to above 7 persons. Besides, the farmers were classified into three categories based on their family size. Farmers having a family size of 1 to 4 members were 40%, family size of 5 to 7 members was 36% and family size above 7 members was 24%.

Table 4.1. Percentage distribution of respondent's family characteristics

Variables	Frequency	Percentage
Marital status		
Single	7	5.6
Married	118	94.4
Total	125	100
Type of family		
Nuclear	70	56.0
Joint	55	44.0
Total	125	100
Family size		
1 to 4	50	40.0
5 to 7	45	36.0
More than 7	30	24.0
Total	125	100

Source: Field survey, 2020

4.2 Percentage distribution of occupation and education

Table 4.2 shows frequency and percentage distribution of household head's education, household head's occupation, female head's occupation and other family member's occupation of the farmer.

The table indicates that, there was no institutional education for 31.2% of respondents, 46.4% of respondents had primary level education and only 22.4% had secondary and above level education. From table, it is also seen that 52% of respondents were involved with only farming practice, whereas, 48% of respondents had other occupations with farming. In the case of female head's occupation, 87.2% of females were housewives and only 12.8% of females were involved with earning activities. At the same time, 12.8% and 32.8% of other family members were engaged with farming and other professions respectively whereas 54.4% of family members were unemployed.

Table 4.2. Percentage distribution of occupation and education

Variables	Frequency	Percent
Household head's education		
No institutional education	39	31.2
Primary	58	46.4
Secondary+	28	22.4
Total	125	100
Household head's occupation		
Only Farming	65	52.0
Others with farming	60	48.0
Total	125	100
Female head's occupation		
Housewife	109	87.2
Others	16	12.8
Total	125	100
Other family member's occupation		
Unemployed	68	54.4
Farmer	16	12.8
Others	41	32.8
Total	125	100

Source: Field survey, 2020

4.3 Percentage distribution of income and savings

The table 4.3 shows having a bank account or not, place of money saving, average monthly income, average annual saving and major source of income of the respondents. The table 4.3 shows that, 34.4% of the respondents had a bank account whereas 65.6% of the respondents had not any bank account. It is seen that 32.8% of the respondents saved their money in bank whereas 4% respondents saved in post office and 63.2% respondents had saved in other place. From the table, it is also seen that in the case of average monthly income, 36% of respondents earned 20000 to 30000 taka per month and the percentage is 24.8 for a monthly income of 30000 to 40000 taka/month. 25.6% of respondents earned less than 20000 taka per month whereas, 13.6% of respondents

earned more than 40000 taka in a month. A substantial number of respondents (58.4%) average annual savings was between 1000 to 5000 taka, while only 7.2% of respondents save more than 5000 taka in a year. 34.4% of respondents saved less than 1000 taka in a year. The table again shows the respondent's major sources of income. It is seen from the table that 49.6% of farmers are dependent on agriculture and allied activities for their income whereas, 20% of farmers rely on only agriculture as their earning source. Besides, a significant number of respondents (30.4%) were dependent on other activities as their revenue source.

Table 4.3. Percentage distribution of income and savings

Variables	Frequency	Percent
Having bank account		
Yes	43	34.4
No	82	65.6
Total	125	100
Place of money saving		
Bank	41	32.8
Post office	5	4.0
Others	79	63.2
Total	125	100
Average monthly income		
less than 20000	32	25.6
20000 to 30000	45	36.0
30000 to 40000	31	24.8
more than 40000	17	13.6
Total	125	100
Average annual savings		
less than 1000	43	34.4
1000 to 5000	73	58.4
More than 5000	9	7.2
Total	125	100
Major income source		
Agriculture	25	20.0
Agriculture and allied activities	62	49.6
Others	38	30.4
Total	125	100

Source: Field survey, 2020

4.4 Percentage distribution of farming information

The table 4.4 shows farm size, no. of years engaged in farming, type of labor used, growing practices, type of fertilizers being used and having a storage place or not for crops.

Based on their farm size, farmers were divided into three groups. The number of respondents with a land size of 'below 1 acre',' 1 to 3 acres' and 'more than 3 acres' was 34.4%, 58.4%, and 7.2 % respectively. The farming experience of a respondent was determined based on involvement in the farming activities related to agriculture. Farmers were classified into four categories based on their farming experience. The table shows that the highest portion of the bean farmers (38.4%) had farming experience of 9 - 10 years and 33.6% of farmers had 7-8 years of experience. At last 8.8% of farmers had less than 7 years' experience whereas 19.2% of farmers had more than 10 years' experience. The table illustrates that in the case of labor usage, 81.6% of respondents used both own and hired labor in their farming activities followed by 12% owned and 6.4% hired. The table also indicates that, 80.8% respondents growing practices were organic practice but not certified whereas 19.2% of the respondents were practicing conventional method for growing. The table shows that both chemical and organic fertilizers were used by farmers in the research area. 63.2% of farmers used both fertilizers on their land, 20.8% of farmers have used only organic fertilizers and the percentage of farmers used only chemical fertilizers was 16%.It is seen from the table that 88.8% of farmers had not any storage place for their crops and only 11.2% of farmers had those facilities.

Table 4.4. Percentage distribution of farming information

Variables	Frequency	Percent
Size of land holdings		
Below 1 acre	43	34.4
1-3 acres	73	58.4
Above 3 acres	9	7.2
Total	125	100
No of years engaged in farming		
Less than 7 years	11	8.8
7-8 years	42	33.6
9-10 years	48	38.4
Above 10 years	24	19.2
Total	125	100
Labor use		
Hired	8	6.4
Owned	15	12.0
Both hired and owned	102	81.6
Total	125	100
Growing practices		
Organic practice but not certified	101	80.8
Conventional method	24	19.2
Total	125	100
Type of fertilizers being used		
Chemical fertilizers	20	16.0
Organic fertilizers	26	20.8
Both	78	63.2
Total	125	100
Having storage place for crops		
Yes	14	11.2
No	111	88.8
Total	125	100

Source: Field survey, 2020

4.5 Percentage distribution of farmer's technical knowledge

The table 4.5 illustrates that 30.4% of the farmers had access to training or technical knowledge where 69.6% of farmers had not any kind of training. It is also seen from the table that, 97.3% of the farmers received training from Agricultural Extension Officer and 2.7% of the farmers received the training from NGO's.

Table 4.5. Percentage distribution of technical knowledge

Variables	**Frequency**	**Percent**
Any training or technical knowledge		
Yes	38	30.4
No	87	69.6
Total	125	100
Received training from		
Agricultural Extension Officer	37	97.3
NGO's	1	2.7
Total	38	100

Source: Field survey, 2020

CHAPTER V

PROFITABILITY ANALYSIS OF COUNTRY BEAN

One of the objective of present study was to determine the profitability of country bean farmers in Narsingdi district. This chapter analyzed the variable cost & fixed cost associated with the production to find out profitability of the farmer.

5.1 Variable costs

Table 5.1 shows different variable costs associated with the production of country bean. Variable costs were:

5.1.1 Cost of seed

The overall cost of seed for bean production on a per-hectare basis was calculated to be Tk. 8408 or 5.56 percent of the total variable cost (Table 5.1).

5.1.2 Cost of labor

Total labor costs were determined to be Tk. 63735 accounting for 42.15 percent of total variable costs (Table 5.1).

5.1.3 Cost of land preparation

The average cost of land preparation for bean production was Tk. 13004 per hectare, accounting for 8.60 percent of total variable costs (Table 5.1).

5.1.4 Cost of irrigation

Irrigation costs on average around Tk. 14546 per hectare, which equals 9.61 percent of total variable costs (Table 5.1).

5.1.5 Fertilizer cost

5.1.5.1 Cost of urea

Farmers in the study region utilized a variety of fertilizers. The cost of urea per hectare was Tk. 12527, accounting for 8.28 percent of the total variable cost (Table 5.1).

5.1.5.2 Cost of TSP

TSP had an average cost of Tk. 9202 accounting for 6.08 percent of total variable costs (Table 5.1).

5.1.5.3 Cost of MoP

The cost of MoP per hectare was determined to be Tk. 1415 representing 0.93 percent of the total variable cost (Table 5.1).

5.1.5.4 Cost of DAP

The cost of DAP per hectare was determined to be Tk. 2201 or 1.46 percent of the total variable cost (Table 5.1).

5.1.5.5 Cost of manure

It was determined to be around Tk. 1331 per hectare, or 0.88 percent of the total variable cost.

5.1.6 Cost of pesticides

The average cost of pesticides used in bean production was Tk. 10389 accounting for 6.87 percent of total variable costs (Table 5.1).

5.1.7 Other cost

The additional variable cost associated with bean production was determined to be Tk. 14450 or 9.55 percent of the overall variable cost (Table 5.1). Additional costs included fence and bamboo stage construction.

5.2 Total variable cost

As a result of the various cost factors listed above, it was determined that the overall variable cost of bean production was Tk. 151209 per hectare (Table 5.1).

Table 5.1. Total variable cost per hectare of country bean production

Items		Taka/ha	Percentage of total variable cost
Seed cost		8408	5.56
Labor cost		63735	42.15
Land preparation cost		13004	8.60
Irrigation cost		14546	9.61
Fertilizer cost	Urea	12527	8.28
	TSP	9202	6.08
	MOP	1415	0.93
	DAP	2201	1.46
	Manure	1331	0.88
Pesticides cost		10389	6.87
Other cost		14450	9.55
A. Total variable cost		**151209**	**100**

Source: Field survey, 2020

5.3 Fixed costs

The land usage cost and interest on operating capital, which are considered fixed costs, are shown in Table 5.2. The fixed expenses associated with producing country beans on a per-hectare basis were as follows:

5.3.1 Land use cost

Land usage costs were determined to be Tk. 7500.00 per hectare, accounting for 60.79 percent of total fixed costs (Table 5.2).

5.3.2 Interest on operating capital

Interest on operating capital for bean production was approximated at 9% and Tk. 4838 per hectare was computed, representing 39.21% of the total fixed cost (Table 5.2).

5.4 Total fixed cost

As a result of the various cost categories listed above, it was determined that the overall fixed cost of Bean production was Tk. 12338 per hectare.

Table 5.2. Total fixed cost per hectare of country bean production

Item	**Taka/ha**	**Percentage of total**
Land use cost	7500	60.79
Interest on operating capital @ 9%	4838	39.21
B. Total Fixed cost	**12338**	100

Source: Field survey, 2020

5.5 Gross return

The gross return per hectare was computed by multiplying the total quantity of product by the per-unit price. The data indicates that the average bean output per hectare was 10493kg and the average bean price was Tk. 20.25. As a result, the total return on investment was determined to be Tk. 212477 per hectare (Table 5.3). And continue with an expected product value of Tk. 12500 per hectare for bean growing. As a result, the total gross return per hectare was determined to be Tk. 224977.

Table 5.3. Gross return per hectare of country bean production

Cost Items	**Quantity**	**Price Per Unit (Tk.)**	**Costs/Returns (TK/ha)**
Main product	10493	20.25	212477
By-product			12500
C. Gross return			**224977**

Source: Field survey, 2020

5.6 Gross margin

Gross margin is the difference between the gross profit and variable costs. Gross margin was determined by subtracting all variable costs from gross return. On the basis of the data, a gross margin of Tk. 7376 per hectare was determined (Table 5.4).

5.7 Net return

The net return or profit was determined by subtracting the whole cost of production from the gross return. On the basis of the data, a net return of Tk. 61429 per hectare was calculated (Table 5.4).

Table 5.4. Per hectare cost and return of country bean production

Item	Cost/Returns (Tk./ha)
A. Total variable cost	**151209**
B. Total fixed cost	12338
C. Gross return	224977
D. Total cost(A+B)	163547
E. Gross margin (C-A)	73767
F. Net return (C-D)	61429
G. Undiscounted BCR (C/D)	1.3756

Source: Field survey, 2020

5.8 Benefit Cost Ratio (Undiscounted)

The Benefit Expense Ratio (BCR) is a ratio that is used to compare the benefit per unit of cost. The benefit-cost ratio (BCR) was determined to be 1.375, indicating that each taka invested in rural bean production yielded Tk. 1.375. (Table 5.4). According to the calculations above (table 5.4), bean growing is lucrative in Bangladesh.

CHAPTER VI

FACTORS DETERMINING BEAN PRODUCTION PROFITABILITY

One of the objectives of the present study was to identify the factors influencing the profitability of bean growers in Raipura Upazila under Narshingdi district. Cobb-Douglas Production Function is taken as logarithmic functional form for present study which shows a functional relationship between inputs and outputs.

6.1 Coefficient of multiple determinations (R^2)

The coefficient of multiple determinations for bean production was determined to be 0.775, indicating that the independent variables in the model explained about 77.5 percent of the entire variance in returns. Thus, we may conclude that this regression model's goodness of fit is superior, since R2 shows the regression model's quality of fit (Table 6.1).

6.2 Adjusted R^2

The phrase "adjusted" refers to the degrees of freedom being taken into account. The modified R2 value for bean production was 0.753, indicating that almost 75% of the variance in output could be explained by the independent variables included in the model (Table 6.1).

Table 6.1 Cobb-Douglas model fitting information with selected variables

Model	R	R Square	Adjusted R Square
1	0.880	0.775	0.753

Source: Field survey, 2020

6.3 Factors affecting the profitability of bean cultivation

Table 6.2 summarizes the results of the calculated Cobb-Douglas production function for bean. The net return on bean has been utilized as the dependent variable in this function. The functional analysis demonstrates that, among the 10 explanatory variables, the cost of MoP and labor contributed significantly to the degree of profit obtained from bean production in the research region. The fact that the important variable 'cost of MoP' has a positive coefficient sign indicates that an extra unit rise in these expenses might enhance the profit from bean cultivation by the coefficient values associated with these variables (table 6.2). The fact that the important variable 'cost of labor' has a negative coefficient sign indicates that increasing these expenses by an extra unit reduces the profit from bean cultivation by the coefficient values associated with these variables (table 6.2).

As shown in Table 6.2, the p value for 'cost of MoP' is 0.017, which is less than 0.05, while the standard error is 0.764. A P value less than 0.05 implies that the 'cost of MoP' is statistically significant at the 5% level of significance. The coefficient for 'cost of MoP' is -17.406, indicating that if the farmer raises the cost of MoP by Tk. 1, the farmer's net return would fall by Tk. 17.406, while all other inputs stay same.

On the other hand, 'cost of labor' has a p value of 0.005, which is less than 0.01 and a standard error of 1.265. A P value less than 0.01 suggests that 'cost of labor' is statistically significant at the 1% level. The coefficient for 'cost of labor' is 17.659, indicating that if the farmer raises the 'cost of labor' by Tk. 1, the farmer's net return will rise by Tk. 17.406, while all other inputs stay equal (Table 6.2).

Table 6.2 Factors influences the profitability of bean cultivation

Factors	Coefficient	p-value	Std. Error
Cost of land preparation	-0.002	0.997	0.423
Seed cost	-0.871	0.609	1.694
Cost of manure	0.934	0.490	0.744
Cost of urea	1.006	0.752	0.561
Cost of TSP	1.693	0.338	0.616
Cost of DAP	-0.010	0.970	0.651
Cost of MoP	-17.406	**0.017****	0.764
Irrigation cost	-1.954	0.620	0.812
Cost of pesticides	-505	0.348	0.740
Cost of labor	17.659	**0.005*****	1.265

Source: Field survey, 2020

CHAPTER VII

PROBLEMS & SUGGESTIONS

The maker of country bean encountered a variety of difficulties throughout production. The issues were as follows: low prices for crops, high costs for water, seed, and fertilizers, inadequate storage facilities, and insect and disease attacks. Additionally, they made several recommendations for resolving the issues. This chapter will address the study's fourth aim.

7.1 Problems faced by farmer

Table 7.1 shows the problems of bean production which were perceived as ‘worst problem’, ‘problem’, and ‘no problem at all’ by bean farmers.

7.1.1 Low price of produce

The majority of bean farmers were forced to sell a big amount of their crop during the harvesting season in order to satisfy numerous commitments such as family expenses and loan repayment. However, due to abundant supply, the harvest season price of bean remained low. As a result, they were unable to get an acceptable return on their goods. As seen in the table, 47.2 percent of bean producers identified low produce prices as their greatest challenge, while 38.4 percent identified it as a challenge and 14.4 percent saw it as a non-issue.

7.1.2 High cost of irrigation water

Irrigation is by far the most important input in bean production. Bean yield varies according on the amount of irrigation water used. Farmers reported having to pay a higher irrigation water bill. According to the table, about 7.2 percent of bean producers identified high irrigation water costs as their greatest challenge, while 64 percent identified it as a challenge and 28.8 percent identified it as a non-issue.

7.1.3 High price of quality seed and fertilizers

The high cost of high-quality seed was also a significant constraint on bean production in the research region. According to the chart, almost 20% of bean producers cited high prices for quality seed and fertilizers as their biggest difficulty, while 56% cited it as a problem and 24% as having no problem at all.

7.1.4 Lack of quality seed

Lack of high-quality seed was one of the most significant constraints on bean production in the research region. According to the chart, over 40% of bean producers identified a shortage of quality seed as their greatest challenge, while 45.6 percent identified it as a challenge and 14.4 percent identified it as a non-issue.

7.1.5 Attack of pest and disease

Bean producers were also impacted by insect and disease attacks. Pests and diseases harm crops, reducing productivity and increasing production costs. Around 20% of bean producers cited pest and disease assault as the most serious issue, while 43.2 percent identified it as a concern and 36.8 percent said it was not a problem at all.

7.1.6 Inadequate extension service

During the study, some bean farmers reported that they did not get any extension services from the Department of Agricultural Extension on enhanced bean growing methods (DAE). Around 28% of bean producers identified insufficient extension service as their most serious concern, while 45.6 percent identified it as a problem and 26.4 percent saw it as a non-issue.

7.1.7 Lack of operating capital

Farmers in the study region were constrained by capital restrictions. To cultivate bean, a large sum of cash was required to acquire numerous inputs such as human labor, seed, fertilizers, and pesticides, among others. Around 20% of bean producers identified a lack of operational capital as their greatest challenge, while 43.2 percent saw it as a challenge and 36.8 percent identified it as a non-issue.

7.1.8 Natural calamities

It was discovered that bean producers had many significant issues related to nature throughout the producing process. Natural disasters such as drought, hailstorms, and extreme rains wreaked havoc on the produce in the field. According to the table, 12 percent of bean producers cited natural catastrophes as their biggest difficulty, while 30.4 percent cited it as a problem and 57.6 percent cited it as having no effect at all.

7.1.9 Shortage of human labor

Human labor was discovered to be unavailable at various phases of manufacturing. According to the table, almost 12% of bean producers identified labor scarcity as their worst challenge, while 30.4 percent identified it as a challenge and 57.6 percent saw it as a non-issue.

7.1.10 Lack of scientific knowledge of farming

Although new agricultural technologies have been implemented in the research region, a significant proportion of bean farmers lack appropriate information about the proper dosages and procedures for using current inputs and technology in their companies. Nearly 47.2 percent of bean producers identified a lack of scientific understanding about farming as their greatest challenge, while 38.4 percent saw it as a challenge and 14.4 percent identified it as a non-issue.

7.1.11 Adulteration of fertilizer, insecticide, and pesticide

The most essential inputs in bean production are chemical fertilizers, insecticides, and pesticides. Numerous farmers have reported being duped into spreading tainted fertilizers and chemicals to their agricultural fields. As shown in the table, about 12.8 percent of bean producers identified adulteration of fertilizer, insecticide, and pesticide as the most serious concern, while 31.2 percent identified it as a problem and 56 percent identified it as having no effect.

7.1.12 Lack of transportation facilities

From table it is evident that about 43.2 percent bean growers reported lack of transportation facilities as worst problem whereas 41.6 percent mentioned it as a problem and 15.2 percent as no problem at all.

7.1.13 Poor storage facilities in house

It appears from table that 47.2 percent bean growers reported poor storage facilities in house as worst problem whereas 38.4percent mentioned it as a problem and 14.4 percent as no problem at all.

Table 7.1. Problems faced by bean farmers

Type of Problems		Worst Problem	Problem	No problem at all
Low price of produce	N(%)	59(47.2)	28(38.4)	18(14.4)
High cost of irrigation water	N(%)	9(7.2)	80(64.0)	36(28.8)
High price of quality seed and fertilizers	N(%)	25(20.0)	70(56.0)	30(24.0)
Lack of quality seed	N(%)	50(40.0)	57(45.6)	18(14.4)
Attack of pest and disease	N(%)	25(20.0)	54(43.2)	46(36.8)
Inadequate extension service	N(%)	35(28.0)	57(45.6)	33(26.4)
Lack of operating capital	N(%)	25(20.0)	54(43.2)	46(36.8)
Natural calamities	N(%)	15(12.0)	38(30.4)	72(57.6)
Shortage of human labor	N(%)	15(12.0)	38(30.4)	72(57.6)
Lack of scientific knowledge of farming	N(%)	59(47.2)	48(38.4)	18(14.4)
Adulteration of fertilizer, insecticide, and pesticide	N(%)	16(12.8)	39(31.2)	70(56.0)
Lack of transportation facilities	N(%)	54(43.2)	52(41.6)	19(15.2)
Poor storage facilities	N(%)	61(48.8)	45(36.0)	19(15.2)

Source: Field survey, 2020

7.2 Solutions provided by farmer

Table 7.2 summarizes some of the solutions made and rated by respondents to address issues encountered during bean production.

In the first ranking, it is evident that the majority of respondents, 63 out of 125, believed that sufficient training is urgently necessary. The proportion of responses in this case is 50.4 percent. As adequate training was a priority, the next thing that bean growers need was a decrease in price risk. Here, 28.8 percent of respondents answered; 36 out of 125 respondents responded. Easy access to credit was necessary in the third tier, accounting for 42.4 percent. Supply of enough fertilizer, insecticide, and pesticide was necessary in the fourth ranking, and 53 out of 125 respondents (42.4 percent) agreed. Additionally,

creation of conventional cold storage was ranked fifth, with a percentage of 49.6. Respondents advised resolving the issue of transportation (42.4 percent) and seed supply (60 percent) in the sixth and seventh categories, respectively. Finally, agricultural water supplies (45.6 percent) and appropriate infrastructure (71.2 percent) were ranked eighth and ninth, respectively.

Table 7.2. Solutions provided by farmer

Ranking of suggestions		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Proper Training	N (%)	**63 (50.4)**	**62 (49.6)**	0	0	0	0	0	0	**0**
Reduction of price risk	N (%)	62 (49.6)	36 (28.8)	27 (21.6)	0	0	0	0	0	0
Solve the problem of transportation	N (%)	0	18 (14.4)	0	27 (21.6)	27 (21.6)	**53 (42.4)**	0	0	0
Easy access to credit	N (%)	0	9 (7.2)	**53 (42.4)**	27 (21.6)	18 (14.4)	18 (14.4)	0	0	0
Establishment of standard cold storage	N (%)	0	0	36 (28.8)	18 (14.4)	**62 (49.6)**	9 (7.2)	0	0	0
Supply of adequate fertilizer, insecticide and pesticide	N (%)	0	0	9 (7.2)	**53 (42.4)**	0	36 (28.8)	9 (7.2)	18 (14.4)	0
Supply of quality seed	N (%)	0	0	0	0	18 (14.4)	0	**75 (60.0)**	32 (25.6)	0
Supply of irrigation water	N (%)	0	0	0	0	0	9 (7.2)	23 (18.4)	**57 (45.6)**	36 (28.8)
Adequate infrastructural facilities	N (%)	0	0	0	0	0	0	18 (14.4)	18 (14.4)	**89 (71.2)**

Source: Field survey, 2020

CHAPTER VIII

KEY FINDINGS, CONCLUSION & RECOMMENDATION

Summary, conclusion and recommendation is narrated from the above chapter v, vi, vii of the present study.

8.1 KEY FINDINGS

The research discovered that cultivating country beans was lucrative in the study region. Bean production had a total variable cost of Tk. 151209.41 per hectare, which included seed, labor, land preparation, irrigation, fertilizer, insecticides, and other inputs. Additionally, the total fixed cost of bean production was Tk. 12338.04 per hectare, comprising Tk. 7500.00 for land usage and Tk. 4838.04 for interest on operating capital. Total gross return, gross margin, and net return per hectare were determined to be Tk. 224976.56, Tk. 73767.15, and Tk. 61429.11, respectively. The benefit-cost ratio was determined to be 1.375, implying that one taka invested in rural bean production yielded Tk. 1.375.

Additionally, the functional analysis showed that, among the 10 explanatory factors, the cost of MoP and labor contributed significantly to the degree of profit obtained from bean production in the research region. The p value for 'cost of MoP' was determined to be less than 0.05, indicating that 'cost of MoP' was significant at the 5% level of significance. The coefficient for 'cost of MoP' was -17.406, indicating that if the farmer raises the cost of MoP by Tk. 1, the farmer's net return would decline by Tk. 17.406, while all other inputs stay constant. On the other hand, the p value for 'cost of labor' is 0.005, which is less than 0.01 and indicates that the variable is significant at the 1% level of significance. The coefficient for 'cost of labor' was 17.659, indicating that if the farmer raises the 'cost of labor' by Tk. 1, the farmer's net return would rise by Tk. 17.406, while all other inputs stay constant.

Low price of produce, lack of quality seed, lack of scientific knowledge of farming, lack of transportation facilities, high cost of irrigation water and high price of quality seed and fertilizers were the major problems faced by the farmers. Respondents ranked proper training, reduction of price risk, easy access to credit, supply of adequate

fertilizer, insecticide & pesticide and establishment of standard cold storage in the 1st, 2nd, 3rd, 4th and 5th position as solutions to the problems occurred during bean production.

8.2 CONCLUSION

This article assessed the profitability of country bean production, its restrictions, and the variables affecting profitability in Narsingdi district's Raipura upazilla. Beans are a significant food that farmers raise mostly for commercial purposes. The research region is ripe for bean growing. The current research's results show that bean production is very lucrative and would contribute to the socioeconomic development of sample farmers in the study region. Additionally, it would aid in the creation of job possibilities. Due to land scarcity in Bangladesh, it is difficult to boost bean output by expanding the area under cultivation. However, there is a chance to enhance bean output by enhancing current technologies. Farmers are highly inefficient as a result of land fragmentation, lack of expertise, and illiteracy, among other factors. Additionally, if modern inputs are made accessible to farmers in a timely manner, output of this crop might be boosted, assisting farmers in easing rural poverty in a variety of areas. Farmers were unaware of the need of applying inputs at the proper time and in the proper dosages. As a result, they used certain inputs excessively or insufficiently. Thus, well-designed management training tailored to their challenges, requirements, objectives, and resource base may result in effective production techniques and a sustained income from commercial bean growing. Additionally, the low price of country bean may be resolved by expanding storage facilities and boosting farmer income to assist farmers in developing their own storage facilities for vegetables. To address the issue of capital scarcity, the government should implement policies that assure timely agricultural loans to farmers and rigorous oversight of all institutions that provide agricultural credit. Additionally, the current research discovers that increased agricultural training, extension contact, and farming experience all contribute to the reduction of farmer difficulties. Finally government support needs to continue for promoting the development of bean production.

8.3 RECOMMENDATION

On the basis of the study's findings, it was concluded that country bean was a viable industry capable of providing income and job opportunities to Bangladesh's rural population. However, some obstacles and limits impeded the achievement of the aforementioned aims. As a result, policymakers should take the required actions. According to the study's results, the following policy suggestions are made:

- According to the survey, bean farmers encounter difficulties due to high input costs, a lack of finance, and a lack of suitable inputs. As a result, the government should guarantee reduced input prices, easier access to loans, and that critical inputs, such as high-quality seeds, fertilizers, insecticides, and pesticides, are made accessible to farmers prior to the growing season.
- Appropriate extension programs, which include approved fertilizer dosages, pesticide applications, the use of high-quality seed, and intercultural activities, are required to enhance country bean output. The Department of Agricultural Extension (DAE) may give further training to bean producers on disease and paste management. Fruitful outcomes may be obtained if DAE strengthens its extension contacts with farmers and arranges for further field demonstrations to address farmer concerns.
- Bean producers were forced to sell their goods at a loss during or shortly after harvest. A suitable storage system should be devised to prevent farmers from being compelled to sell their crop at a loss during the harvest season. Additionally, measures should be done to investigate export markets and secure a fair price for the bean to ensure its sustainability.
- Additionally, transportation infrastructure should be enhanced to address the issue of rural bean transportation.

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APPENDICES

APPENDIX: Questionnaire

FACTORS DETERMINING PROFITABILITY OF COUNTRY BEAN IN NARSINGDI DISTRICT OF BANGLADESH

1. **Name: _____**
2. **Age**: a) Below 20 years b) Between 20-35 years c) Between 36-50 years d) Above 50 years
3. **Marital status:** a) Single b) Married c) Divorcee
4. **Education**: a) Illiterate b) Illiterate but can sign c) Primary d) Secondary e) Diploma/Technical f) Graduation g) Post graduation h) Others
5. **Type of family**: a) Nuclear b) Joint
6. **Size of land holdings**: a)Below 1 acres b) 1-3 acres c) 3.01-5 acres d) Above 5 acres

7. Annual income: a) Below 1 lakh b) Between 1-3 lakh c) Between 3-5 lakh d) Above 5 lakh

8. Annual savings: a) Below 20000 taka b) Between 20000-35000 taka c) Between 35001-50000 taka d) Above 50000

9. How many years have you been engaged in farming? a) 1-2 years b) 3-4 years c) 5-6 Years d) 7-8 years e) 9-10 f) Above 10 years

10. Off-farm employment: a) Yes b) No

11. Labor use: a) Hired b) Owned c) Both hired and owned

12. Which kind of fertilizers do you use?

a) Chemical fertilizers b) Organic fertilizers

13. How do you control pests and diseases?

a) Biological and organic control method b) Chemical pesticides
b) Integrated Pest Management (IPM) d) Chemical pesticides and IPM

14. Do you have a storage place for your crops? a) Yes b) No.

15. Any training or technical knowledge about modern agriculture? a)Yes b) No

15. i) If yes, Received training from: a) Agricultural institution b) NGO c) Agricultural Extension Officer d) Others

16. Cost of production:

a. Variable cost

Items		**BDT**
Labor cost		
Land preparation		
Seed		
Fertilizer	Manure	
	UREA	
	TSP	
	DAP	
	MOP	
	Others	
Irrigation		
Pesticides and Insecticides		
Harvesting cost		
Other costs		

b. Fixed cost

Land use cost	

17. Overall production and sells related information

Items	**Hectre**	**Kg**	**Tk.**
Area of land used to cultivate bean			
Total production of bean			
Total post-harvest loss			
Total volume of sales			
Sales price /kg			

Type of Problems	**Worst Problem**	**Problem**	**No problem at all**
Low price of produce			
High cost of irrigation water			
High price of quality seed and fertilizers			
Lack of quality seed			
Attack of pest and disease			
Inadequate extension service			
Lack of operating capital			

Natural calamities			
Shortage of human labor			
Lack of scientific knowledge of farming			
Adulteration of fertilizer, insecticide, and pesticide			
Lack of transportation facilities			
Poor storage facilities			

18. To whom do you sell your produces?

a) Directly to consumers b) Local Market Retailers

c) Wholesalers d) Processors

e) Government corporation f) Exporters

19. Problems faced by farmer during production

20. Suggestions of farmers to overcome the problem

Please rank the following suggestions of the table:

Suggestions	1	2	3	4	5	6	7	8	9	10
Proper training										
Reduction of price risk										
Solve the problem of transportation										
Easy access to credit										
Adequate govt. support										
Establishment of standard cold storage										
Supply of adequate fertilizer, insecticide and pesticide										
Supply of quality seed										
Supply of irrigation water										
Adequate infrastructural facilities										

Thank you so much for your cooperation

Name of the enumerator:
Signature: ……
Date: