AN ANALYSIS OF SHRIMP VALUE CHAIN AND IDENTIFY THE RISK MANAGEMENT ADOPTION BEHAVIOR AMID VALUE CHAIN ACTORS IN SOME SELECTED AREAS OF THE KHULNA DISTRICT

SAGAR PAUL

DEPARTMENT OF AGRIBUSINESS AND MARKETING

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

DHAKA-1207

DECEMBER, 2021

AN ANALYSIS OF SHRIMP VALUE CHAIN AND IDENTIFY THE RISK MANAGEMENT ADOPTION BEHAVIOR AMID VALUE CHAIN ACTORS IN SOME SELECTED AREAS OF THE KHULNA DISTRICT

BY
SAGAR PAUL

REGISTRATION NO.: 14-06262

A Thesis
Submitted to the Department of Agribusiness and Marketing
Sher-e-Bangla Agricultural University, Dhaka 1207
In partial fulfilment of the requirements
for the degree of

MASTER OF SCIENCE (MS)
IN
AGRIBUSINESS AND MARKETING
SEMESTER: JULY-DECEMBER, 2021

Approved by:

Dr. Airin Rahman
Associate Professor
Dept. of Agribusiness and Marketing
Sher-e-Bangla Agricultural University
Supervisor

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

Dr. Sharmin Afrin
Chairman
Examination Committee
Department of Agribusiness and Marketing
Sher-e-Bangla Agricultural University

Email: sagarpaul71@gmail.com
Phone: +8801677034522

DEPARTMENT OF AGRIBUSINESS AND MARKETING

Sher-e-Bangla Agricultural University

CRTTIFICATE

This is to certify that the thesis entitled **'an analysis of shrimp value chain and identify the risk management adoption behavior amid value chain actors in some selected areas of the khulna district.'** 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 **SAGAR PAUL**, Registration Number: **14-06262** 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:
Bangladesh

Dr. Airin Rahman
Associate Professor
Dept. of Agribusiness and Marketing
Sher-e-Bangla Agricultural University
Supervisor

DEDICATED

TO

MY BELOVED PARENTS

ACKNOWLEDGEMENT

All praises are due to the almighty for His gracious kindness and infinite mercy in all the endeavors which create that opportunity for the author to successfully complete the research work required for the partial fulfillment of the degree of Master of Science.

The author would like to express his heartfelt gratitude and sincere appreciation to his supervisor Associate Professor Dr. Airin Rahman, Department of Agribusiness and Marketing, Sher-e-Bangla Agricultural University, Dhaka, for her valuable guidance, advice, encouragement and support throughout the study. Likewise, grateful appreciation is conveyed to his co-supervisor Sauda Afrin Anny, Assistant Professor, Department of Agribusiness and Marketing, Sher -e-Bangla Agricultural University, Dhaka, for her constant encouragement, constructive criticisms and valuable advice to complete the thesis.

The author expresses his sincere respect to Dr. Sharmin Afrin, Associate Professor and Chairman, Department of Agribusiness and Marketing, Sher-e-Bangla Agricultural University, Dhaka for providing valuable advice and sympathetic consideration regarding the research.

The author is deeply indebted and grateful to his parents who continuously prayed for his success and without their love, affection, inspiration and sacrifice this work would not have been completed.

December, 2021

The Author

ABSTRACT

Fisheries sector is playing an important role in the economy of Bangladesh from the ancient time. The overall objectives of the present study were to identify the activities conducted by different actors in shrimp value chain, calculate the corresponding costs and earnings of those activities of the actors and evaluate the distribution of revenue, cost and profit along the chain, do situational analysis (SWOT analysis) of shrimp value chain and to identify the risks faced by the shrimp value chain actors and their management technique. Dumuria and Paikgacha upazilla of Khulna district were selected for the study based on intensive cultivation of shrimp. Simple random sampling technique had been used for collecting data from 100 shrimp farmers, 20 wholesalers, 3 commission agents and 2 processors by using structured interview schedule. After analyzing the data, it found that order to produce and export one kilogram of shrimp, farmers had to bear 78% of the costs, 64% of the revenue, and 21% of the profit. Despite making a higher contribution to revenue and expenses than any other group, farmers did not do so in a profit. Conversely, the wholesaler only retained 19% of revenue and 7% of costs, while absorbing 57% of the profit. Per kilogram of shrimp, the processor contributed 16% in revenue, 14% in expenses and 20% in profit. In comparison to other actors, wholesalers therefore always gain. Farmers have always kept a larger portion of revenue and costs compared to a smaller portion of profit. The commission agent has not significantly altered as usual. The most notable beneficiaries are the wholesalers, whose profit share has consistently been high relative to revenue and expense sharing. This study also identified some of the problems and barriers associated with shrimp farming. Problems faced by the respondents were ranked on the basis of extent of magnitude. The problems should be removed comprehensively through an integrated program for the overall development of shrimp value chain. Among the risk factors, 65% shrimp farmers termed natural disaster as the biggest risk factor.75% farmers were used net around four side of the gher as risk mitigation technique. Most of the farmer said that they do not enough financial support from government.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACCRONYMS AND ABBREVIATIONS

%	Percentage
BBS	Bangladesh Bureau of Statistics
BER	Bangladesh Economic Review
DoF	Department of Fisheries
et al.	And Others
FAO	Food and Agricultural Organization
FRSS	Fisheries Resources Survey System
Etc.	Etcetera
EPB	Export Promotion Bureau
FY	Financial Year
Ha	Hectare
Kcal	Kilo Calorie (s)
Kg	Kilogram (s)
Kg/ha	Kg Per Hectare
MT	Metric Ton
NGO	Non-government Organization
No.	Number
SAU	Sher-e-Bangla Agricultural University
Sq.	Square
TK.	Taka
TK./ha	Taka Per Hectare

CHAPTER I

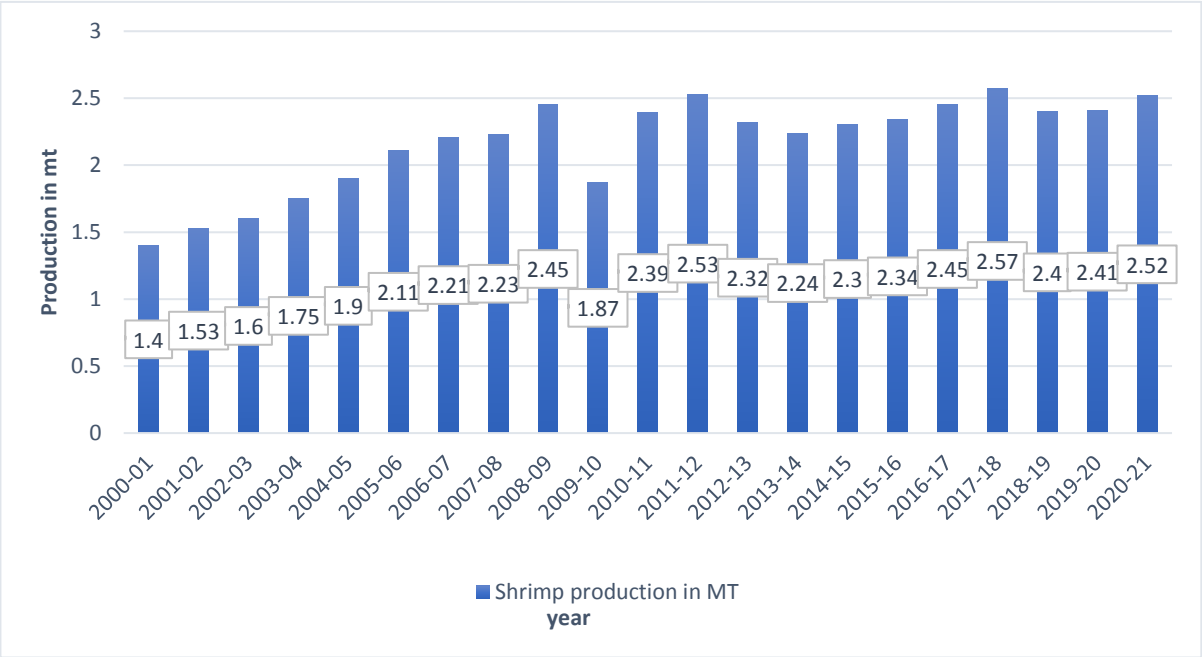
INTRODUCTION

1.1 Background

Bangladesh is an agricultural country of which fisheries sector is one of the prominent sectors. The contribution of agriculture sector to the country's total GDP is 11.50 % (BBS,2022). The contribution of fisheries resources to the country's total GDP is 2.51% which hold second position from agricultural sub sectors and the biggest contributor from agricultural sub sectors is crops and vegetables and its contribution is 5.37% of total GDP(BBS,2022). In terms of creating jobs, reducing poverty, and ensuring food security, agriculture plays a significant role. In Bangladesh, aquaculture is an essential component of the agricultural production system. Aquaculture has enhanced the supply of fish for human consumption and helped to improve the livelihoods of thousands of households of Bangladesh and it has grown greatly over the years but its full potential has yet to be gained. More progress is required to cope up with the increasing demand for fish. Shrimp farming is one of the parts of aquaculture. Investments are required for shrimp production and marketing in the economic activity of shrimp farming. In either a marine or freshwater environment, shrimp farming produces shrimp or prawns for human consumption. In terms of producing nutrients and proteins for human consumption from a specific number of resources, it is a productive and effective system. Additionally, it requires less labor, and it generates a sizable number of jobs in the fields of production, processing, and marketing. Due to Bangladesh's agro-climatic characteristics, the shrimp industry may prove to be a useful tool for boosting employment and income in rural areas.

Early in the 1970s, shrimp farming started in Bangladesh's southeastern coastal region. After 1980, it quickly emerged as one of the main export items that brought foreign currency. Bangladesh is currently the seventh-largest exporter of shrimp to the Japanese and American markets. The World Bank, the Asian Development Bank, and other foreign financial organizations helped to grow the shrimp business over the last twenty years. By rapid job-creating economic activities, the private sector and its export-oriented industries, like the apparel and shrimp industries, have been established to reduce poverty (WB, 1994). Under the Second Five-Year Plan (1980–1985), the Bangladeshi government shrimp had been recognized as an industry by the Bangladeshi government and took the required steps to increase shrimp output (Haque, 1994).

Bangladesh was the eighth-largest producer of shrimp in 2000. Before the development of the present-day shrimp growing method, the locals engaged in a traditional kind of shrimp farming known as Bheri/Gher farming (DDP 1985). There, the fisherman initially divided the region into manageable halves with dams and constructed the necessary wooden sluice gates. Tidal water might enter the farming area through those sluice gates and leave as necessary. In the past, they used to keep the tide water in the area and replace it as needed.



Source**:** DoF (2020)
Figure 1.1: Shrimp production trends during last 18 years (lakh MT)

With a total production of 46.21 lakh MT in FY 2020–21, Bangladeshis lucky to have huge water bodies. 57.10 percent of the total fish production comes from aquaculture. The country has passed the anticipated production target of 45.32 MT of fish by 2020-21 in conformity with the target of accomplishing vision 2021.With a per capita intake of 62.58 g/day compared to the aim of 60 g/day, Bangladesh is now a self-sufficient fish-producing nation that supplements almost 60% of the daily animal protein diet of its citizens. Bangladesh makes a large amount of money by exporting fish, shrimp, and other fisheries goods, which account for 1.24 percent of the total foreign dollars are generated from the exportation of shrimp. Our country earns BDT 4088.92 crore in 2020–21 by exporting almost 76.59 thousand MT of fish and fisheries goods (FRSS 2021). One of the most significant drivers of Bangladesh's economic growth is the shrimp industry.

Two types of shrimp are cultivated in Khulna district. They are Galda Shrimp which us also known as the giant river prawn or giant freshwater prawn (*Macrobrachium rosenbergii*) and the another one is Bagda Shrimp which is also known as Tiger Prawn (*Penaeus monodon*).

Table 1.1: Production of Galda and Bagda post larva (PL) during last three years

Name	Production in 2016(cr)	Production in 2017(cr)	Production in 2018(cr)	Production in 2019(cr)	Production in 2020(cr)
Galda	4.65	5.05	5.21	1.58	2.36
Bagda	1314.20	1383.04	1412.04	979.37	792.952
Total	1318.85	1388.09	1417.25	980.95	795.312

Source: DoF (2020)

As a result of introducing new breeding technology of Galda and Bagdha, many private hatcheries have established to produce shrimp post larva. In 2020, the total production of PL was 795.312 Cr. Different culture technique like monoculture, polyculture along with other fishes and aquaculture in paddy fields along with paddy are being practiced. In the year 2019-20 the total production of shrimp including both Galda and Bagdha is 51096 million metric tons.

Table 1.2: Total production of shrimp in different years

Year	Production (MMT)
2015-2016	114406
2016-2017	116846
2017-2018	113280
2018-2019	115368
2019-2020	115784

Source: Fisheries statistical year book of Bangladesh 2019-2020, FRSS, DoF

Value chain analysis is vital for understanding markets, their relationships, the participation of various actors, and the critical restrictions that limit the expansion of shrimp farming output and, as a result, the competitiveness of smallholder farmers. Even though, in theory, risk and rewards should be shared down the chain, these farmers today only get a small portion of the total value of their output.

In the Value Chain Analysis (VCA), the term "value" is synonymous with "value added" since it refers to the increased worth of the finished good that results from processing a given good. Value addition for agricultural products can also occur through product diversification based on food safety and functionality.

1.2 Statement of shrimp farming and value chain

Everywhere in the world, shrimp farming is a successful industry (Rahman *et al*. 2013). So, in recent years, shrimp farming has been seen as an essential part of Bangladesh's agricultural diversification, especially for the rural system. Development of shrimp farming is crucial to generating employment possibilities for people because it is a labor-intensive industry that supports employment in production, processing, and marketing.

In his 1985 Best-Seller, Competitive Advantage: Creating and Sustaining Superior Performance, Michael Porter first introduced the value chain and defined it in detail. When trying to comprehend the elements that have an impact on a farm's long-term profitability and when creating an effective business strategy, the value chain can be a very helpful conceptual tool. The value chain can be conceptualized as a series of processes, services, and goods that result in an item or service that is delivered to the customer. A value chain is a series of interconnected operations for a business engaged in a particular industry. Products move sequentially through each activity, gaining value along the way. The chain of activities adds more value to the products than the total value of the individual activities.

1.3 Nutritional value of shrimp

Shrimp is a great source of protein.

Table 1.3: Nutritional value of shrimp (in every 100gm)

Items	Quantity
Total Fat	0.3 g
Cholesterol	189 mg
Sodium	111 mg
Potassium	259 mg
Total Carbohydrate	0.2 g

Source: FAO (2012)

1.4 Importance of shrimp farming in Bangladesh

About 70% of Bangladesh's overall agricultural exports are shrimp, making it one of the country's most important commodities. For this reason, in Bangladesh, shrimp is frequently referred to as "White Gold." In Bangladesh, there are 56 different species of shrimp, of which 37 are freshwater species and the remaining 12 are brackish water species. The shrimp processing sector is expanding in Chittagong and Dhaka even though 95% of hatcheries are situated in the south-eastern districts of Khulna, Bagerhat, and Satkhira. Shrimp aquaculture is practiced on a surface area of more than 275,000 hectares in Bangladesh. In terms of local fish production, Bangladesh came in third place globally (FAO,2017). Shrimp is the biggest contributor to the fisheries of Bangladesh. Shrimp Farming increases Increase the income of the population in the southwest of the nation since shrimp farming generates five to six times more revenue than other types of agriculture.

1.5 Justification of the study

Exporting shrimp generates a significant amount of foreign currency for Bangladesh each year. Bangladesh has a tremendous potential to earn a lot of foreign currency by exporting shrimp due to the rising demand and high price of shrimp in both the local and export markets. It was necessary to do research on shrimp production and marketing because of the significance of shrimp distribution and production.

As far as I know there were few researches and studies in Bangladesh conducted to analysis the value chain of shrimp farming and identify the role and contribution of different actors. Therefore, this study has been taken to analysis Shrimp value chain of the farmers of Dumuria, Khulna. This study also helps to identify the controlling power of different actors engaged in shrimp value chain and problems faced by different actors and their possible solution.

Many researchers (Shawn *et al*.,2018; Ahmed. 2018) studied on the profitability of shrimp farming. Few Researchers (Rasha *et al*.,2019; Begum *et al*.,2013) studied on resource use efficiency. There are many researchers (Paul *et al*.,2011; Deb *et al*.,1998) who did research on socioeconomic importance of shrimp farming. A very few research was conducted on shrimp value chain and profit margin for key actors involved in shrimp value chain. The purpose of the current study is to assess the value chain of shrimp production, define the value chain, identify the actors in value chain, marketing channels for shrimp farming, profit margin for each value chain actors and identify the challenges facing shrimp farming in Bangladesh.

The findings of this study will be useful to planners, policy makers, and extension personnel in comprehending the existing situation of shrimp farming and in formulating plans to speed up the development of our nation's fisheries. Development professionals will be better able to determine the type of strategy required to promote technology uptake and sustain smallholder farmers' livelihoods by understanding the barriers to technology adoption among these farmers. Academics and scholars will also find this work useful for further conceptualization.

1.6 Key research questions

a) To whom farmers sell their shrimp?

b) Who are the actors involved in the shrimp value chain?

c) How does the price have been added?

d) What is the profit margin for different actors?

e) What are the risk factors perceived by the actors?

f) What is the mitigation technique adopted by them?

g) Are these mitigation techniques proper to manage the risks?

1.7 Objectives of the study

1. To identify the activities conducted by different actors in shrimp value chain.
2. To calculate the corresponding costs and earnings of those activities of the actors and evaluate the distribution of revenue, cost and profit along the chain.
3. To do situational analysis (SWOT analysis) of shrimp value chain.
4. To identify the risks faced by the shrimp farmers and their management techniques.
5. To find out the constraints and recommend for policy implications.

1.8 Outline of the Study

The write-up for the current thesis has been divided into eight chapters, which are arranged in the order listed below. The study's introduction and objectives are presented in Chapter 1. An overview of the literature in the topic area is provided in Chapter 2. In Chapter 3, the relevant study's methodology is covered. The socioeconomic situation of the farmers who raise shrimp and prawns is covered in chapter four. The costs and profits of shrimp and prawn farming are covered in chapter five. The elements influencing the profits from shrimp and prawn farming are discussed in chapter six. The issues with and solutions to shrimp and prawn farming are highlighted in Chapter 7. The summary, conclusion, and policy proposals to boost shrimp and prawn output are covered in Chapter 8 as well.

CHAPTER II

REVIEW OF LITERATURE

2.1 Introduction

Any research project must include a review of the literature since it gives the opportunity to assess the body of knowledge and data pertinent to the planned inquiry. It represents the relevant articles for comprehending the approach and causal connections between previous and ongoing studies on shrimp and prawn farming. This would aid in accurately identifying the issue and choosing the best approach of analysis. Numerous studies have been conducted on the cultivation of shrimp and prawns. However, in order to have a wider perspective, the evaluation of literature is not just confined to Bangladesh but also included other nations.

2.2 Literature review

Ahmed *et al.* (2008) conducted a study on 'Freshwater prawn farming in Bangladesh: history, present status and future prospects. Freshwater prawn farming is currently one of Bangladesh's most important economic industries. For rural residents, it is generating a variety of livelihood alternatives. An outline of Bangladeshi freshwater prawn farming was provided in this publication. Although producer associations and marketing organizations are crucial for capturing markets, freshwater prawn farming is mostly ideal for small-scale operations. When being harvested, processed, and marketed, prawns needed specific attention. To understand the relevance for growth and rising economic output from this sector, a variety of public and private sector initiatives were required. Even though the environmental impacts of prawn farming are undoubtedly less severe than those of marine shrimp farming, they are still little understood in Bangladesh. Therefore, both quantitative and qualitative research would be needed.

Ahmed *et al.* (2008) stated that 'An economic analysis of freshwater prawn, *Macrobr achiumrosenbergi,* farming in Mymensingh, Bangladesh'. It discusses the freshwater prawn farming system, financial viability, and cost structure in the district of Mymensingh. This study compares the extensive and semi-intensive prawn farming systems' costs and returns. The study found that the annual net return per hectare of prawn farming ranged from US$1140.37 for semi-intensive farming to US$609.39 for extensive farming. Here, the income from intensive farming was determined to be 36% and that from semi-intensive farming to be 42%. There were 1.57 and 1.73 BCRs for the extensive and semi-intensive farming systems, respectively. Government and national banks should ensure enough access to interest-free financing or credit at a lower interest rate for prawn farmers to ensure they can transition to the semi-intensive farming system.

Uddin (1995) conducted "An economic study on shrimp farming in some selected areas of Khulna and Satkhira district". He found that most of the farmers in Satkhira district followed improved traditional method in shrimp farming which resulted in higher yield. In Satkhira district, the total cost of shrimp production per hectare was Tk. 62613.26, but in Khulna district, it was Tk. 41815.69. He discovered that each hectare Satkhira District's net income was Tk. 78374.60, whereas Khulna District's was Tk. 32447.49, meaning that Satkhira District's net income was 2.41 times greater than Khulna District's. Comparing Satkhira with Khulna districts, Satkhira was more profitable for overall shrimp production.

Rasha (2019) conducted a study on 'Productivity and resource use efficiency of bagda shrimp farming in some selected areas of Bagerhat district in Bangladesh'. Gross margin, net return, and return on investment per hectare were found to be Tk. 260095.00, Tk. 364222.00, and Tk. 215931.00, respectively. The total cost of producing shrimp was estimated to be Tk. 148291.00 per hectare. For shrimp aquaculture, the Benefit Cost Ratio (BCR) was found to be 2.46. As a result, it was discovered that shrimp farming was quite lucrative. According to a production function analysis, the factors in the model that had a positive and significant impact on the gross return of shrimp production were the cost of shrimp fry, the cost of feed, the cost of fertilizer, the cost of labor, and the cost of water management. The price of lime, on the other hand, was detrimental.

Yasin (2016) found that the top three shrimp-importing nations from Bangladesh are the US, Japan, and Europe. Together, these three markets account for 98% of Bangladesh's total export revenue.

Shawon *et al.* (2018) conducted a study on 'Financial profitability of small-scale shrimp farming in a coastal area of Bangladesh'. The results of the current study demonstrated that aquaculture, and particularly shrimp farming, significantly contributes to Bangladesh's economy. The socioeconomic situation and financial viability of small-scale shrimp farming in particular parts of the Khulna district are estimated in this study. For the study, one hundred (100) shrimp producers were chosen, and data were gathered by direct interviewing. This analysis looked at financial profitability from a new angle. According to the report, around 35% of farmers are in the prime working age range. A handful of the farmers were illiterate, but the majority of them had completed their primary school. The average farmer had a family size of three, and 40 percent of them farmed shrimp as their primary industry. This study also showed that the gross profit margin was high, at 59 percent, which showed that farmers managed their farms properly and had more operational, finance, and other expenses to pay for. While break-even production was determined to be 155 kg per acre, the break-even price for small-scale shrimp was Tk. 311 per kg. The benefit cost ratio (BCR) and net profit margin were found to be more than one and positive, respectively, demonstrating the commercial viability of small-scale shrimp farming. The study comes to the conclusion that there is enough capacity and opportunity for supporting and establishing small-scale shrimp farming in Bangladesh's coastal region.

According to **Gammage *et al*. (2006)** Shrimp value chain includes many actions taken at various stages of the process, starting from hatching by the mother shrimps to ultimate consumption of shrimp or processed shrimp or using shrimp disposal (the shrimp shells) to make fish or poultry feed.

Hassan *et al*. (2012) observed that different middlemen carry out various tasks related to marketing and demand fees for their services. These fees cover things like the price of packaging, loading, unloading, sorting, and grading as well as market fees and commission. In the case of the profit of the middlemen, many actors such as "Faria," "Bepari," commission agents, wholesalers, retailers, and so on handle produce and earn profit by engaging in this profession. This process begins with the sale of the produce from the growers till it reaches the customers. Their profit is incorporated into the cost of the good and is added to the market margin.

Mwirigi and Theuri (2012) thoroughly examined the core value chain operations of the sea food sector in a review article. In order to enhance the chains of the Kenyan seafood sector, they identified the gaps that present in the chain and recommended solutions.

Mendoza (1995) observed that the amount of market margins is mostly influenced by a mix of the quantity and quality of marketing services offered, the cost of doing so, and how effectively they are carried out and charged. For instance, depending on the marketing expenses as well as the selling and buying prices, a large margin may result in little to no profit or even a loss for the seller involved.

Routroy& Behera (2017) analyzed the Agriculture Supply Chain (ASC)literature along many categories. They found that demand forecasting and ASC integration were found to be crucial areas of ASC, but they were less focused, examined and researched.

Rahman (2003) conducted "An economic study of Galda shrimp farming in some selected areas of Jessore district". An economic analysis of the Galda shrimp industry in a few key Jessore district locations He discovered that the output of shrimp under year-round galda shrimp farming was 550 kg per hectare, which was more than the production of shrimp under alternate galda shrimp rice farming (440 kg). The combined gross return from the production of galda shrimp and finfish, Tk. 202500.00, was significantly larger than the combined returns from the production of galda shrimp and rice, Tk. 159800.00, under an alternative system of galda shrimp rice cultivation. He made it very apparent that raising galda shrimp all year round was incredibly profitable because farmers only had to pay a modest amount to produce the shrimp. Additionally, he discovered that the cost to produce galda per acre was Tk. 78728.00, with a Tk. 123772.00 net profit.

Chhina (2009) observed that marketing margin is crucial for a number of reasons, including research on marketing effectiveness, market comparisons, systemic marketing improvement, intermediaries research, and the implementation of various government legislation. The function of intermediaries has a significant role in shaping the margins and costs of marketing. The marketing margins of the various intermediaries can be improved if they show that some of their fees are excessive or that their services are not being used effectively. The execution of government policy is an additional crucial component of marketing margin assessments. The government creates policies with the intention of increasing marketing effectiveness.

According to UNIDO (2016) To expand or enhance productive activities and provide social benefits, poverty reduction, income and employment generation, economic growth, environmental performance, gender equity, and other development goals, a positive or desired shift in a value chain is necessary. Improved business operations at the level of producers, processors, and other players in the chain, as well as the (contractual) connections between them, knowledge and information exchange, and innovation, can all be the focus of value chain development interventions. Value chain growth can also encourage overall chain coordination, engagement of particular beneficiaries in regional, national, and international value chains, entrance barrier reduction, and a larger proportion of value addition for particular actors.

Trienekens (2011) illustrates the value chain as a medium through which all company operations, from the procurement of raw materials to the final customer, pass. The objective is to provide the greatest value at the lowest total cost.

Parvin (2001) conducted a study on "Shrimp processing industry in Bangladesh: A market structure analysis". She said there were two ways used to distribute processed shrimp. Although there was little evidence of considerable product difference in the market, the main entrance barriers for new businesses were the scarcity of raw shrimp and a lack of finance. Additionally, he discovered that the major issues facing shrimp processing companies included a lack of raw shrimp (100%), a lack of institutional support (100%), a lack of shipping facilities (45%) as well as strikes and political upheaval (88%) and pricing instability (83%)

Uddin (2008) conducted a study on "safety standards in shrimp export from Bangladesh to the world's market". This study sought to outline the operations of various players along the value chain, from production to export market compliance with food safety requirements. The outcome showed that shrimp farming was very profitable and that the working environment had improved. They were discovered to be attempting traceability. As third-party certifying agencies, some international organizations are active. But it was also advised to provide traceability from the farm level to transportation. In order to increase production and export volume, it is also advised to reclaim the illegally seized government land and give it to the legitimate shrimp growers and processors.

Alauddin and Hamid (2014) under look ‘Shrimp culture in Bangladesh with emphasis on social and economic aspects. He discovered that shrimp farming had an impact on the economy, society, and ecology. Some variables, including as ecological, economic, institutional, social, and cultural aspects, had a key role in the growth and development of shrimp aquaculture. It was argued that the integrated shrimp-rice farming system's cumulative effects could lead to the sustainable development of the shrimp business. It recommended two research plans. They were: (1) a strong approach to the complex and interconnected problems of integrated shrimp-rice farming, which developed indicators to measure the sustainability of shrimp farming and could be used by shrimp producers at the farm level; and (2) an approach that offered policy planning to effectively respond to changing various factors that determine and affect shrimp farming.

Rahnman *et al*. (2020) conducted a study on “How indebted farmers perceive and address financial risk in environmentally degraded areas in Bangladesh”. She found that mostfarmers have not used risk management tools (27.75%), while26.25% have used off-farm income diversification and 23.75%have used contract farming. About 22.25% of the respondents used the combination of both.

Rahnman *et al*. (2022) conducted a study on “Factors influencing farmers' awareness and risk perception of environmental degradation in Bangladesh”. She found that farmer level of awareness and risk perception were strongly influenced by the respondent's age, average family income, income from the crop, farming experience, adoption of inclusive agribusiness strategies, ease of access to extension services, and distance from farm to industrial zone. With a 5% level of significance, respondent age significantly influenced awareness level in a favorable way.

Hasan *et al*. (2020) conducted a study on “A sequential assessment of WSD risk factors of shrimp farming in Bangladesh: Looking for a sustainable farming system”. He discovered that farms operated by a tenant worker (p: 0.03), mixed use of fertilizer (p: 0.009), poor quality water source (p: 0.001), lack of reservoir for water purification (p: < 0.001), and frequent exchange of water during a single crop culture (p: < 0.001) were significantly associated with White Spot Disease prevalence.

Kabir *et al*. (2020) conducted a study on "Farmers' perceptions and management of risk in rice/shrimp farming systems in South-West Coastal Bangladesh". The findings of this study showed that farmers in all three size categories in Uttar Kaminibaisa clearly perceived the production and market risks affecting their rice/ shrimp farming system. The greatest perceived risk factor for shrimp production was viral disease, with hatchery-bred post larvae highly susceptible.

2.3 Concluding Remarks

The discussion and review described above show that the majority of studies focused on the cost, return, profitability, and value chain of shrimp. In order to improve upon the shortcomings of earlier studies, methodological features were redesigned with the aid of the literature review. Based on the aforementioned studies, the researcher felt that it was necessary to examine the productivity of shrimp farming in Bangladesh within the context of current development. This will aid policymakers in better understanding the situation and implementing programs that will increase shrimp production and improve the overall shrimp value chain. On the other hand, the researcher thought that the study's findings would offer helpful, current information that would aid researchers and policy makers in future studies.

CHAPTER III

THEORETICAL COBCEPT OF VALUE CHAIN

3.1 Definition

This chapter will provide a brief definition and explanation of Value Chain Analysis. It includes a concise description of the evolution of the value chain idea and several analytical stances.The value chain analysis is a method for dissecting a chain into its component elements for a better understanding of its functioning and structure.

According to Kaplinsky and Morris (2001), "The value chain defines the whole range of actions necessary to carry a product or service from conception through the various production phases, distribution to ultimate consumers, and final disposal after use,"

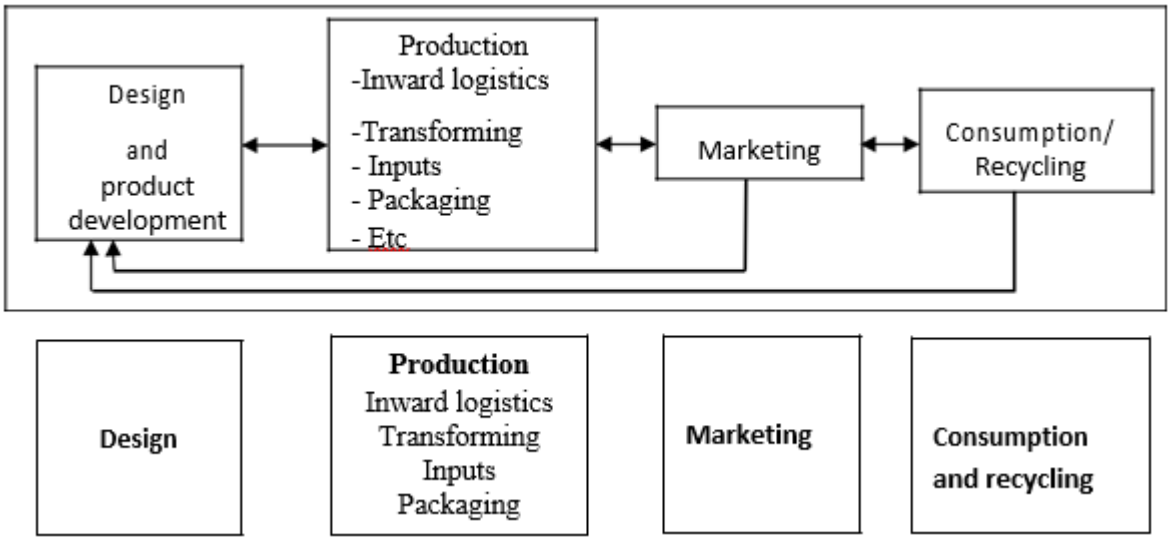


Figure 3.1: Four links in a simple value chain (*Source:* Kaplinsky and Morris 2001:4)

Compared to the simple value chain, the extended value chain is far more complicated. There are several chain links in it.

3.2. THE CONCEPTS OF VALUE CHAIN ANALYSIS

There are many concepts in the value chain analysis. Two important concepts are described below:

3.2.1 THE PORTER FRAMEWORK

According to Porter (1998), "Value chain is a general framework for strategically thinking about the activities involved in any organization and evaluating their relative cost and function in differentiation that is introduced by competitive advantage". Porter developed the value chain as the fundamental tool for examining all of the tasks that a company undertakes, including designing, producing, promoting, delivering, and providing support.

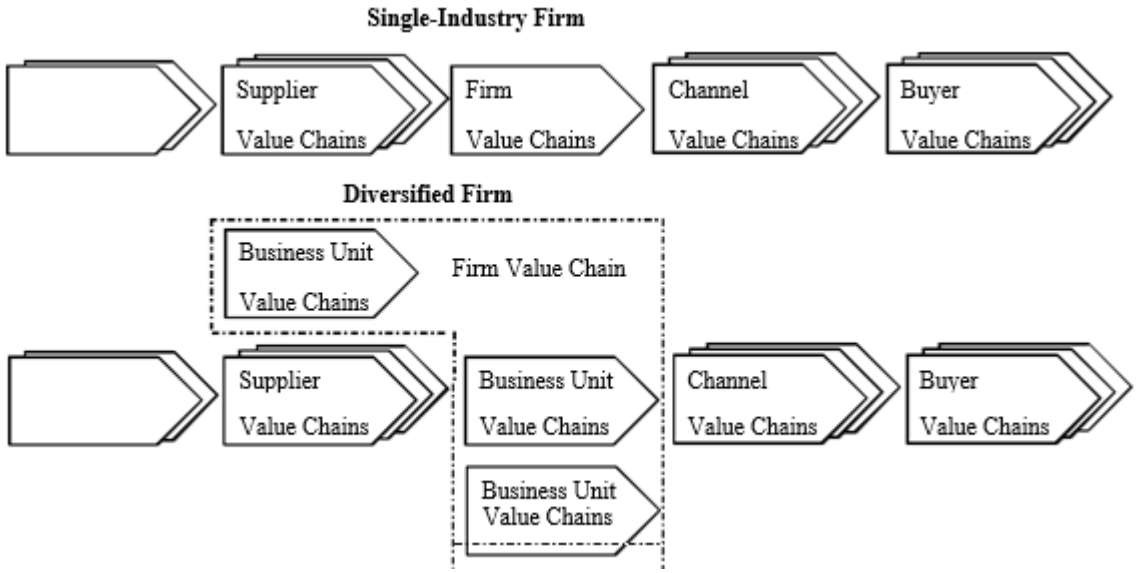


Figure 3.2**:** The Value model according to Porter (1998:35)

Additionally, he refers to the value chain contained in the massive stream of operations shown in figure 5 as a firm's value chain. The value chains of suppliers produce and distribute the acquired inputs needed in a firm's chain, which is called "upstream value". They are able to influence a firm's success in several other ways along with allocating goods or services. In addition, a lot of products go through value chains before reaching final consumers.

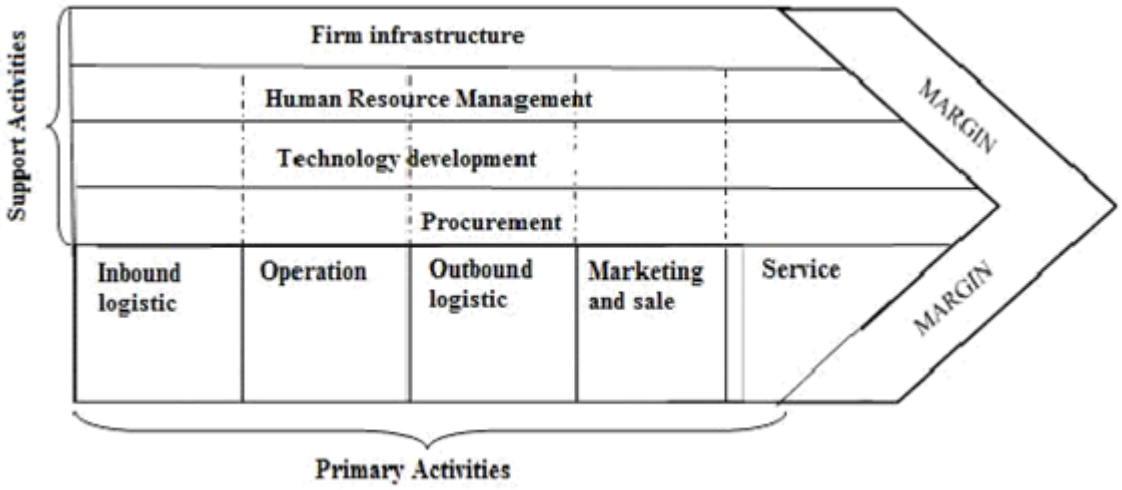


Figure 3.3: The generic Value Chain according to Porter (1998:37)

Porter mentioned that there are five generic categories of primary activities involved in competing in any industry that shown in figure 3.3. According to the specific industry and business strategy, each category can be further subdivided into a number of separate tasks. They are operations, outbound logistics, marketing and sales, and service. They also include inbound logistics. Depending on the industry, each of the categories is crucial for competitive advantage.

3.3 MAPPING THE VALUE CHAIN

A clear view of the sequences of activities and the main actors and relationships involved in the value chain can be understand by knowing value chain mapping. It offers methods and illustrations for identifying a value chain's many aspects. The following aspects should be mapped in order to give a summary of the investigated value chain as they are crucial.

First, the value chain's central process might be found. In other words, what are the primary processes that use raw materials in the production of the final good? However, it's crucial to keep the primary tasks under control between the start of the production process and the final customer's purchase. If not, it will be too complex and require a lot of time and resources.

Second, the next stage is to recognize and map out the important players who are participating in these activities, along with their roles. It is crucial to distinguish between the performers and group them according to their line of work. Another point is that it would be helpful to assign locations to operations if the value chain were geographically

dispersed across different places. Processors handle the shrimp processing while farmers handle the shrimp production in the Khulna district. Despite being straightforward, this classification does not offer much information. Large, medium, and small-scale shrimp growers can be categorized. Additional categories for the classification include intensive, semi-intensive, and extensive.

Third, the value chain's actors and particular activities have been identified after completing steps 1 and 2. The mapping of the product flows across the value chain comes next. Since they change from inputs to raw materials, intermediate products, and final products during this step, the products are identified at every stage of the process. The movement of products from raw materials to the finished product, which is prepared for sale to the ultimate clients, is clearly depicted in this stage. When the quantity of the product is known, the sizes of the various channels within the value chain may be seen.

Four, the value chain map comprises the initial identification of challenges that various value chain actors experience as they carry out their roles. Other challenges could be identified and incorporated during the value chain analysis. It is important to remember that there are challenges stated. The reasons for these issues and their solutions are kept for further investigation.

CHAPTER IV

METHODOLOGY

4.1 INTRODUCTION

This chapter covers the study's methodology. Any systematic investigation should give it considerable attention. An appropriate approach must be employed in scientific study. Good research requires appropriate methods. The nature of the study, together with its goals and objectives, determined how the main data was gathered. This chapter outlines the precise sequential phases of research activity, such as choosing the study regions, choosing the samples and sampling methodologies, choosing the data sources, processing the data, choosing the analytical techniques, etc.

4.2 Selection of the Study Area

For this study, two upazilla which are Dumuria and Khulna under Khulna district had been selected as shrimp cultivated area. Reasons for collecting data from these two subdistricts were

a) The presence of traditional gher farmers, shrimp producers
b) Good transport system and easily accessible
c) Researchers thought quality data can be collected from this area and so on.

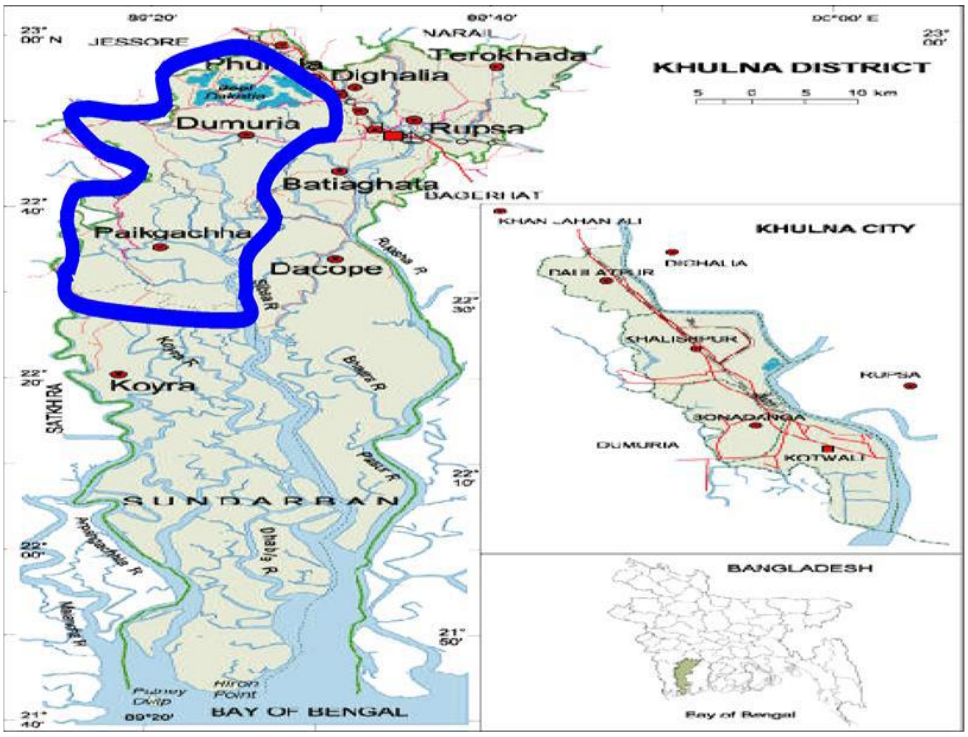


Figure 4.1: A map of selected area

Dumuria upozilla is situated at 22.8083°N 89.4250°E. Number of total household is 46251 and total area is 454.23 square meter. Additionally, Paikgachha is situated at 22.5889°N 89.3361°E. Its overall area is 411.19 km2, and there are 41,194 houses there (Wikipedia).

4.3 Selection of the Samples and Sampling Technique

Total 125 samples were taken to conduct the study among which 100 samples were farmers,20 samples were wholesalers, 2 samples were commission agents and 3 samples were processors. Multi-stage sampling was followed to collect data from respondent.

4.4 Preparation of the Survey Schedule

One of the most crucial aspects of this study is creating the survey schedule. A thorough survey schedule was created to get the required information from the chosen respondent in a way that would make it simple to find all relevant information for shrimp and prawn farming within least possible time. The interview schedule was trialed beforehand to determine its acceptability. Based on the findings of the pre-test survey, the final survey form was created.

4.5 Sources of Data and Collection of Data

Primary and secondary sources were used to compile the data needed for the current investigation. The chosen respondents provided the primary data, while additional data came from a variety of public sources. In the research region, the main data gathering period was from December 2021 to February 2022. Data were appropriately edited and evaluated after collection. Secondary data sources included the Department of Fisheries (DoF), Bangladesh Economic Review (BER), journals, newspapers, publications, the internet, and the Bangladesh Bureau of Statistics (BBS). Data were gathered in local units to reduce mistakes. The data were then translated into the proper standard unit.

4.6 Editing and Tabulating Data

The filled schedules were revised for analysis after primary data collection. These data were checked to make sure that there were no mistakes or contradictions. A thorough analysis and summary of all the obtained data were performed. The Microsoft Excel applications was used for data entry and analysis. Here, it should be noted that data was first gathered in local units before being transformed into standard units after being verified. Following that, a few pertinent tables were created in accordance with the analysis that was required to achieve the study's goals. The data will be analyzed using both descriptive and statistical methods.

4.7 ANALYZING COSTS AND EARNINGS

Analyzing costs and earnings is one of the major factors of value chain analysis. This analysis gives an overview of incurred cost by different factors as well as revenues and profits.

Costs are divided into two types which are variable costs and fixed costs. Variable costs are related to economic decision-making which is short run-in nature. Variable costs vary in proportion with level of output produced in a time period. On the other hand, fixed costs are costs that are independent on the level of output produced by a famer. There is no easy way to categorize all costs into variable and fixed costs. As a result, assumptions are necessary in some circumstances. Costs per unit can be estimated and reported for each level of the value chain once the classification is completed. The allocation of costs element is shown in this analysis. In addition, the study displays cost component variations as well as total expenses. Furthermore, this research explains revenue swings over time as well as the main causes. And, by comparing revenues and costs, this study exposes how much income different actors make from their businesses.

The revenue is composed of marketing margins belongings to various value chain operators. The difference between the selling price paid by the following step and the purchase price paid by the previous stage is known as the marketing margin (Chuong 2011). All expenditures associated with moving a product from one stage to the next, as well as a suitable return on investment, must be covered by the marketing margin (Shepherd, 2007).

Revenue composed of three items which are

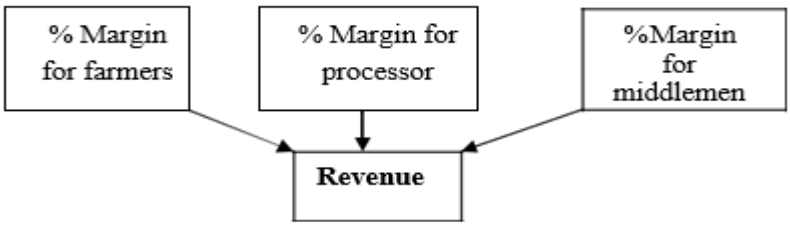


Figure 4.2: The distribution of revenue

The total cost of the final product sold to the end consumer is made up of the additional costs incurred by the various actors in the chain shown below. Added costs are calculated by subtracting the purchasing price paid at the preceding level in the value chain from the overall cost. Added expenses reflect the efforts of various chain actors in enhancing the end product's value.

The distribution of cost composed of three items which are

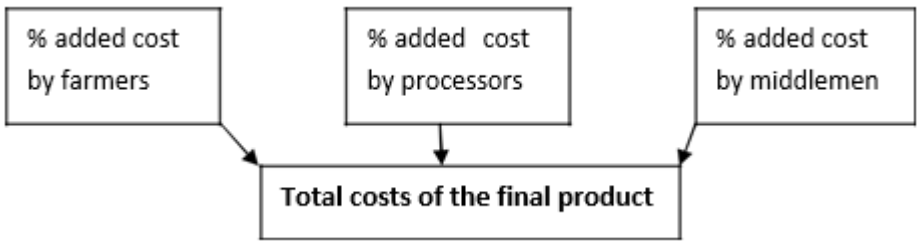


Figure 4.3: The distribution of cost

Earnings resulting from the sale of the final product to the ultimate customer include profits resulting from various chain actors, as shown below.

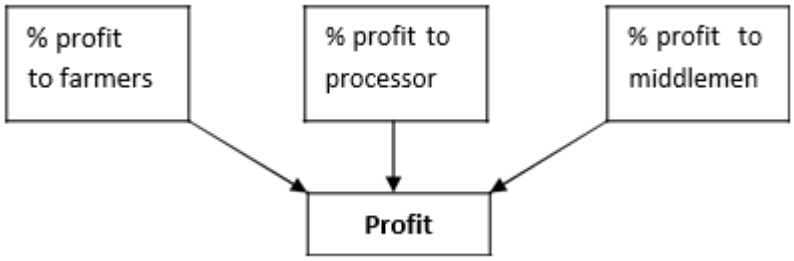


Figure 4.4: The distribution of profit

As an example, the revenue, profit, and added cost distributions are presented in the graph below.

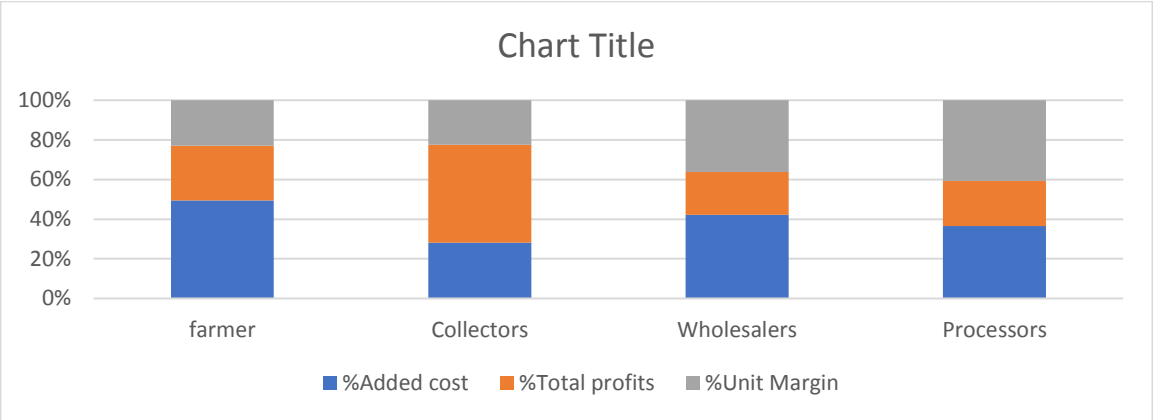


Figure 4.5: The distribution of revenue, profit, and added costs

(*Source:* M4P 2008, cited from National Economic and Social Development Board of Thailand (2004): Training course on integrating value chain analysis and methodologies into policy analysis)

CHAPTER V

SOCIO-ECONOMIC STATUS OF SHRIMP AND PRAWNFARMERS

5.1 DATA COLLECTED FROM SHRIMP FARMERS

From 100 shrimp farmers data were collected

5.1.1 Scale or size of the farms

Most of the selected farmers were small scale farmers. There were about 56% small scale farmers, 30% medium scale farmers and 14% large farmers.

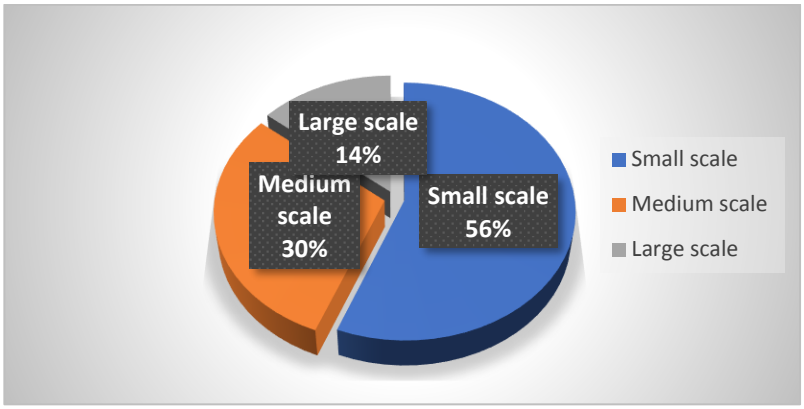


Figure 5.1: Size of farming

5.1.2 Buyers of shrimp

About 90% farmers said that they sold shrimp to middlemen and remaining 10% their shrimp directly to processors and these group people were large scale farmer. About 90% farmers said that they sold shrimp to middlemen and remaining 10% sold their shrimp directly to processors and these group people were large scale farmer.

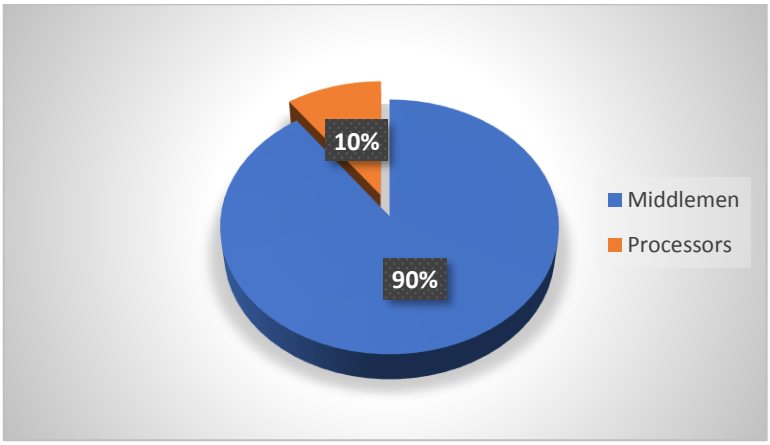


Figure 5.2: Buyers of shrimp

5.1.3 Seed suppliers for shrimps

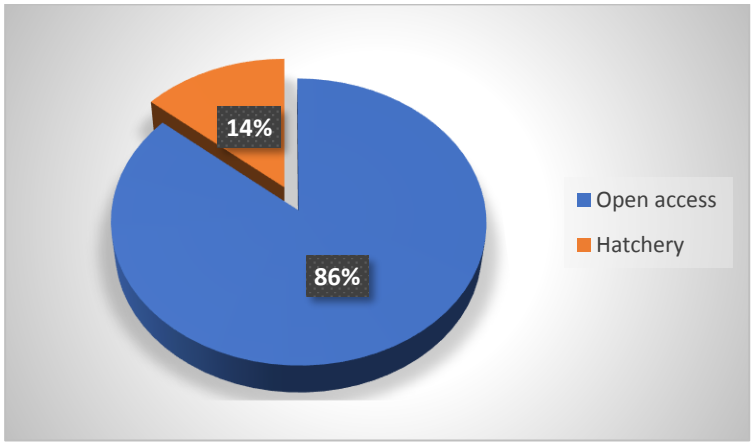


Figure 5.3: Seed suppliers

86% of total seeds were collected from hatchery.

5.1.4 Types of Contracts

From the survey, it had been seen that about 95% of farmers were not likely go with any formal agreement and sometimes it created problematic situation for uneducated shrimp farmer.

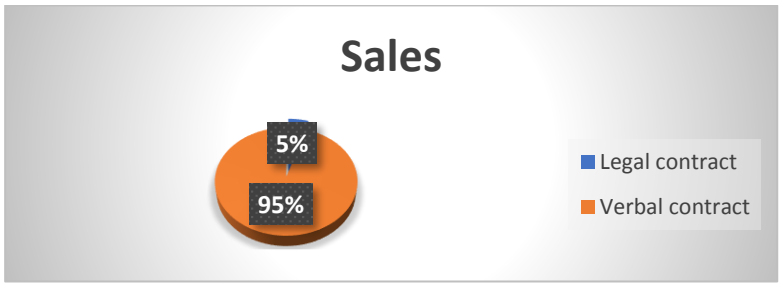


Figure 5.4: Types contract

5.1.5 Facilities received by farmers

Among 100 surveyed farmers only 10% got credit assistance from bank,15% got training facilities and 25% got marketing information on time.

Table 5.1.1: Facilities received by farmers

Facilities	Credit assistance from bank	10	10%
	Training facilities	15	15%
	Market information's	25	25%

5.1.6 Reasons of depending on middlemen

Table 5.1.2: Reasons for depending on middlemen

Reasons of depending on middlemen	Convenient to sell	75	75%
	Easy to communicate with	80	80%
	Hassle free transaction	60	60%
	No requirements for processing	96	96%
	Assurance of payment	85	85%

Source: Surveys from farmers, 2021

From figure 5.2 we can see that 90% farmers sold their shrimp to middlemen. There were several reasons behind selling most of farmers produce to middlemen. The reason which was frequently told by farmers was no requirements for processing and the second most important reason was the assurance of payment.

Shrimp farming is divided into three categories: small, medium, and large scale. Twenty-eight of the fifty farmers surveyed work on a small scale, fifteen on a medium scale, and seven on a large scale. Farmers can buy seeds either from a local store or from a hatchery. According to the survey, practically all farmers operate their businesses on the basis of verbal agreements and do not follow any formal legislation. Bio-security cannot be maintained, as a result the cattle are able to readily enter into the firm and it spreads various virus. As a result, diseases start to break out. Shrimps are sold by farmers to middlemen and processors. During the study, it was found that farmers are greatly worried about the disease and have no information about feed.Flour and cow dung are utilized as feeds, and viruses spread as a result. During the study, little evidence of government or non-government organization (NGO) training for farmers was found. It's interesting to note that the majority of farmers are able to obtain market information after transporting their goods to a local market. Farmers' reliance on middlemen is fueled by immediate payment, reliance, and quick communication. Farmers were severely impacted by the covid epidemic in 2020 and 2021, as seed prices surged and shrimp prices fallen due to low demand in both domestic and international markets.

5.2 DATA COLLECTED FROM WHOLESALER

Table 5.2.1: Information revealed by wholesalers (From 20 surveys)

Items	Descriptions	Number	Percentage
Shrimp buyers	Commission agent	16	80%
	Processor	4	20%
Facilities	Instant Cash payment by agents	18	90%
	Loan facilities	3	13%
	Quick payment	18	95%

Source: Surveys from farmers,2021

According to the wholesalers, they are unable to sell the products directly to the processing company. They need to sell it to commission agent. During the interview, the respondent stated that if they do not meet their goal, they will have to lose money. Another major issue is lack of ice, which causes shrimp to be wasted. When shrimp are stored in cold storage, the color of the shrimp changes, causing wholesalers to incur loss. Miscreants are another issue that wholesalers must deal with.

5.3 DATA COLLECTED FROM COMMISION AGENT (From 2 surveys)

Table 5.3.1: Information revealed by commission agents

Questions	Agent 1	Agent 2
Number of wholesalers controlled by commission agents	10	25
How much do commission agents earn?	3 taka per kg	4 taka per kg

Source: Surveys from farmers,2021

The processing companies purchase shrimp exclusively from the Commission Agent, according to the Commission Agent's survey. It is observed that the wholesaler or farmers can rarely sell their products to the processing company. Another crucial point is that transportation costs are the most pressing issue in their business. During harvest seasons, the processing companies assist them by providing vehicles for transporting the products, but they do not do so during the off-season. They also have an issue with payment irregularities. Because the agents are not paid on time, they are unable to pay the wholesaler on time.

5.4 DATA COLLECTED FROM PROCESSOR

Table 5.4.1: Information revealed by processor

Questions	**Processor 1**	**Processor 2**	**Processor 3**
Who are your suppliers	100% from Commission Agent	100% from Commission Agent	100% from Commission Agent
Why do you prefer to buy shrimp from a commission agent rather than a farmer or a wholesaler?	Without buying from them, it is tough to run business	Without buying from them, business is quite impossible.	Due to easier communication
To whom do you your products?	Importers	Importers	Importers and few low-grade products to local trader.
What are the stages of processing?	Buying the shrimp Grading Devein Freeze Preservation Package	same	Same
Regulations	Fish inspection and Quality control, Khulna	FIQC, Khulna	FIQC, Khulna

Source: Surveys from farmers,2021

According to the survey, commission agents buy 100% of the shrimp for processing firms. Officials from the surveyed companies claimed it was difficult to obtain shrimp from farmers or wholesalers without using an intermediary. Only raw shrimp is shipped to foreign, but a little amount is sold to local traders. there is a huge competition for raw materials.

Few shrimp processing companies of Khulna district are Achia Sea Foods Limited, Marine Fresh Bangladesh etc. Processing firms are obligated to handle commission agents by providing numerous facilities for obtaining raw materials.

Another issue is that when shrimp are processed at the intermediaries' level, four holes are drilled to allow frozen water to escape. The middlemen, on the other hand, fill in the gaps while processing in their phases. As a result, the ice melts, and the shrimp lose their quality after traveling for 8/10 hours, resulting in a shortfall of two kilograms out of a hundred kilograms. The processing companies adhere to the Bangladesh government's FIQC (Fish Inspection and Quality Control) regulations.

RESULT AND DISCUSSION

CHAPTER VI

VALUE CHAIN AND ITS ACTORS

6.1 INTRODUCTION

This chapter mainly deals with identifying value chain and its actors. This chapter also described the functions and activities of different actors involved in shrimp farming.

The value chain of shrimp in Khulna District, Bangladesh

6.2 Value chain actors and their functions

Table6.1. Value chain actors and their functions

Actors	Functions
Farmer	Shrimp is produced by farmers. Shrimp PL (post larvae) are grown in Gher and sold to depot and faria owners.
Faria	Faria is a middleman in the shrimp industry who purchases small quantities of shrimp from farmers in outlying regions and then sells them to the depot owner and aratdar. They lack a market or other location to buy and trade. They conduct their business every day.
Aratdar	Aratdar have a fixed location where they carry out their operations. They just facilitate shrimp sales and purchases between buyers and sellers. In exchange, they demand payment from the vendor at a specific amount or rate (between 3 and 5 percent per 100 Tk). (faria or farmer).
Bepari	Shrimp are purchased by Bepari from farmers and faria through aratdar and are then sold to processing plants through suppliers or commission agents. Additionally, they sell shrimp to the retailers from nearby and far-off markets. They make large purchases.
Depot owner	The owner of the depot has a location to store and buy shrimp in the shrimp-growing regions. They buy shrimp from farmers, beparis, and farias and then sell it to processing facilities through commission brokers.
Suppliers/ commission	On the sale of shrimp to the processing factories, commission agents charge a fee. They only coordinate the commission-based purchasing and selling of

agent	shrimp between owners of depots and processing facilities. They keep track of transactions, serve as guarantors, and guarantee a steady supply of shrimp.
Retailers	Retailers sell shrimp to customers at retail prices on both the local and global markets. They operate a storefront in the marketplace and engage in various value-adding activities that reduce marketing expenses. With the help of aratdar, they buy shrimp from Bepari.
Processing plants	Shrimp purchased from depot owners through commission agents are valued further by processing facilities. For performing the high technology heavy processing tasks, they have a permanent building complex. This plant's produce is intended for consumers abroad. All processing phases assure a high level of product standard.

Source: Field surey,2021

Table 6.2 Shrimp value chain (domestic and foreign markets).

Overseas value chain	
Value chain – I	Fish Farmer → Faria → Aratdar → Bepari → Depot Owner → Commission Agent → Processing Plant → Consumer
Value chain – II	Fish Farmer → Faria → Depot owner → Commission agent → Processing plant → Consumer
Value chain – III	Fish Farmer → Depot owner → Processing plant → Consumer
Domestic value chain	
Value chain – IV	Fish farmer → Faria → Aratdar → Bepari → Retailer → Consumer (Local market)
Value chain – V	Fish farmer → Faria → Aratdar → Bepari → Retailer → Consumer (Distant market)

Source: Field survey (2021).

From the table, it is clear that numerous actors were found throughout the shrimp value chain in the Khulna district, starting from farmers to processing businesses. Farmers, wholesalers, commission agents, and processors make up the majority of these actors because they are responsible for producing the goods for the final consumers.

Each actor has joined together to form a chain, and they all contribute to the shrimp value chain. The survey has revealed the connections between the participants in the shrimp value chain. In recent years, the trade has expanded to well-established countries like Europe and Russia. Farmers produce shrimp in ghers using seeds obtained from shrimp hatcheries and collectors as well as feeds obtained from feed mills. Farmers mainly rely on wholesalers to sell their products after shrimps are harvested. Wholesalers purchase raw shrimp from farmers and then sell them to Commission agents using ice. Shrimp is purchased by commission brokers, who then sell it to processors. After that, the raw materials are processed and made ready for export.

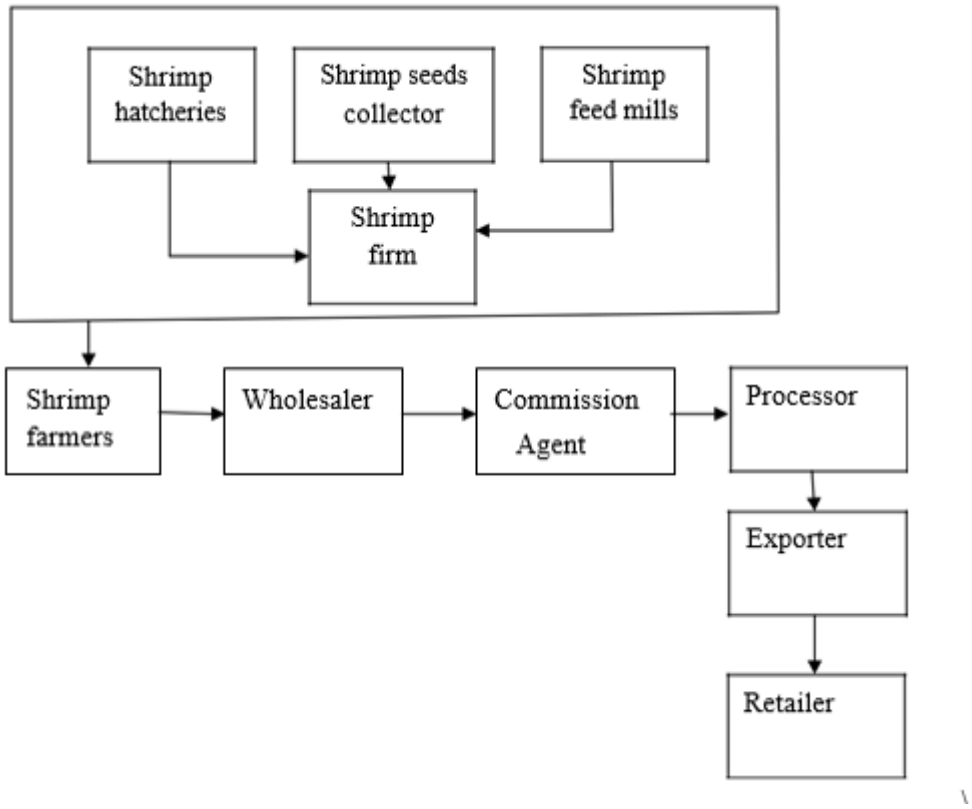


Figure 6.1: Backward and forward value chain mapping of shrimp

6.3 Value chain governance:

Legislative governance is clearly dominated by external parties from outside the chain, with national bodies concentrating on ensuring that the norms established by these external parties are being followed (judicial governance). As a commodity for export, shrimp must pay particular attention to ensuring that all standard issues are resolved prior to export. Now, various chain participants must fulfill these requirements. The government has not actively helped the processing plants to comply with these regulations. In the case of the private sector, trade associations had to offer certain benefits to their members, but this is insufficient.

6.4 ACTIVITIES AT DIFFERENT STAGES OF SHRIMP VALUE CHAIN

6.4.1 Farming stage

To grow and expand their shrimp farming business, farmers must follow the following procedure:

a) **Choosing a suitable farm:** Before starting to grow shrimp, an appropriate location must be selected. The success of this enterprise depends heavily on location choice. Disease risk decreases if the farm's environment is properly maintained. The farming should meet certain requirements, such as a pollution-free area, a flood-free region, and infrastructure facilities etc.

b) **Pond drying:** Drying is another crucial step in the shrimp farming process that helps regulate and eradicate wild species while improving soil fertility.

c) **Collecting seeds:** It is yet another crucial step in the culture of shrimp. The hatchery and other seed collectors are places where it can be obtained.

d) **Shrimp harvesting:** Water is drained out before harvesting, leaving only enough water for shrimp to survive. Shrimp can be harvested four months after the seed is planted or when each shrimp weighs 25 grams.

e) **Taking care after collection:** After collection, adequate care must be taken because transportation is not yet well-established in Bangladesh. Farmers wash caught shrimp in ice-mixed water to remove mud, soil, and trash. Following that, it is packaged and offered for sale to wholesalers.

6.4.2 Procurement stage:

Wholesalers inspect the size of the shrimp when the farmers are ready to sell them. Shrimp are either not sold or farmers receive a lower price if the size is below the standard level. Farmers are in charge of harvesting, and wholesalers and commission agents are in charge of transportation and storage.

a) **Killing the shrimp:** Shrimp are killed after being received from farmers and maintained in a container with ice and water. It becomes heavier after being submerged in water. Some wholesalers have a habit of cheating by increasing weight by adding particular substances.
b) **Preservation:** Ice is used in the preservation of shrimp. The ratio of shrimp to ice is influenced by how far the processing enterprises are from the preservation region. More ice should be present if the distance is greater.
c) **Transport:** Shrimp and ice are carefully packed into the containers before being sealed. Then, they are piled onto trucks to send them in processing plant quickly. It is quite challenging to arrive on time in Bangladesh because of the bad traffic jam situation and the large number of miscreants who are on the road and demand illegal money. The quality of the shrimp may degrade and be rejected by processors if for whatever reason the loaded shrimp cannot be delivered in time to the processing plant. It should be noted that all tasks like killing, preserving, etc. are under the purview of the wholesalers. The products must be delivered to processors by the commission agents. The issue commission agents and wholesalers have is a lack of understanding of preservation techniques. The technology used to preserve the raw shrimp items is actually a creation of their own expertise. The order of shrimp would be declined if the commission agents were unable to uphold the assurance of safety and sanitation.

6.4.3 Processing stage:

Exporting the frozen shrimp is the responsibility of processing companies. Raw shrimp must go through various steps of preparation before being processed, which is a crucial task for processors.

a) **Buying raw shrimp:** Purchasing raw shrimp is the initial stage in the processing firm. The shrimp are purchased from commission agents. The concerned employee must now negotiate with the commission agent. Some agents claim that another

business has agreed to pay them a specific amount, thus they are requesting additional money. The employee will encounter challenges at this point.

b) **Grading:** After being purchased, shrimp must be graded by a processing company's employee. Grading is the number of shrimps required per kilogram.
c) **Semi-processing:** In the first stage of the semi-processing process, shrimp are washed. Following that, shrimp are moved into tanks that are kept in the processing line. The head is usually removed and tail is deveined in this stage.
d) **Processing:** Shrimp are graded and divided based on quality after the semi-processing step. Then it moves on to the next stage of processing, being the finished goods. In the industry, processors commonly use two-floor warehouse facilities. Shrimp in the first layer are preserved in 5- to 10-kg packets and are ready to be processed at -5° in a chiller room. Fully processed shrimp are kept in the second layer of cold storage until they are verified and dispatched to customers. The temperature of the second layer is maintained between -12 and -20 °C.
e) **Freezing:** There are two varieties of freezing, known as block and IFQ (Individual Quick Frozen). A certain number of shrimps are frozen into blocks during block freezing. However, when using the IFQ method, each shrimp is frozen separately.
f) **Packaging and preservation:** After freezing, shrimp are packaged and kept at a freezing temperature for preservation. Processors employ locally produced trays, plastic packs, and cartons with personalized labels. According to the buyer's specifications and agreed price, the packing style varies. Shrimp that sells for more money typically have exclusive packaging, whereas shrimp that sell for less money are frequently packed in single plastic packs or blocks then repackaged by the importer or retailer. Due to the high cost of disposal in developed nations, consumers typically prefer simple packaging for basic and unbranded products.

The primary difficulties faced by processing companies in Bangladesh are the sanitation and food safety regulations enforced by importing nations. In the processing plants, both men and women labor, although their jobs are quite specialized and distinct. While men typically work more closely with machines, block freezing, and Individually Quick Frozen (IQF) operations, women typically clean and de-head shrimp. Children working in the processing facilities has also been reported

CHAPTER VII

COST, EARNING AND RISK ANALYSIS

7.1 INTRODUCTION

The estimation and analysis of the expenses associated with the production of shrimp are the key topics of this chapter. Fixed costs and variable costs were used to categorize the expenses. The majority of the inputs were valued at their current market value, occasionally the price set by the local government during the survey period in the research region, as well as the prices at which farmers had purchased the inputs. However, it was quite tough to find out some cost as the farmer could not keep in mind the incurred cost.

In this chapter, in terms of shrimp farming per hectare yield, gross return, gross margin, net return is discussed.

7.2 ANALYZING OF COSTS AND EARNINGS

7.2.1 Farming stage

Table7.1: Costs per kg of raw shrimp at farming stage.

Cost Items Sl No.	Land rental	Seed	Labor cost	Feed Cost	Electricity and Fuel	Others	Total
1.Total incurring cost	6515	15509	7275	17717	1670	1790	50476
Average Cost	65.15	155.09	72.75	177.17	16.7	17.9	504.76
Percentage of total cost	12.90712	30.72549	14.41279	35.09985	3.308503	3.54624	100

Source: Field survey,2021

Table 7.1 illustrates all the cost components incurred by farmer during the cultivation of shrimp. Here, labor wage, land rent and others costs are the fixed costs. On the contrary seed costs, electricity costs and fuel costs are, the variable costs. The percentage of total cost on land rental, seed cost, labor cost, feed cost, electricity and fuel cost and others are 12.91%,30.73%,14.41%,35.10%,3.31% and 3.55% respectively. The average cost incurred by farmers for per Kg of raw shrimp is Tk. 504.76. It is mentionable that the labor costs, seed costs, feed cost and land rent are major components where seed costs and feed cost comprise the major portion.

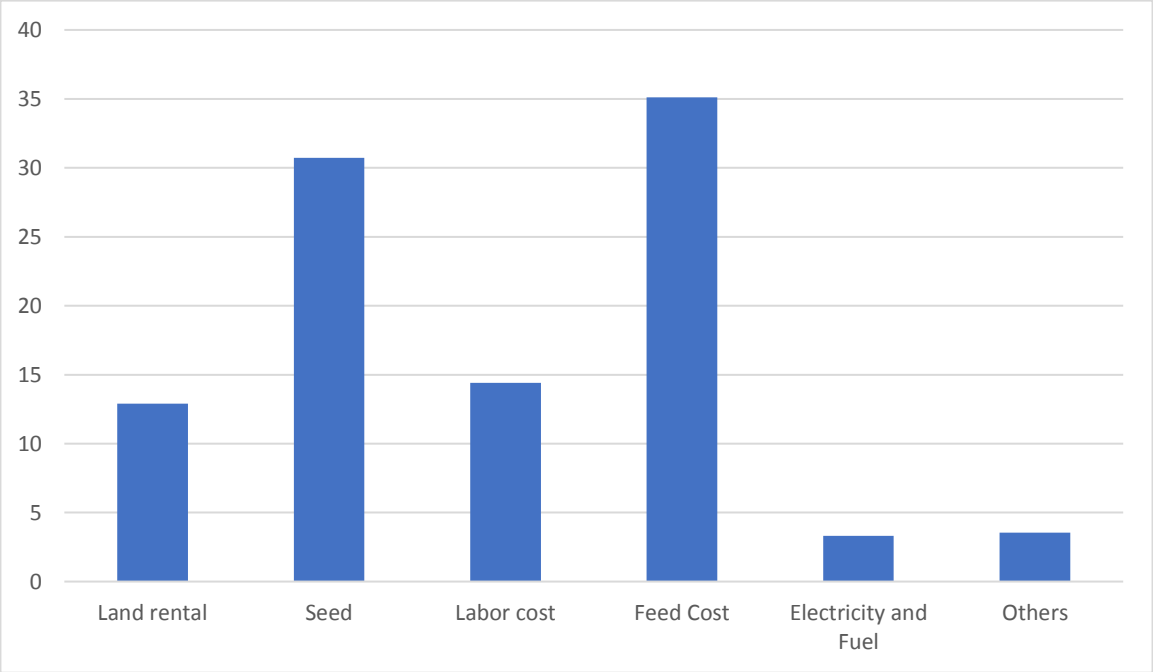


Figure7.1: Share of cost components (farming stage)

From the figure 7.1 it has been seen that most of the costs are incurred for buying seed and feed for shrimp by the farmers. The respondent said that they have faced lots of problems during covid pandemic as the seed cost and feed cost was so high at that time. The scenario has started to change from the beginning of 2022.

Table 7.2: Revenue, Cost, and Profit per kg shrimp at farming stage.

Items	Amounts in taka
Revenue	548
Cost	504
Profit	44

Source: Field survey,2021

Table7.2 showed the profit earned by the farmers by farming shrimp per kg of Shrimp. Here average revenue, cost and profit are Tk. 548,504,44 accordingly. At the time of interviewing farmers said that they had faced great loss in 2020 due to covid pandemic and sometimes they faced loss due to the outbreak of disease as shrimps are very susceptible to disease. From survey, it is observed that sometimes the farmers did get the appropriate price against the costs and so they had to face loss. The prime causes for being loser are the disease and rough weather. According to some shrimp farmers there were syndicate (cartel) in the shrimp market and they were the price taker. So, they were bound to sell their raw shrimp to the wholesaler according to the price set by them.

7.2.2 PROCUREMENT STAGE

Table 7.3: Added costs for per kg shrimp at the procurement stage

Items	Amounts in taka
Transport	7.65
Grading	7.55
Ice	13.4
Labor	9.15
Other	5.3
Total	43.05

Source: Field survey,2021

The raw shrimp was prepared for sale to the following step once the cultivation stage was completed. The products are then purchased by the wholesalers with additional charges to move them to a later level. At this point, the costs of transportation, labor, and ice are considered variable costs, whereas the remaining expenses are fixed costs. The term

"Grading" refers to the quantity of shrimp per kilogram, and the grading includes 15, 20, 30, 40, and 50 shrimp per kilogram.

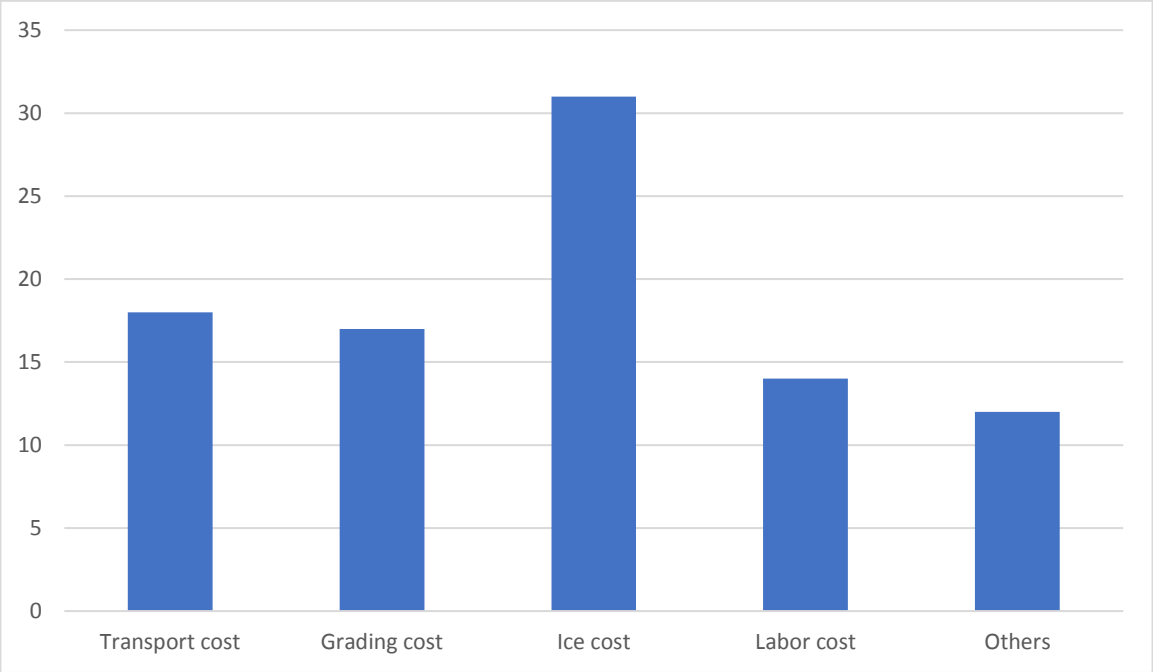


Figure7.2: Percentage of cost at procurement stage

From the above chart it has been seen that most of the cost incurred by wholesalers for purchasing ice to keep to shrimp fresh. Sometimes they have to face problems due to the shortage ice as the production of ice has declined due to load shedding.

Table 7.4: Total cost of per kg shrimp of whole seller

Items	Amounts in taka
Purchasing price	548
Added costs	43
Total cost per kg	591

Source: Field survey,2021

From table 7.5, it has been discovered that the wholesaler's total cost per kilogram of shrimp includes of the purchase price plus additional expenses. To get shrimp to processing companies, wholesalers cover the additional expenses and sell to commission agents. Wholesalers purchase shrimp at on an average 548 taka per kg from farmers and

taka 43 has been incurred by wholesalers for doing various activities like transporting, grading, adding ice and labor cost.

Table 7.5: Selling price, Total cost and profit per kg of wholesaler

Items	Amounts in taka
Selling price	710
Total cost per kg	591
Total profit	119

Source: Field survey,2021

Table 7.6 illustrates selling price, purchasing price and profit per kg of shrimp of wholesalers. On an average wholesalers get profit of taka 119 for per kg of shrimp. By having conversation with wholesalers, I have known that wholesales are controlled by commission agents made cartel. Due to cartel, they are kind of bounds to sell shrimp to some robust processers with the help of locally known commission agents. Moreover, wholesalers have to face loss when there is less global demand for shrimp. At time they have to sell their products with few profits or loss to local traders. Wholesalers said that this scenario has seen at the time of covid.

7.2.3 COMMISSION AGENTS

The commission agent comes next, who has limited power to alter the chain. They solely get processor commission .

Table 7.6: Selling price per kg of commission agent

Items	Amounts in Taka
Purchasing price	710
Costs	2
Commission	3
Selling price	715

Source: Field survey,2021

I spoke with two commission agents, and their voices are remarkably similar. They only pay 2 taka per kg of Shrimp and only receive 5 takas from the processing company. Even while it appears to be a simple task, it is not.

They must build the processors' dependability, which takes time. To ensure that the products can be transferred to the processing plan smoothly, the commission agents must possess the ability to connect with law enforcement agencies.

7.2.4 PROCESSING STAGE

The format of costs and profits in the processing stage is the same as that of the production and procurement stages, which is given in table x. Purchase costs, fixed overhead, variable overhead, and shipping costs are all costs. It is interesting to note that the processors receive a 50-taka government subsidy, and as a result, their costs have been significantly reduced. The Fisheries Ministry wants a 25% financial incentive for exports of chilled fish due to the post effect of covid pandemic and economic instability.

Table 7.7: Cost, export price and profit for per kg shrimp at processing stage

Items		Amount in Taka
Purchasing price		715
Fixed overhead cost	Material	20
	Land rent	12
	Labor cost	11
	Electricity	9
Variable Overhead cost	Administrative cost	40
	Transport	20
	Others	10
Shipment		20
Total costs		857
(-) Government subsidy		50
Grand total costs		807
Selling price		848
Profit		41

Source: Field survey, 2021

From the table7.7, we can see that processor get profit of taka 41 per kg. Processor mainly export the products and the products which quality have deteriorate are sold to local traders. There are many factors to determine the export price such as world demand, size of the shrimp etc.

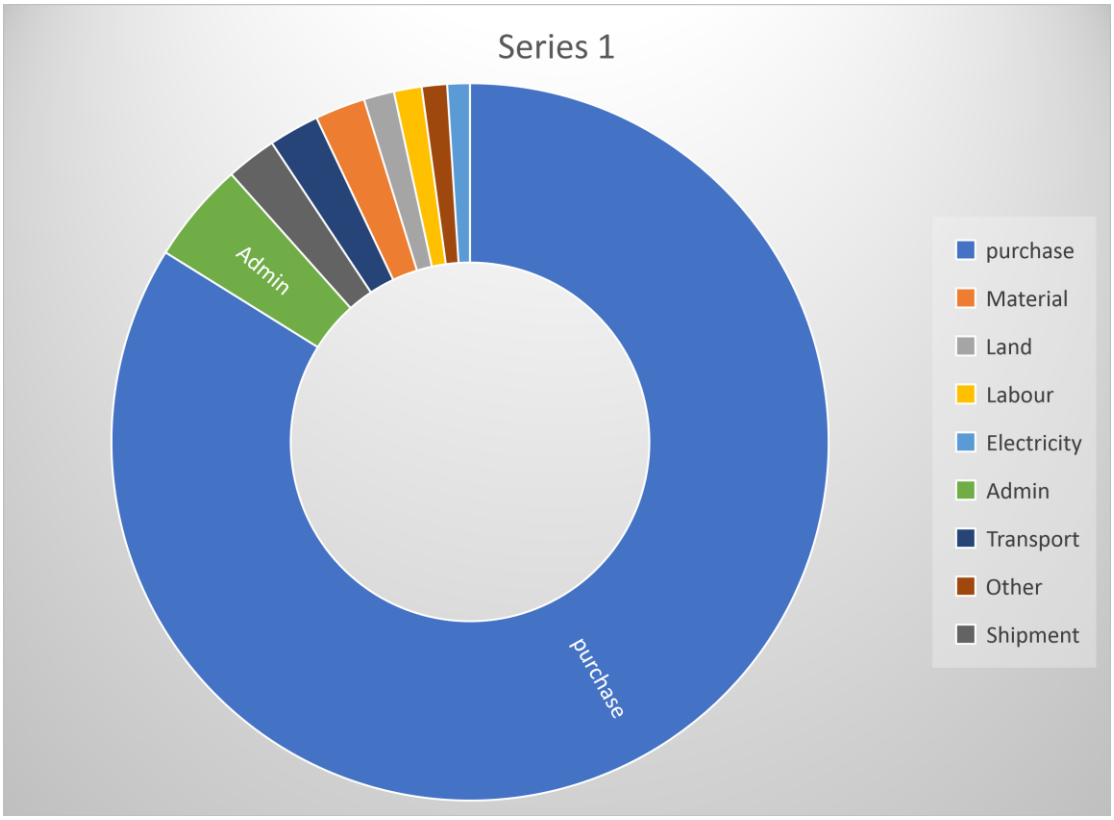


Figure 7.3: Different cost at processing stage

From the above figure, it has been seen that major portion of cost at processing stage are comprised with purchasing cost.

7.3 DISTRIBUTION OF REVENUE, COST AND PROFIT

In the preceding chapter, analyses were conducted to give a feature of the actions of farme rs, wholesalers, commission agents, and processors. According to the evaluations, practica lly every participant in the shrimp value chain has experienced positive financial growth o ver time. In this part, analysis will be done to indicate how much each actor in the value ch ain received in awards.

Table 7.8: Profit, added cost and margin per kg shrimp.

Actors	Purchasing Price	Total cost	Selling Price	Profit		Added cost		Margin	
				Absolute value	%	Absolute value	%	Absolute value	%
Farmer	…….	504	548	44	21	504	78	548	64
Wholesaler	548	591	710	119	57	43	7	162	19
C. agent	710	712	715	3	2	2	1	5	1
Processor	715	807	848	41	20	92	14	133	16
Total				207	100	641		848	100

Source: Field survey, 2021

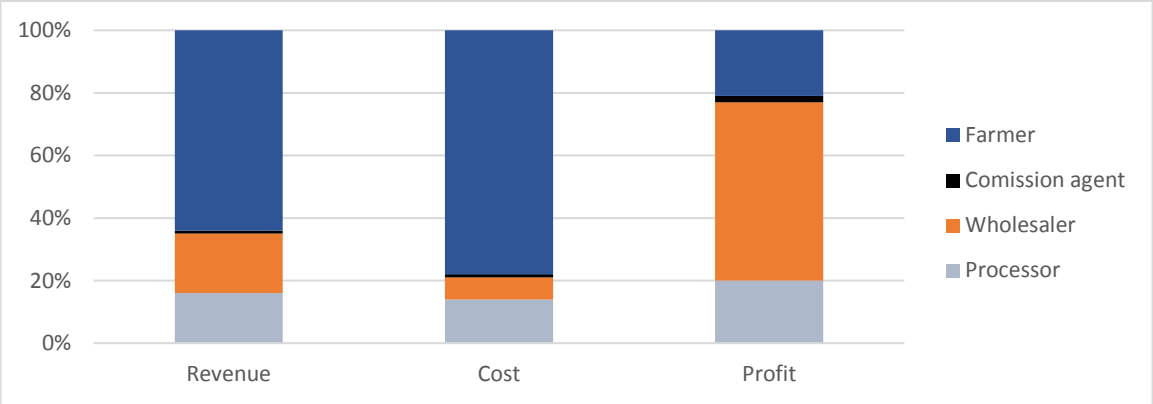


Figure 7.4: Share of cost and profit margin at different actors

Islam *et al*., (2019) found that revenue for farmer is 500.00 whereas above study found that revenue for farmer is Tk. 548 for per kg of shrimp this is due to the increase of feed price, seed price. Toma *et al*., (2019) found that farmers spend 26.14% of total cost on feed and 35.40% on labor but in my study, it is found that farmers spend 35% of total cost on feed which is quite larger than above mentioned study as because the price of seed has increased in recent times and 14% of total cost on labor which is less than the above-mentioned study this is happened because farmers in my studied area were likely to engaged themselves in shrimp farming.

From the table 7.9, we can see that in order to produce and export one kilogram of shrimp, farmers had to bear 78% of the costs, 64% of the revenue, and 21% of the profit. Despite making a higher contribution to revenue and expenses than any other group, farmers did not do so in a profit. Conversely, the wholesaler only retained 19% of revenue and 7% of costs, while absorbing 57% of the profit. Per kilogram of shrimp, the processor contributed 16% in revenue, 14% in expenses and 20% in profit. In comparison to other actors, wholesalers therefore always gain. Farmers have always kept a larger portion of revenue and costs compared to a smaller portion of profit. The commission agent has not significantly altered as usual. The most notable beneficiaries are the wholesalers, whose profit share has consistently been high relative to revenue and expense sharing.

7.4 SWOT analysis of Shrimp Value chain in the studied area

Strengths, Weaknesses, Opportunities, and Threats is referred to as SWOT. A SWOT analysis is a tool for evaluating and comprehending the internal and external factors of a farm. The internal factors are the strengths and weaknesses. They are features of a company that offer it a comparative advantage over rivals. Threats and opportunities, on the other hand, are external forces. Opportunities are features of the outside environment that management may take advantage of to boost operational performance.

Table 7.9: SWOT analysis of Shrimp Value chain

Strength	Weakness
➢ Favorable climatic, soil, and water conditions. ➢ A high natural rate of production. ➢ Fewer chemical and fertilizer uses. The product is nearly natural. ➢ Small is farming is possible. ➢ User friendly farming technology. ➢ It is possible to cultivate over fresh water fishes along with shrimp. ➢ At off seasons farmers can cultivate paddy in the land.	➢ Low production rate and during the off seasons farmers have nothing to do. ➢ Less profit margin for farmers. ➢ Shrimp is very susceptible to disease. A single disease can cause death to all shrimp. Even sometimes it affects the whole region. ➢ Dispute over land usage between shrimp growers and agricultural producers
Opportunities	**Threats**
➢ Shrimp consumption is on the rise in industrialized nations like the United States and European union countries etc. ➢ Opening of Padma Bridge will boost up shrimp export.	➢ New rules for the export market. ➢ Natural disasters like floods, cyclones, and heat waves occur frequently which have negative impact on shrimp industries. ➢ Withdraw of Government subsidies will negatively affect shrimp export.

Source: Field survey, 2021

SWOT analysis for an agricultural farm is very important. By reviewing this chapter, reader can easily understand the strength, Weakness, opportunities and threats of shrimp farming in studied area.

7.5 Risk factor and adopted mitigation techniques

A risk is a event that has a negative effect (threat) or on the project objectives. But a problem statement describes a 100% certain condition that exists now and threatens achieving the project objectives. Problems can be solved by taking proper initiatives (which is described in the next chapter) but it is tough to mitigate the risk factor though our farmers always follow some mitigation techniques to reducethe extent of damage.

Table 7.10: Risk mitigation Technique by farmers

For farmers				
Risk factors	Adopted risk mitigation techniques by farmers			
Natural calamities like flood, cyclone etc.	Covered four side of gher with net	Raise the bank of the gher	Farming around home	Don't follow any adaptation technique
	75%	10%	5%	20%
Viral Disease of Shrimps	Avoiding rapid changes in water conditions	Probiotics as antiviral Agents	Treating infected ponds or hatcheries with 30 ppm chlorine	Sell shrimp to local market with loss
	60%	20%	40%	50%

Source: Field survey, 2021

Most of the farmers said that they faced lots of risk due to natural calamities such as cyclone, high temperature, excess rainfall, salinity, shifting season, prolonged drought etc. They also mentioned that in 2020 during the time of Cyclone Amphan farmers had faced huge loss as the level of water in river has risen up and all the gher has washed way. Sometimes due to high temperature, the temperature of pond water has risen up which as a result the shrimp has died. Human has barely control over the nature but impact of natural calamities can be reduced with few initiatives.

The disruptive effects of a natural disaster on farmers can be lessened via preparation, education, awareness, and prediction and warning systems. However, to prevent or lessen actual harm from dangers, mitigation procedures including the adoption of zoning, land-use guidelines are required. In case of natural disaster farmers had nothing to do. They covered whole gher with net so that shrimp from one gher not pass to another shrimp. Few farmers raise the bank of the gher every year which is costlier. About 10 farmers said that they do shrimp farming around their homestead which is normally a high land that's why they are less vulnerable to flood.20% farmer did not follow any mitigation techniques as a result they face huge loss. If natural disaster happened, all farmers have to face more or less loss. Farmers said that if they get financial support from government, they might overcome the tough times.

About sixty-two farmers mentioned that they face risk due to the disease of shrimp. Screening of the brood stock, nauplii, PL, and grow-out phases; avoiding abrupt changes in the water environment; preventing stress in shrimp; avoiding the use of fresh feeds, particularly crustacean; reducing water exchange to keep viral vectors out of the pond; cleaning related equipment and treating contaminated ponds or hatcheries with 30 ppm chlorine to kill sick shrimp and carriers. Sometimes hectare after hectare shrimp farms were affected by pathogen or viral disease e.g., White Spot Disease. At that time farmers sold immature fish to local market at lower price and by doing these farmers reduced the amount of loss. Some others mitigation technique followed by farmers are avoiding rapid changes in water conditions, using probiotics as antiviral agents and treating infected ponds or hatcheries with 30 ppm chlorine.

The extent of risk faced by farmers had greater negative impact on the whole shrimp value chain. Sometimes it can collapse the whole value chain. Other actors in shrimp value chain have to face little risk as they can divert it to farmers as they can save themselves by not buying shrimp from farmers. Wholesalers and commission agents said they engage in other activities like working in a grocery shops, introduce themselves as day labor to earn their livelihood at the time of pandemic.

CHAPTER VIII

PROBLEMS FACED BY DIFFERENT ACTORS IN SHRIMP VALUE CHAIN

8.1 Introduction

Various actors in the shrimp value chain were experiencing certain issues, according to the report. This chapter describes the magnitude of different problems at each actor in value chain.

For each problem, the respondents were asked to assess the problem's severity against one of four options: high, medium, low, or not at all. The problem's higher magnitude was then indicated by adding the total number of responses to the problem. The issues were ranked in order and displayed in table in order to help the reader comprehend the relative importance of various issues and to gauge their severity.

8.2 Problems faced at farming stage

Table 8.1: Rank order of the problems faced by shrimp farmers

Nature of the problem	**Numbers of farmers**				**Rank order**
	High	**Medium**	**Low**	**Not at all**	
Capital shortage	58	35	5	2	1st
Lack of bio-security	52	32	11	5	2nd
Lack of water treatment facilities	48	32	10	10	3rd
Preservation problem	40	30	20	10	4th
Difficulties to controlled due to large area	20	20	30	30	5th

Source: Field survey, 2021

8.2.1 Unavailability of virus-free seeds

Few farmers said that it is tough to get virus free seed all time. By maintaining proper biosecurity measures, the availability of virus free seed can be ensured.

8.2.2 Capital shortage

About fifty-eight farmers said that the face problem while they have to manage capital. This problem can be solved by ensuring financing facilities by Government and NGO in the form of loan.

8.2.3 Lack of bio-security

About 52 farmers said that they faced problem while ensuring biosecurity. Though ensuring biosecurity is quite expensive as the farmers need to check shrimp and water qualities in laboratories which is tough for shrimp farmers.

8.2.4 Lack of water treatment facilities

Few farmers said that they face problems while treating water. In shrimp farming, sometimes it is required to entering river water in shrimp pond. Sometimes the owner whose pond is near to the river do not want to get water passing through his land even sometimes the owner demand money for this. Some farmers complain that they were bound to sell their pond to the powerful owner as they barely have anything to do. This problem can be solved with proper steps by upazilla administration.

8.2.5 Preservation problem

Farmers are bound to sell their harvested shrimp within few hours of harvesting in less market price as there is not any shrimp preserver in near to farmer. This problem can be solved with proper initiative by the Government.

8.2.6 Difficulties to controlled due to large area

Few farmers have face difficulties while controlling over large area of shrimp farm. This problem can be solved by employing labors as a supervisor of the pond.

8.3 Problems faced by wholesalers

Table 8.2: Rank order of the problems faced by shrimp wholesalers

Nature of the problem	Numbers of farmers				Rank order
	High	Medium	Low	Not at all	
Electricity problems	15	3	2	0	1st
Inadequate capital	14	4	1	1	2nd
Lack of knowledge of grading technique	10	5	5	0	3rd
Lack of knowledge of using ice	9	6	5	0	4th
Highly competitive market	6	5	5	4	5th

Source : Field Survey,2021

8.3.1 Electricity problems

Most of the wholesalers raise their voice to the fact that they face electricity problem. Due to the shortage of electricity supply, ice factories cannot produce ample amount of ice. As a result, ice shortage has seen in the market. On march our honorable prime minister has declared 100% electrification, so we hope that within few months' electricity problem will be solved.

8.3.2 Inadequate capital

About fourteen wholesalers said thst they face the problem of capital shortage. Capital shortage can be minimized with the process of financing from Government Banks or NGOs.

8.3.3 Lack of knowledge of grading technique

Most of the wholesalers said that they face problem while grading shrimp. As a result, the price of shrimp in foreign market as well as in local market has reduced to a great extent. A workshop or training program can be arranged by Government or NGOs to tech associated personnel about how to do grading maintaining international standards and by this way grading problem can be solved.

8.3.4 Lack of knowledge of using ice

About nine wholesalers said that they do not have much knowledge of using ice. So proper training on this can solve the problem.

8.3.5 Highly competitive market

Few wholesalers said that the market is getting competitive day by day. In some perspective this is a good sign.

8.4 Problems faced by commission agents

Table 8.3: Problems faced by Commission agents

Problems Faced by Commission agent	❖ Lack of transportation ❖ Payment is not in due time ❖ Factory doesn't support transportation facilities ❖ High Transportation cost ❖ Unable to fulfill the target ❖ Lack of ❖ Transportation

Source: Field survey,2021

I have interviewed two commission agents, there complains are almost same. This problem can be solved with proper planning and Government initiatives.

8.5 Problems faced by processors

Table 8.4: Problems faced by processors

Difficulties faced by processors	❖ Cheating by closing the hole of shrimp with jelly or iron to make it heavier. ❖ Lack of raw materials ❖ High competition in market ❖ Capital shortage

Source: Field survey, 2021

I have interviewed three processors and they have almost said the same things. One of the common problems all the processors are said is that the few farmers follow dishonest way by closing hole of shrimp with jelly or iron to make it heavier which ultimately affect total export from our country.

8.6 Conclusion

A complete program with an integrated approach is required to address all of the aforementioned issues and limitations in order to advance shrimp farming as a whole. The difficulties that the farmers experienced were rated according to the corresponding percentages. According to the majority of actors natural disaster, a lack of funding etc. were the greatest obstacle to their ability to produce shrimp. And based on its ranking, this issue holds the top spot. However, there were some contradictions in their response. Therefore, researchers concluded that the primary obstacles to shrimp production were the outbreak of shrimp illnesses and a lack of water during the dry season. These inputs already get government subsidies.

CHAPTER IX

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

9.1 SUMMARY

The majority of the study's data came from primary sources, which the researcher personally gathered by interviewing the sample farmers. From two upazila, namely Paikgacha, and Dumuria in Khulna district, a total of 125 respondents were chosen including farmers, wholesalers, commission agents and processors. A survey approach was utilized to gather information on production, and a simple random sampling technique was employed to choose the shrimp producers. The study's goals were achieved by using both tabular and statistical methods. In light of the current investigation, the following precise goal of identifying the activities conducted by different actors, calculating the corresponding costs and earnings, SWOT analysis, identifying risk factor and mitigation technique were developed.With respect to socioeconomic features of the sample farmers, the findings revealed that farmers were doing mainly three types of farming which are small scale farming, medium scale farming and large-scale farming. About 56% farmers were involved in small scale farming, 30% in medium scale and 14% in large scale. The value chain actors of the surveyed area were farmers, wholesalers, commission agents and processors. About 90% farmers sold shrimp to middlemen and remaining 10% sold their shrimp directly to processors and these group people were large scale farmer. Farmers collected 86% of total seeds from hatchery. It had been seen that about 95% of farmers were not likely go with any formal agreement and sometimes it created problematic situation for uneducated shrimp farmer. Among surveyed farmers only 10% got credit assistance from bank,15% got training facilities and 25% got marketing information on time. Among surveyed farmers only 10% got credit assistance from bank,15% got training facilities and 25% got marketing information on time. The reasons behind this were no requirement for processing, easy communication, assurance of payment etc. 80% wholesalers sold shrimp to commission agents. The processing companies purchased shrimp exclusively from the Commission Agent, according to the survey. Commission agents buy 100% of the shrimp for processing firms as it was difficult for processors to obtain shrimp from farmers or wholesalers without using an intermediary.

The value chain analysis of shrimp and prawn in Khulna district has four key actors which are directly engaged to produce shrimp and contributed to economic value. Farmers, wholesalers, commission agents, and processors are the actors. Farmers have the most added value, yet they are also the weakest and most susceptible characters. Shrimp cultivation also heavily depends on environmental factors and other players in the value chain.

Shrimp's value chain was subdivided into the stages of production, procurement, processing, export, and retail sales. Farmers have a variety of expenditures associated with farming, including labor, seed, and other fees. Within a year, all costs rose. Due to rising shrimp prices and rising overall sales, the farmer was able to survive. The farmers also benefit from not raising the value of the property since they lease the land for 3 or 4 years.

For producing per kg shrimp farmers expense was 504 taka and selling price was 548 takas. Farmers had to bear 78% of the costs, 64% of the revenue, and 21% of the profit. Despite making a higher contribution to revenue and expenses than any other group, farmers did not do so in a profit. Conversely, the wholesaler only retained 19% of revenue and 7% of costs, while absorbing 57% of the profit. Added cost by wholesalers was 43 taka and profit margin for wholesalers was 119 takas. For per kilogram of shrimp, the processors contribution was 16% in revenue, 14% in expenses and 20% in profit. Total cost of processors was 807 taka and selling price was 848 takas. Profit for processors was 41 takas for per kg shrimp. The commission agent has not significantly altered as usual. They just had profit of taka 3 for each kg of shrimp. The most notable beneficiaries are the wholesalers, whose profit share has consistently been high relative to revenue and expense sharing.

Farmers were adopted different technique to mitigate risk factor as risk factor can destroy the whole value chain.

All the actors were faced by some problems. Problems faced by farmers are all the actors were faced by some problems. Problems faced by farmers are natural calamities, disease of Shrimps, unavailability of virus-free seeds, capital shortage, lack of bio-security, lack of water treatment facilities, preservation problem, difficulties to controlled due to large area.

Problems faced by wholesalers were electricity problems, inadequate capital, lack of knowledge of grading technique, lack of knowledge of using ice, highly competitive market etc.

Problems faced by commissions agent were lack of transportation, payment is not in due time, factory didn't support transportation facilities, high Transportation cost, unable to fulfill the target, lack of transportation etc.

Problems faced by commission agent were cheating by closing the hole of shrimp with jelly or iron to make it heavier, lack of raw materials, high competition in market, capital shortage etc.

9.2 Conclusions and Policy Recommendations

Both shrimp farming and prawn have great opportunities in the studied area. It is hoped that with the opening of Padma bridge of, Shrimp farming in Khulna can contribute immensely in country's GDP. Farmers' output will grow if they have timely access to modern inputs and production technologies, which can help them raise their income and enhance their standard of life. There are several opportunities to increase the year-round per-hectare yield of shrimp and prawn farming and by ensuring. The following suggestions are given as part of the current study, which serves as a strategy-forming exercise to increase shrimp and prawn output in the Khulna district and helps to improve the productivity and efficiency of the shrimp and prawn value chain.

I. Although the government currently provides subsidies, fair input pricing should be guaranteed so that farmers may purchase the available materials at a competitive price.
II. Bangladesh government through Department of Agricultural Marketing (DAM) and NGOs can take necessary steps to increase the efficiency of shrimp value chain so that farmers profit margin can increase in accordance with their investment.
III. Training in shrimp farming can be extremely important for enhancing overall positive change. Therefore, additional training should be organized by extension organizations to use farms effectively.
IV. For the growers of shrimp and prawns, bank loans as well as institutional credit should be made available with simple terms and conditions.
V. The fair prices of the shrimp and prawn produced by farmer should be ensured so that farmers don't be cheated.
VI. The study area's marketing and transportation infrastructure both needed to be improved.

VII. The farmers should have access to and be guaranteed high-quality fingerlings in order to improve productivity, proper feed quality must be maintained.

VIII. Local administration should aware the farmers before upcoming cyclone or flood which can help shrimp farmers to minimize the loss.

IX. To reduce social tension and enhance the condition of shrimp and prawn farming regions, law and order enforcement agencies should be aware of the study area.

9.3 Limitations of the Study

It is obvious that every study has some limitations. The study I conducted was very important and took a lot of my time. I did my very best when writing this paper. Only four actors—farmer, wholesaler, commission agent, and processor—have got attention in this research. There are many more individuals participating in this chain, however due to time and resource constraints, these actors are not examined in this study. Shrimp has considered in this research. Some shrimps are sold by the farmers to the local market, and then the commodity moves through a large number of actors after being exported to overseas markets which could not be examined. Many interviewees, particularly those who were asked to provide information on costs and earnings, declined to do so. They believed that the information would hurt their business or that I was a government agent who would add on extra taxes to their income. It was difficult to track the processor as they are not likely to talk and there are few processors in the area. Finally, additional study should be looked at in order to ensure the sustainable growth of shrimp in this region. Future study should be conducted on intensive and semi-intensive cultivation techniques.

9.4 Way Forward/Future Directions

The shortcomings of study show some new avenues of research which might be undertaken in the context of Bangladesh. These are discussed below.

- A similar study using many samples may be conducted.
- Due to the fact that the current study only examined two upazila in and Khulna district, a more comprehensive study that compared shrimp farming across the entire nation may be done.
- An in details study on risk factor which may affected shrimp value chain can be done and it will provide a broad scenario of shrimp value chain.

REFERENCES

Ahmed, N., Demaine, H. and Muir, J. F. (2008). Freshwater prawn farming in Bangladesh: history, present status and future prospects. *Article in Aquaculture Research.* Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh.

Ahmed, N. (2018). Profitability of Shrimp Farming: A Study in Some Selected areas of Bangladesh, Doctoral Dissertation, Department of Development and Poverty Studies, Sher e Bangla Agricultural University, Dhaka.

Ahmed, N., Ahammed, F. and Brakel, M.V. (2008). An economic analysis of freshwater prawn, *Macrobrachium rosenbergii*, farming in Mymensingh, Bangladesh *Journal of the World Aquaculture Society*. Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh 2202 Bangladesh.

Alauddin, M. and Hamid, M. A. (2014). Shrimp culture in Bangladesh with emphasis on social and economic aspects. Department of Economics, University of Queensland, 4072, Australia.

Begum, M. E. A., Hossain, M. I., & Papanagiotou, E. (2013). Technical efficiency of shrimp farming in Bangladesh: an application of the stochastic production frontier approach. *Journal of the world aquaculture society*, *44*(5), 641-654.

Chhina, S.S. (2009). Agricultural Marketing in India. Kalyani Publishers, New Delhi.

DOF (2020). Fisheries week 2020 souvenir. Department of Fisheries, Fisheries and Livestock Department. Dhaka.

DDP (Delta Development Project) (1985). Shrimp culture in the semi-saline zone of the Delta:final report. Technical Report No. 13, Bangladesh–Netherlands Joint Programme.The Hague, Delta Development Project.

FAO (2012). Species Fact Sheets: *Penaeus monodon* (Fabricius, 1798). In: FAO Fisheries and Aquaculture Department.

FAO (2017). EASYPol. On-line resource materials for policy making. Analytical tools. Module Commodity Chain Analysis. Constructing the Commodity Chain, Functional Analysis

Gammage, S., Swanberg, K., Khondkar, M., Hassan, M.Z., Zobair, M. &Muzareba, A.M. (2006a). A pro-poor analysis of the shrimp sector in Bangladesh, Washington, DC: USAID.

Hasan, N. A., Haque, M. M., Hinchliffe, S. J., & Guilder, J. (2020). A sequential assessment of WSD risk factors of shrimp farming in Bangladesh: looking for a sustainable farming system. *Aquaculture*, *526*, 735348.

Haque, S.M. 1994. Annual report of Bangladesh Frozen Foods Exporters Associations (BFFEA).

Islam, MS; Haque, MM; Rabbani, MG; Sharmin, S (2016). *Marketing of shrimp in Bangladesh-A value chain analysis. Journal of the Bangladesh Agricultural University*, *12(2), 359*–. doi:10.3329/jbau. v12i2.28696 Dhaka, BFFEA Special Bulletin, January 1994.

Kaplinsky, R and Morris, M. 2001. A handbook for value chain research. University of Sussex, UK, pp. 5-15.

Kabir, J., Cramb, R., Alauddin, M., Gaydon, D. S., & Roth, C. H. (2020). Farmers' perceptions and management of risk in rice/shrimp farming systems in South-West Coastal Bangladesh. *Land Use Policy*, *95*, 104577.

Mwirigi, F.M and Theuri, F.S. (2012) ," The challenge of value addition in the seafood value chain along the Kenyan north coast", International Journal of Business and Public Management, Vol.2 No.2, pp. 51-56.

Mendoza, G., (1995). A Primer on Marketing Channels and Margins. Lyme Rimer Publishers Inc., USA. 425p.

Parvin, S. (2015). Shrimp processing industry in Bangladesh: A market structure analysis. An unpublished M.S. Thesis. Submitted to the Department of Agricultural Marketing, Bangladesh Agricultural University, Mymensingh.

Paul, B. G., &Vogl, C. R. (2011). Impacts of shrimp farming in Bangladesh: challenges and alternatives. *Ocean & Coastal Management*, *54*(3), 201-211.

Rasha, R. K., Rahman, M. R., Huq, A. A., & Jalil, G. M. (2019). Productivity and resource use efficiency of tiger shrimp farming in some selected areas of Bagerhat district in Bangladesh. *Asia-Pacific Journal of Rural Development*, *29*(1), 7-19.

Rahman, Mohammad & Rashid, M. Harun-Ar. (2013). A Case Study on the Present Status and Potentiality of Shrimp Farming in Bangladesh. Asia-Pacific journal of rural development. 23. 97-110. 10.1177/1018529120130107.

Routroy, S., & Behera, A. (2017). "Agriculture supply chain: a systematic review of literature andimplications for future research" Journal of Agribusiness in Developing and Emerging Economics, (just-accepted), 00-00.

Rahman, M. H. (2013). An economic study of galda shrimp farming in selected areas of jessore district. M.S. Thesis. Submitted to the Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.

Rahman, Md Moshiur. (2018). Importance of the Khulna region of Bangladesh for shrimp aquaculture: prospects and problems.

Rahman, A., Jianchao, L., Adnan, K. M., Islam, M. D. I., Zhao, M., &Sarker, S. A. (2020). How indebted farmers perceive and address financial risk in environmentally degraded areas in Bangladesh. *Environmental Science and Pollution Research*, *27*(7), 7439-7452.

Rahman, A., Zhu, N., Islam, M. D. I., Anny, S. A., Afroj, M., Sarker, M. N. I., & Islam, M. W. (2022). Factors Influencing Farmers' Awareness and Risk Perception of Environmental Degradation in Bangladesh. *Polish Journal of Environmental Studies*, *31*(2).

Shawon, Noor-A-Arefin and Prodhan, Md. Masudul Haque and Khan, Md Akhtaruzzaman and Mitra, Sandip, Financial Profitability of Small Scale Shrimp Farming in a Coastal Area of Bangladesh (April 16, 2018). J Bangladesh Agril Univ 16(1): 104–110, 2018, Available at SSRN: https://ssrn.com/abstract=3172761

Shawon, N. A. A., Prodhan, M. M. H., Khan, M. A. and Mitra, S. (2018). Financial profitability of small scale shrimp farming in a coastal area of Bangladesh. *JBangladesh Agril Univ* 16(1): 104–110. Department of Agricultural Finance, Bangladesh Agricultural University, Mymensingh.

Toma, N. & Islam, M. & Islam, M. & Sultana, Razia & Islam, Syful & Alam, M. (2019). An Economic Study on Shrimp Production and Value Chain System in Khulna District of Bangladesh. Asian Journal of Agricultural Extension, Economics & Sociology. 1-8. 10.9734/ajaees/2019/v35i330224.

TrienekensJ. H. (2011). "Agricultural value chains in developing countries a framework for analysis", International Food and Agribusiness Management Review, Vol.14 No.2, pp.51-83

Uddin, M. H. (1995). An economic study on shrimp farming in some selected areas of Khulna and Satkhira district. M.S. Thesis. Submitted to the Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.

UNIDO, (2016). Pro-poor Value Chain Development, 25 Guiding Questions for designing & Implementing Agroindustry projects.

WB World Bank. (1994). Bangladesh. Shrimp Culture Project, Project Completion Report, South Asia Regional Office, Washington D.C

Yasin, H.M. (2016). "Sea Food processing industry: a tale of white gold from Bangladesh", Business review, Vol.12 No.3,pp.1-10.

APPENDIX

Department of Agribusiness and Marketing

Sher-e-Bangla Agricultural University

DHAKA-1207.

An interview schedule for a research study entitles

Questionnaire for shrimp farmers in Khulna District, Bangladesh

An analysis of shrimp value chain and identify the risk management adoption behavior amid value chain actors in some selected areas of the khulna district.

Serial No……

Respondent Name:

Village:

Upazila:

District:

Mobile No:

(Please provide the following information. Your information will be kept confidential and it will be used for research purpose only)

1. Age

What is your present age?.....Years

2. Education

What is your level of education?

a) Illiterate…… b) Can sign only …… c) Have passed class……

d) I took non-formal education……weeks/months/years

3. Family size

Please mention the number of your family member

a) Male…….... b) Female… Total……

4. Experience in shrimp cultivation----------years

5. How many hectares are you farming? ……

6. Total income/year……..(we ask this question at the end naturally, we need it to measure risk management capacity if farming is in danger)

6. You are farming under which mode

- □ Intensive mode
- □ Semi-Intensive mode
- □ Extensive mode

7. How long is your culturing duration? ……

8. When does it begin and end? …….

9. From where do you buy your seeds? …….

10.Why do choose those seed suppliers? ……

- □ For lower price
- □ Higher quality
- □ Near your farm
- □ Other reasons

11. To whom do you sell your shrimp?

- □ Processor
- □Local market
- □ Middle men
- □ Others

12. How much (%) do you sell to each buyer?

- □ Processor
- □ Local market
- □ Middle men
- □ Others

13. What problem do you face while doing shrimp farming?

……

Problems	high	medium	low	Not at all
Unavailability of virus-free seeds				
Lack of water treatment facilities				
Capital shortage				
Natural calamities				
Disease of Shrimps				
Lack of bio-security				
Difficulties to controlled due to large area				
Preservation problem				

Some others problem…….

Are there any techniques you follow to reduce the impact of the problems?

……

14. Do you apply for loan from bank?

□ Yes □ No

15. Do you learn culturing techniques and disease tackle techniques before starting your business?

□ Yes □ No

If yes, from where do you learn this? …….

16. Is there any scientific paper from which you are benefitted?

□ Yes □ No

17. Do you have any help/support from processor?

□ Yes □ No

18. Do local government/NGO offer any aid programs to farmers?

□ Yes □ No

If yes who are they? ……..

19. Do you look for market information associated to your business?

□ Yes □ No

If yes, where can you find the information that you need?

□ Print media □ Electronic media □ Other farmers □ Other source

20. 16. Do you have to comply with any regulations during your shrimp farming?

……

21. Costs and earnings

Area ……. Hectare

Items	Unit	2021		
		Price	Quantity	Total

Year	2021
Harvest	
Farm-gate price	

22. Why do you sell your harvest to middlemen?

……

23.Do you face any risk while shrimp farming?

If yes, then which kind of risk are you facing…

- Man made risk (Categorize the risk if find the data)
- Natural /Climate Risk

What types of climate risk?

flood	saline water	less availability of water	something else's and what are that

- how do you reduce/manage risks? ……
- what do you think about what will be the recommendations to these problems?
- What do you think about strength,weakness,opportunities and threatsin shrimp farming

  ……

- What are your activities in shrimp value chain?
- What is the risk factor affecting value chain?
- What are the risk mitigation technique adopted by you?
- Are you satisfied with the mitigation technique……If not then why?

Questionnaire for wholesaler in Khulna District, Bangladesh

1. How long have you been doing such kind of business? …….

2. While doing your business, what kind of problems are you facing?

…….

3. What are the regulations that you have to comply with to run the business?

……..

4. Where do you sell your products?

 Processor Another agent

How much (%) do you sell each type of buyers?

 Processor Another agent

5. Costs and earnings

Purchasing price of shrimp	2021

Selling price of shrimp	2021

Added costs	Amount
	2021
Ice	
Labor	
Total	

6. Why do you think farmers prefer to sell their harvest to you than to processor?

7. What problem do you face?

Problems	High	Medium	Low	Not at all
Inadequate capital				
Lack of knowledge of using ice				
Lack of knowledge of grading technique				
Electricity problems				
Highly competitive market				

Any others problem…….

8. Are there any techniques you follow to reduce the impact of the problems?

…….

a) 9. What do you think about strength, weakness, opportunities and threats as an actor of shrimp value chain?

…….

9. What are your activities in shrimp value chain?

Questionnaire for commission agents in Khulna District, Bangladesh

b) How many wholesalers do you control?

c) What kinds of problems do you face?

d) How much do you earn from this business?

e) What kind of problems faced by you?

f) Do you follow any technique to manage the problems?

g) What do you think about strength, weakness, opportunities and threatsas an actor of shrimp value chain?

h) What are your activities in shrimp value chain?

Questionnaire for processor in Khulna district, Bangladesh

1. Who are working as your shrimp suppliers?

□ Farmers □ Middlemen

How much (%) do you normally buy from each type of suppliers?

2. Why do you prefer to buy more shrimp from middlemen than from farmers

……

3. To whom do you mostly sell your products?

□ Exporters □ Supermarkets □ Others

4. What are the steps of processing raw shrimp into final products ready to export?

1	
2	
3	
4	

5. Do you face any kinds of difficulties during your activities?

……

6. What kinds of regulations/terms and conditions that you have to follow in your work?

Regulations	Issued by

7. Do you know where your products are export?

8. What kinds of problems faced by you?

…….

9. Do you follow any technique to manage the problems?

10. What do you think about strength, weakness, opportunities and threats as an actor of shrimp value chain?

11. What are your activities in shrimp value chain?