A Value Chain Analysis Approach to Value Creation for the Shrimp Industries in Bangladesh

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ABSTRACT

Since 1990, industrial changes have been taken in the agro-food chains which changed the food industry process from firms to business. The result of globalization has brought the opportunities for the developing nations to offer their agro-food products to the global consumers. Exporting shrimp products from Bangladesh is such a global commodity that starting from pond to plate via a diverse chain. The standard chain and analysis of those chains unlock the value and ensure the value creation activities in the shrimp industries. Considering that business marketing has been paying attention to the creation of value. For creating value, value chain analysis (VCA) is a way of understanding the creation throughout a vertical configuration. The key to value creation in shrimp industries is value chain analysis, developing standard value chain, guidelines for rapid appraisals of shrimp products chain performance, value co-creation with the consumers, e-traceability for the quality and safety, knowledge creation in shrimp industries, well marketing strategy with the consumer segment and others. Many studies identified that unlocking value through analysis, tracing the product information through technology, managing knowledge for both stakeholders and firm people; inviting farmers and consumers in the production process and applying modern technologies convert the challenges into opportunities in the shrimp industries.

For the present study, we have empirically examined the value chain of shrimp industries with the help of Porter (1985) value chain and focused how the value chain activities facilitate the value creation through the analysis of the chain actors. We have conceptualized the e-traceability for the value creation activities in shrimp industries. We have also empirically examined the knowledge creation activities in the shrimp industry and utilized Nonaka and Takeuchi (1995)'s SECI model for mapping out the FIQC activities. For examining and exploring the value chain and knowledge creation activities, we have conducted two interviews with the shrimp processing plants and FIQC people. The methodology employed was a combination of qualitative and quantitative approaches.

The study found that poor transportation, communication gap between the stakeholders, shortage of raw shrimps, manual processing of shrimp products, less variety of value added products and lack of quality standard are the areas where shrimp industries were suffering. It was found from the study that some of the primary and secondary activities of shrimp industries did not mapping with the Porter's framework. Based on Porter's framework, the study suggested that by analyzing and synthesizing those gaps can lead the firm to offer more value and competitive advantages. In the knowledge creation activities, results show that the Bangladeshi FIQC officers are actively involved in facilitating knowledge creation and sharing initiatives with the farmers and firms people. By doing their daily visits to processing plants, discussion with the colleagues, informal discussion, maintaining meeting memo, formulating national policy and storing all information in the databases they are continuously creating knowledge for the shrimp industry.

FIQC officer works as intermediaries between the farmers and firm people in terms of providing shrimp production, certification and others export oriented support. For the traceability area, shrimp industries in Bangladesh do not have any e-traceability system. Considering the technology and process, industry people have lack of clear knowledge as how to apply e-traceability in the industry. For the present study, we have conceptualized one framework of e-traceability for the value creation in shrimp industries. By offering e-traceability, Bangladeshi shrimp industry will gain the consumers and buyers trust.

Finally, we have come up with a framework where we have focused how the value chain, knowledge creation and e-traceability facilitate to value creation in the shrimp industries of Bangladesh. We found that analyzing the chain with the primary and supporting activities, conceptualizing the e-traceability system and creating new knowledge leads to offer more value creation in shrimp industries. The new value can be in the form of opening new market, gaining competitive advantages, consumer satisfaction, increasing exports and more profits in the industry. Lastly, we discussed the limitations and put some directions for the future works of this study. While there has been a very few studies on value creation of the shrimp industries in Bangladesh, the result of the present study will support to unlock the gap and offer new strategies for value creation. Apart from value creation, stakeholders, firm people, and other patrons of shrimp industries in Bangladesh will be made aware of the effect of value chain, knowledge creation and e-traceability. This study will bring many unattended topics of shrimp industries to open a debate and academicians/researcher/firm people will come forward to work on it.

Keywords
Value chain analysis (VCA), shrimp industry, knowledge creation, e-traceability, FIQC.

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List of Abbreviations

AIN	Aquaculture for Income and Nutrition
ASC	Agriculture Supply Chain
BAP	Best Aquaculture Process
BBQ	Barbecue
BF	Block Frozen
BFFEA	Bangladesh Frozen Foods Exporters Association
BFQ	Better Fisheries Quality
BQSP	Bangladesh Quality Support Programme
DBE	Digital Business Ecosystems
DD	Deputy Directors
DIKW	Data Information Knowledge Wisdom
DNA	Deoxyribonucleic Acid
DoF	Department of Fisheries
DTC	Development Technical Consultant
EC	European Commission
E-traceability	Electronic traceability
EM	Emerging Markets
EPCIS	Electronic Product Code Information Services
ESE	eServices Everywhere
EU	European Union
FAO	Food and Agriculture Organization
FM	Farm Managers
F2F	Face to Face
FCV	Food Consumption Value
FDA	Food and Drug Administration
FGD	Focused Group Discussion
FIQC	Fish Inspection and Quality Control
FRSS	Fisheries Resources Survey System
GAP	Good Aquaculture Practice
GAqP	Good aquaculture practice
G-D Logic	Good-Dominant Logic
GDP	Gross Domestic Product
GMP	Good Manufacturing Process
GST	Gulf Seafood Trace
HACCP	Hazard Analysis and Critical Control Points
HLSO	Headless Shell on
HOSO	Head on Shell on
ICT	Information and communications technology
IQF	Individual Quick Frozen

ISO	International Standard Organization
IUCN	International Union for Conservation of Nature
KM	Knowledge Management
MDGs	Millennium Development Goals
MFCA	Ministry of Fisheries and Coastal Affairs
MOFL	Ministry of Fisheries and Livestock
MRQ	Major Research Question
MT	Metric ton
NGO	Non-Government Organizations
NORAD	Norwegian Agency for Development Cooperation
NRCP	National Residue Control Plan
PSO	Principal Scientific Officer
QR	Quick Response
RCA	Regional competent authority
RFID	Radio-frequency identification
R & D	Research and development
SaFaL	Sustainable Agriculture, Food Security and Linkages
SECI	Socialization, Externalization, Combination, and Internalization
S-D Logic	Service-Dominant Logic
SRQ	Subsidiary Research Questions
SSOQ	Shrimp Seal of Quality Organization
SWOT	Strengths, Weakness, Opportunities and Threats
TQM	Total Quality Management
UN	United Nations
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USA	United States of America
USAID	United States Agency for International Development
VCA	Value Chain Analysis (VCA)

Chapter One: Background & Introduction

1.1 Background of the study

Changes of agri-food chains have been occurred since 1990's which have transformed the agri industries in many ways. These transformations have changed the industry stakeholders, farms, processing plants and other actors of these industries which lifted the millions of people's life in many ways. Like the other industry, this transformation has also taken place in the shrimp food industry which changed the food industry process from farms to business (Islam, 2008).Among the shrimp exporting countries in the world, Bangladesh is one of the most important suitable regions for fisheries which have the world's largest flooded wetland and the third largest aquatic biodiversity in Asia after China and India (Shamsuzzaman,*et.al.*,2017).Countries like Bangladesh, this industry have important contribution in the national economy. Considering to food consumption, nutrition, employment and export, this industry's contribution is substantial (Islam, *et. al.*, 2014). Bangladesh similarly, this industry faces challenge with number of barriers that are hindering growth. The linkages between various shrimp value chain actors, such as producers, processors and exporters, are fragmented. It is affecting product quality and decreasing the competitiveness of the sector (Oxfam, 2018).Moreover, lack of raw shrimps, limited access to financial resources and global market, safety and hygiene issues in the products, traceability problems, demand of value added products, insufficient marketing and promotional activities, and various preconditions of importing countries hinder the growth of this industry in Bangladesh (Nabeshima, 2016).For example, many courtiers like the United States, European Union (EU) and Japan have their own processing plants in the exporting countries. They allowed products to be imported by examining in these certified plants.Sea food particularly in the shrimp industry, farmers, processing plants, nationally and internationally consumers, buyers and supermarkets in many advanced and developing countries have been playing major actors in food chain (Reardon *et. al*., 2003). It is widely recognized that chain of shrimp products consumption have followed these changes over

the past few decades (Willer and Yussefi, 2011).The result of globalization has created the opportunities to lead the developing nations to offer their sea food products to the global consumers.

Nowadays, shrimp industries in developing countries are witnessing clear transformations due to changing the demand and need of global consumers and their food habits, imposing different safety regulations, limited access to global markets and so on. Transformation is leading towards changing the nature of shrimp industries as well as challenges. The undergoing changes occur in the format of value chain, value added products, HACCP, traceability and global competitions. Apart from these changes, shrimp industries around the world are facing many challenges in maintaining safety and quality issue, disease, production costs, international trade barriers and products quality control has become the biggest challenge facing the world's shrimp industry. So, how can shrimp industries address this and can create more value for their consumers? To answer this, we have taken analyzing the value chain activities, traceability and creating new knowledge through which shrimp industries can overcome these challenges and create value. Firstly we will focus on value chain analysis.

Various activities like value chain analysis (VCA), value addition, value co-creation with the consumers, Hazard Analysis and Critical Control Points (HACCP), traceability, maintaining safety regulations, marketing and standard processing of products facilitate the value creation which is widely discussed in many literatures. Many studies in the field of organization, strategy and operations management noted that value creation as a process that improves competitive advantages and carry out to create potential value. At present in the business to consumer market, creating value and pro-environment for value creation is crucial importance for the success of a firm (Lindman, *et.al*. 2016). In a firm or organization, it must adopt a set of activities/chains that are essential for the consumers, meet the consumer needs so that consumers are willing to pay for the value. Value chain is a way of understanding the creation of value throughout a vertical configuration (Stabell and Fjeldstad, 1998).Gertner (2013) noted that "value chain analysis (VCA) is a powerful instrument for the company to identify its core activities as having the potential to accomplish competitive priority and create superior performances. P1" It has been used as a

powerful tool for management to unlock the value of firms that open the way to create more value.

In shrimp industry, value creation is a set of activities that a shrimp firm performed to design, produce, market and delivers valuable shrimp products to the market.All these activities can be represented using a value chain. Here value is created by acquiring raw materials and using them to produce something useful to the consumer. The more value a shrimp firm creates, the more profitable it is likely to be. And when shrimp firms provide more value to their consumers, it builds competitive advantage (Porter, 1985).Configuring value by maintaining standard activities are vital for competitive advantages (Stabell and Fjeldstad, 1998). If the chains and activities run efficiently, the company gains profit and consumer gets more value from the products.The standard chain of the shrimp products ensure the value creation and help the global consumers to choose the products. As a global commodity, shrimp exporting process reflects the whole chain i.e., pond to plate via a diverse chain. Alam, *et. al.*, (2012) identified that shrimp farmers, aratdar, paiker, retailer and consumers are the five intermediaries in domestic supply chains; shrimp farmer, aratdar, retailers and consumer are the four intermediaries in local market and three overseas supply chains are identified for the shrimp marketing. Three overseas supply chains are namely the suppliers, processing plant and overseas consumer.Like other business industries, new product development, value creation and satisfaction of consumers depend on farms ability, examining value chain to find the gap, creating new knowledge, availability of tangible and intangible resources and management support. For the present study, we have focused only the processing plants of the overseas supply chain. To create more value, industries need to analysis the value chain activities based on the standard chain offered by Porter (1985).

Secondly, understanding what drives value for consumers, knowledge creation and traceability facilitate to create value for the consumers and industries. Malik and Malik (2008) discussed that to create new value, farms must create new knowledge through their research and development department. Therefore, it is critical for the farms to identify their knowledge assets and have the ability to leverage them.Based on Kaplan *et.al*, (2001)'s work, we can say that shrimp farms must be able to create new knowledge by combining

knowledge with the different activities and knowledge with resources, as well as change internal processes and structures. In shrimp industries, knowledge creation can begin with socialization by the government agencies and shrimp farm industries.Learning of individuals can transfer to groups and from groups to farm to harvest value creation in industries. Lee and Yang (2000) introduced the knowledge value chain model under the knowledge framework. They showed how KM guides the way a corporation performs individual knowledge activities and organizes its entire value chain. They suggested that corporate organizations may offer more value if they perform discrete activities under the knowledge value chain framework. Like knowledge creation, it was noted a food traceability system that provides detailed information on food production, processing, transfer, and distribution can create value in food exchange. Chang, Tseng & Chu (2013) discussed that global consumers are more aware of the food safety issues after the outbreaks of mad cow disease. Consumers become more concerned with the quality and safety of the food they eat. They identified that traceability and value creation has the relationship. Consumers care more for food that have food traceability labels. Consumers want to obtain sufficient information on the food before purchasing. To create value in food exchange, firms have begun to pay attention to the emerging issue of food traceability (Lupien, 2005). In the shrimp industry, shrimp products traceability influences the global consumers to buy the products that create value for the industry. Deploying traceability systems can improve food safety by enabling firms to identify and resolve food safety or quality problems (Chryssochoidis *et al*., 2009). Thus, an optimalfood traceability system can create food exchange value for consumers.Although Bangladesh has traceability system that is accepted by the EU commission, this system is not yet operating optimally. The large number of small-scale farmers makes it very difficult for Bangladesh to guarantee full traceability.

While there have been limited studies on value creation through traceability in food industry (Chang ,Tseng & Chu, 2013;Chryssochoidis *et. al*., 2009); role of seafood traceability in entire value chain perspective (Sterling, *et. al.*,2015); sea food export from Bangladesh and current status of traceability (Kabir, 2013); knowledge value chain model in corporate industry (Lee and Yang, 2000); Knowledge and value creation in professional service firms (Løwendahl, Revang and Fosstenløkken,2001) and role of knowledge in value creation

(Möller & Svahn, 2006), none have combined knowledge and traceability for the value creation in the context of shrimp industries in Bangladesh.Similarly, the extant literature is yet to provide empirical evidence linking value chain analysis with value creation in the shrimp industries in Bangladesh. Considering this, the present study investigates the role of VCA, traceability and knowledge for value creation in shrimp industries.

1.2 Statement of the problem

In shrimp firms or industry, shrimp value chain examines the full range of activities of the products which are needed to bring the product from its conception, through the different phases of production and delivery to final consumers. In Bangladesh, value chain and understanding how shrimp firms create value are still in the nascent stage. Analysis of value chains requires detailed micro-level data, which are not available in Bangladesh and are often difficult to obtain in most countries (Alam, *et.al*., 2012).Although the exportation and cultivation of shrimp in Bangladesh has been rapidly expanding for the last two decades, difficulties remain to adopt a standard value chain. The constraints are the lack of standard chain and skilled labor force, proper handling of shrimp from pond to processor, lack of traceability, lower level of production and services, lower quality, delay deliveries and shortage of raw materials. Murray and Little (2016) noted biosecurity investments & exclusion of smaller farmers, market failures at processor level, lack of proper finance, the poor linkage with EU & other buyers are the challenges that Bangladeshi shrimp industries are facing. In case of market access, as a developing country Bangladeshi shrimp products do not get automatically market access to the global markets. Moreover, comparing with other exporting countries, branding and marketing are not in a good position.To address these challenges and overcome the limitations, Bangladeshi shrimp industries need to focus standard value chain, stimulate the knowledge creation activities and give priority to the traceability areas. Shrimp industries should think of value creating strategies by developing a robust and holistic approach that addresses major actors in the chain processing plants/firms, people and traceability.For these purposes, industries need to follow standard chains to provide quality products to the consumers and need to embrace a scenario where knowledge is created within the industry. We believe that value creation strategies by chain

analysis, knowledge creation and traceability can lead to a stronger relationship between the industry and its consumers, a more agile way of working and a cycle of offering quality products for the global markets.Combining these three constructs in the shrimp value chain, for the present study we frame the problem from theoretical view of applying VCA, knowledge creation and traceability can lead to quality products in shrimp industries.

1.3 Objectives of the study

For the shrimp industries to remain relevant to its local and international consumers, they must offer innovative shrimp products. Industries must work actively to create value for their consumers (Ferdous and Ikeda, 2015). Analyzing value chain, creating new knowledge for the different stakeholders in industry and maintaining traceability for the quality and safety shrimp products are some of the factors by which a firm can create value for their consumers. Considering these factors, the present study has focused the following major objectives;

- To build a theoretical model for the value creation of the shrimp industries in Bangladesh.
- To put some recommendations for the implication of this model in the shrimp industries.

1.4 Research questions

To address these objectives, we have formed one major research question (MRQ) and three subsidiary research questions (SRQs) which helps to find the way of the proposed research.

MRQ: What is the role of value chain analysis (VCA) for facilitating value creation in the shrimp industries?

SRQ1: How does shrimp industry perform the value chain activities?

SRQ2: How does e-traceability effect value creation in shrimp industries?

SRQ3: How is knowledge created in shrimp industries?

1.5 Significance of the study

In Bangladesh, shrimp is one of the most leading export products and this product has the plenty of demand in the international market. As a shrimp exporting country, Bangladeshis

blessed with pro-environment for the shrimp cultivation and amiable for shrimp production. Shrimp farming is growing in Bangladesh due to suitable agro-climatic conditions, cheap labor force, international donor agencies, adequate water resources and the involvement of multinational corporations (Paul and Vogl, 2011).However, the industry is fighting with many obstacles at present.The problem of Bangladeshi shrimp industries are lack of standard value chain activities which relates with the inefficient management, high mortality rate, low quality shrimp, processing plants problems and lack of awareness. Moreover, lack of traceability, almost non-existent of knowledge creation (research and development endeavors) and lack of coordination with the different stakeholders reduce the possibilities of expanding this industry. Maintaining a standard value chain and analysis of those chains, following the traceability and research or knowledge creation activities can bring the new opportunities which can unlock to create values for industries. Though exploratory and qualitative in nature, the present study has revealed the areas that value chain analysis, knowledge creation and traceability have positive effect on value creation by theoretically and later empirically. If the Bangladeshi shrimp industries follow the Porter's (1985) value chain, identifying the gap and create new knowledge to fill up those gaps and follow the traceability system, industries will take a strong position in the global market. The result of the study refers that the more value Bangladeshi shrimp firm creates, the more possibilities they have to offer better products to the consumers. The present study also focused how the firm managers perceive value chain, knowledge creation activities in firm and existing status of the traceability of the shrimp industries in Bangladesh. Value chain analysis in shrimp industries is useful which excel the firm's ability to understand and optimize the activities that lead to create more value to firms and offer better products for the consumers. The proposed framework for this study will bring certain benefits and lead to offer better products and competitive advantages for the firms. This study helped raise awareness of the role of value chain analysis, knowledge creation and traceability in the shrimp industries in Bangladesh.One of the most important parts of this study is to examine the Porter's (1985) value chain where relatively few researches have been conducted. Based on the Porter's (1985) work, analyzing the primary and secondary value chain activities, a firm can ensure the value creation and competitive advantages. Based on SECI model given

by Nonaka & Takeuchi (1995), this study also focused how the FIQC officers create knowledge for the shrimp industries. Finally, it focused the existing status of traceability and proposed an e-traceability framework for the shrimp firms in Bangladesh. The proposed model based on value chain analysis, knowledge creation, and traceability could help both academicians, practitioners, industry people and other stakeholders to advance understanding of the relationships between VCA, knowledge creation and traceability in shrimp industries. As a result, the present study is significance to industry people and other stakeholders in shrimp industries for creating value in their products.

1.6 Research methodology

For the present study, we used mixed method approach to address the different research objectives and questions. We have chosen the qualitative email and face to face interviews, observation in some cases and theoretical reasoning. The methods employed in this study include the following:

1.6.1 Document analysis

For the value chain analysis (VCA), traceability in shrimp industries and knowledge creation activities, substantial amount of literatures have been studied in depth. Different online databases, relevant websites, brochures, office records and organizational information have been analyzed to get the key aspect and statistical information for this dissertation. The objectives of this document analysis were to get the theoretical framework and exploring the different VCA frameworks in shrimp industries. Moreover, we have examined and reviewed different VCA, traceability and knowledge creation frameworks to come with the theoretical framework for this study. This document analysis was also used to designing the questionnaires for this study.

1.6.2 Qualitative and quantitative approach

For the present study, we used mixed method approach. We had to rely on this methodology because of collecting, analyzing and integrating data were both qualitative (open ended) and quantitative (closed ended) in nature. In chapter three and five, to

examine the value chain analysis and knowledge creation activities in the shrimp industries, we relied upon the qualitative method for collecting data.

In chapter three, for the value chain analysis, we relied upon the exploratory qualitative research approach with semi-structured questionnaire. In depth, semi-structured interviews were conducted with the shrimp industry managers for getting a deeper understanding of the chain. It gave a better insight into the process we were studying. Merriam noted that, 'Qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of their work and the experiences they have in the world' (Merriam, 2015, p.6).Maxwell (2012) maintains that qualitative research is useful to understand the experiences of participants, the context in which they act, the influences on their behavior and the processes surrounding their behavior.

In chapter five, for the knowledge creation activities in shrimp industries, we also relied on the qualitative method for collecting data. Questionnaires with both open and close-ended questionswere sent to the Fish Inspection and Quality Control (FIQC) officers who were working in the FIQC officevia e-mail. For gaining the more responses, personalized individual e-mails with a link to a web-based questionnaire (including informed consent) were sent out to the FIQC people inviting them to participate in this study.

1.6.3 Theoretical approach

In chapter four, we used theoretical approach for conceptualizing the e-traceability framework for the shrimp industries in Bangladesh. We did not depend upon an experiment, manipulation of variables or empirical evidence. We generally did observation and study in depth of the e-traceability framework of shrimp industries in different countries.

1.7 Terminology

Aquaculture: The term ‘aquaculture’ relates with fish, shrimp, oyster and other aquatic farming. It implies cultivation of aquatic species under the controlled environment. For the present study, we use the term as shrimp farming.

Value chain: Porter (1985) first used this concept in his famous book 'Competitive Advantage: Creating and Sustaining Superior Performance'. He defines value chain is a set of activities that a firm operates to perform in order to deliver a valuable product or service for the market. For the present study, we have showed the shrimp value chain where focuses how shrimp is farmed, processed and exported by the shrimp industries in Bangladesh.

Value Chain Analysis (VCA): VCA is a process where a firm put emphasis on its primary and support activities, then analyze these activities to unlock the value or find the gap which creates value to consumers or the organization.

Traceability: Traceability is the capability to trace something. In shrimp industry, it is the ability to verify the history and location of shrimp products. In shrimp traceability, shrimp products can be traced from farmer to collection centre to processing from hatchery to harvest. Under this system, consumers of shrimp products can trace the origins of what they are eating back to the producer.

Knowledge creation: The ability to create new knowledge is often treated as the heart of the industry's competitive advantages. For the present study, we used the SECI (socialization, externalization, combination, and internalization) model of Knowledge creation given by Nonaka & Takeuchi (1995). We explain that how tacit and explicit knowledge of FIQC people and shrimp industry are converted into organizational knowledge.

Shrimp processing plants: Shrimp processing plants are those plants/organizations where raw shrimps are collected from the markets and transformed those raw shrimps into final products. It cleans, processes the shrimp based on their quality, freezing, preserving and adding value to those products in different ways.

Fish Inspection and Quality Control (FIQC): Fish Inspection and Quality Control (FIQC) is a branch of the Department of Fisheries (DoF). The Department of Fisheries (DOF), under the administrative control of the Ministry of Fisheries and Livestock, is a front line government agency focused on fisheries development in Bangladesh. FIQC people inspect the processing

plants, farms and hatcheries, conducted microbiological and chemical test and conducting various training program.

Hazard Analysis and Critical Control Points (HACCP): HACCP in shrimp industries is a systematic process of preventing approach to shrimp products safety from biological, chemical, and physical hazards in the shrimp production processes. These are the steps or procedures which can be utilized for the food safety and reduce the risks factors at minimum level.

Value creation: Creating value is the essence of business. In shrimp industries, value is created through the different activities. For the present study, we refer value creation is a process where shrimp industry benefitted to export their products by maintaining standard value chain analysis, traceability and creating new knowledge in the industry. The purpose of shrimp industry is to create value for consumers purchasing their products, as well as for other stakeholders in the industry who wants to see their stake appreciate in value.

1.8 Structure of the dissertation

The present study is organized into six chapters. The initial chapter of this study sheds light on the research background, problem statement, objectives of the study, research questions, significance of the study, research methods and terminology used in the dissertation. A good number of relevant literature on value chain, value chain analysis, knowledge creation, traceability and value creation have been discussed in the 2ndchapter of this dissertation. In chapter two, it is also discussed the present status of the shrimp industries, its value chain and focuses the shrimp exporting scenarios of Bangladesh. The review proceeds with the shrimp industry, its stakeholders and other actors in the chain process. Finally, we have reviewed the different theoretical lens and framework of the value creation to come up the model of the present study.

In chapter three, we have examined the value chain of the shrimp industries in Bangladesh with the help of Porter (1985) value chain frame work. In chapter four; we have come up with a framework of the e-traceability of the shrimp industries and suggested how to start

this in the shrimp industries in Bangladesh. In chapter five, we presented the result of knowledge creation activities of FIQC officers and showed how they create new knowledge with the shrimp industry. Finally chapter six summarized the findings of all objectives and research questions, and then we constructed a theoretical model. Finally, it is followed by the practical implications, limitations and future work of this study.

Chapter Two: Literature Review

The objectives of this chapter are pointing out the gap in the research and put focus the position of the present study in the context of previous research. This chapter is going to review the existing literatures on the value creation strategies of the shrimp industries globally and then put focus on the shrimp industries in Bangladesh. It address the value chain analysis, traceability, knowledge creation, value co-creation and value adding strategies in the shrimp industries. It also focuses the existing scenarios of the shrimp industries, different stakeholders' position, exporting and other key enabling areas of value creation in this industry. This review focuses on major models and framework relating to value chain analysis, traceability and knowledge creation. After reviewing the substantial amount of literatures, we come up with the theoretical framework of this study.

2.1 Value and value creation in business

Value creation is the core concept in the management and organizational studies. It was well studied in both microlevel (individual, group) and macrolevel (organization theory, strategic management) research. Yet there is little consensus on what value creation is or on how it can be achieved (Lepak, Smith and Taylor, 2007). Value and value creation are the heart of business. Value is an elusive term and the nature of value has been discussed and debated since Aristotle (Vargo, Maglio and Akaka, 2008).In their paper on 'Value and value co-creation: A service systemsand service logic perspective' Vargo, Maglio and Akaka (2008) discussed the two general meanings of value, ''value-in-exchange'' and ''value-in-use'', which are the different ways of thinking about value and value creation.In business, value is determined the extent to which a good or service is perceived by its customer to meet his or her needs or wants, measured by customer's willingness to pay for it. It commonly depends more on the customer's perception of the worth of the product than on its intrinsic value.Anderson and Narus (1998) define value in business markets is the worth in monetary terms of the technical, economic, service, and social benefits a customer company receives in exchange for the price it pays for a market offering. The concept of value is of paramount

importance and numerous studies have demonstrated the key benefits that it can generate for consumers, firms and other stakeholders.

In the traditional conception of process of value creation, consumers were outside the firm. Value creation occurred inside the firm (through its activities) and outside markets (Prahalad and Ramaswamy, 2004). The concept of the "value chain" epitomized the unilateral role of the firm in creating value (Porter, 1985).The relationships between consumers or buyers and industry are the centre to value-creation. Value creation is the ultimate goal of business and business begins with value creation. In industry, creating and delivering value to the markets in efficient ways generate profit for the industry. The purpose of any business industry or firm is to create value through different activities and sell or trade their products to consumers. Verdin and Tackx (2015) defined value creation as the perceived benefit to the customer. They noted it as the utility of a company's offering for its customers. In food industry, it is the work of food industry people who acquire raw materials from farmers, process and deliver the furnished products to their consumers. In this way, industry people participate in value creation, creating value from various resources into something valuable to others.Without value creation, businesses wouldn't be in business at all.

Ulaga (2003) examined the capturing value creation in business relationships from the customer perspective. It was found from the business studies that value creation in buyer–seller relationships is still in its infancy, and a sound understanding of how firms create and deliver value in business relationships is needed. Bröring & Cloutier (2008) shed light on value-creation in the new product development (NPD) projects and they found that buyer-seller relationship is important in new product development. Lindman, *et.al*. (2016) investigated the firm's role in the value creation process. They defined a frame work of value creation. After classifying the chain and activities that firms carry out to facilitate the creation of value, they named the actionable framework as "value space". They discussed that value space is both a practical and theoretically based framework which contributes to the development of a more holistic and "actionable" view on the role of firm in the value creation process. Lapierre (1997) found that providers and organizational customers do not perceive value as a static concept. Author identified that the value definition comprises a

time aspect and is associated with the exchange value during the transaction itself and value in use after the transaction.

Stark and Stewart (2011) focused five steps to creating more consumer value. They have discussed the five steps which starts from understand what drives value for consumers and ends with focus investments on most valuable consumers. They have also discussed the other three factors understand the value proposition, identify the customer segments and create a win-win price. In this write up, it was explored how the customer value leads the growth of business. In the organization level value creation, Porter (1985) explained that new value is created when firms develop/invent new ways of doing things using new methods, new technologies, and/or new forms of raw material.

From the above literatures and studies, we found that value and value creation in business goes beyond thevalue that can be realized through the configurationof the value chain (Porter, 1985), co-creation experiences: the next practice in value creationby the consumers (Prahalad and Ramaswamy, 2004), value creation in e-business (Amit and Zott, 2001),the formation of strategic networks among firms (Dyer and Singh, 1998), or the exploitation of firm specificcore competencies (Barney, 1991),consumer involvement and creating more consumer value (Stark and Stewart, 2011) and value creation by firms (Moran and Ghoshal, 1996).The reviewed literature suggests that no single entrepreneurship or strategic management theory can fully explain the value creation potential of business. Rather, an integration of the received theoretical perspectives on value creation through firms, consumer involvement, formation of networks between stakeholders, chain analysis and management support is needed. Finally, it can be said that value is the potential to serve with the help of firms, consumers, chain analysis and active participations of the other actors of the value chain.

2.2 Value creation in food industry

In the business world, every successful business creates something of value to their consumers. Without value creation, a business cannot exist. The more real value a firm creates for their consumers, the better business will be and the more prosperous offer for

the firm. Lindgreen and Wynstra (2005) present a review of the existing literature on value in business markets, from the perspective of both business marketing and purchasing and supply management. Like the other firms, the agro-food is facing global challenges in all fields of value creation. This continuous pressure strive them in their value creation activities. In food industry; value is captured partly by the firms and partly by the consumers. Toth (2015) identified that value creation through the food chain is always targeting at the final consumer. In food industry, value creation means adding value to a raw product or deliver the products that consumer wants. Creating value in food industry generates more profits which has significant impact on food industries. Offering value to the consumers through their products, firms earn competitive advantages. In food industry, agricultural producers receive a much smaller portion of the consumer's dollar than do food processors, especially processors who produce brand name items (Anderson and Hanselka, 2009).Wilson & Goddard (2004) discussed the limited production capacity, global market forces, technological forces, global cost forces, and socio-political macro-economic forces have contrived to constrain the global marketing opportunities of wine industries in New Zealand. To overcome these barriers and to create and deliver value in the minds of the final consumer, they suggested constructing a conceptual value chain map of the wine industry.

Bourlakis, Maglaras & Fotopoulos (2012) investigate the differences in value outcomes within the Greek food chain by examining its key members and they found that the Greek food chain has still many characteristics of a traditional chain and many improvements are required to reach the "best value chain" status. Vellema and Van Wijk (2015) in their paper focus the partnerships intervening in global food chains and the emergence of co-creation in standard setting and certification. They address the question whether and how multi-stakeholder partnering makes internationally constructed standards fit local institutions. In a case study between the Utz Certified rooibos tea in South Africa and Aquaculture Stewardship Council certified shrimp in Indonesia, they have examined global and local interactions. It was found that co-creation in global value chains is plausible under specific conditions and it can create more value food value chain. Cucagna (2014) analyzed the differences in stages within the agri-food value chain by identifying which firms and actors excel in the value creation process.The modified economic value added, the percentage of

companies that create value and the persistent value creation was the three additional value creation measures. Taking the sample of 454 agri-food companies worldwide, this paper empirically analyzes value creation in the agri-food value chain. The results indicate that agricultural producers the most commoditized sector contribute the least amount of value to the chain, while further processing and retailing contribute significantly higher levels of value.Defining the value net attributes and analyzes the applicability of the value net as a value creation and business model in the food industry, Kahkonen (2012) suggested food sector firms or companies can apply the value net as business model. Various attributes or characteristics were found to be significant and useful for food companies. Moreover, food firms and industries may create remarkable value by utilizing value nets.To define and describe how consumers may take part in firms' value co-creation process in the food and beverage (F&B) industry, Tardivo, *et.al. ,*(2017) noted that by doing increasing awareness activities of the role of consumers by firms can play important role in value creation in food industry. Considering the tough time in the food sectors in Europe, Delivanis (2015) offers six steps to create more value in food industry. These are balance of power, operating profit, latent demand, targeted investment, holistic strategy and link performance to profit growth which can reshape the value creation process in food manufacturing.Introducing the concept of food consumption value (FCV), Dagevos and Van Ophem (2013) refers the FCV consists of four elements. They discussed that product value refers to food's features, process value refers to consumers' interest, location value refers to the setting in which food is purchased or consumed and emotional value refers to feel goods such as experience. This paper was the first exploratory study on the development of the new concept of FCV that examines consumer value beyond tangible product attributes and price.While the rise of value creation in business is well documented, little is knownabout the process by which agri-food supply chains have been configured to create value. A number of studies have examined the dynamics of buyer-seller relationships in agri-food supply chains and the changes in modern food retailing by Toth (2015); Anderson and Hanselka, (2009); Wilson & Goddard (2004); Kahkonen (2012); Tardivo, *et.al.,* (2017); Delivanis (2015) and Dagevos and Van Ophem(2013), these studies tend to overlook the value creation processes in agri-food industries over time.

2.3 Value creation strategies in shrimp industries: Theoretical lens

The value creation strategies for shrimp industries have been the subject of several studies over the years and afew of those studies focus on the present study. Value creation strategies in shrimp firms or industries are complex in nature. It often refers to the value chain analysis (VCA), e-traceability, knowledge creation, value co-creation, business to business relation, offering value added products and competitive advantages. Before focusing the major variables for this study, we begin this section by highlighting the value creation potential embedded inshrimp industries. Our literature review then elaborately focuses on major value creation strategies. For each of these perspectives, we describe the main theoretical approach, expose the main sources of value creation suggested, and discussthe theoretical implications of these major strategies.

Teti, Perrini & Tirapelle (2014) investigated a defined competitive strategy which brings about different value creation levels where value is defined shareholder value and social capital value. They found that different strategies like cost leadership, competitive strategies and standard chain generate considerably higher value for all the stakeholders.Merchant (2014) found three strategies for creating shareholder value for firms who venture into Emerging markets (EMs). In the shrimp aquaculture export industry, Vietnam has achieved the competitive advantages in food safety standards set by the markets. Yoshida (2017) discussed the standard food safety measurement, harmony withthe local buyer-supplier relationship within the industrial cluster and improving the industrial capability that have created more value in this industry in Vietnam. Ongsritrakul & Hubbard (1996) highlighted that Thailand's shrimp export has increased to the EU market and it was all about the consistency of the quality of shrimps, hygiene and standards set by the EU.Ministry of Fisheries and Coastal Affairs (MFCA) in Norway has focused the electronic traceability, efficient management, access to market and research and development areas. These all elements ensure the strategy for a competitive Norwegian aquaculture industry. In a paper, an evaluation of consumers' preferences for certified farmed Atlantic salmon, Haghiri (2014) provided empirical insights about how consumers are interested in consuming certified farm raised Atlantic salmon. Even for having that, they are ready to pay

an additional premium price to purchase the product.Shrimp industries are presently adapting to these new difficulties to survive and grow inthe business and market places. Various commercial business ventures have begun toapply the change programs such as continuous quality improvement, Six-Sigma,benchmarking, quality circle, adoption of ISO 9000 series, TQM and others.

Owusu & Darko (2017) have discussed the application and awareness of TQM in Ghana's aquaculture industry. They found that Total Quality Management (TQM) is a way of guaranteeing high quality products and services in the aquaculture industry and industry can create value by applying it. Identify the level of good aquaculture practice (GAqP) among aquaculture farmers in Malaysia, Kamaruddin and Baharuddin (2015) found that pond management by brackish water fish farmers is better than freshwater fish farmer. They have also found that physical and human assets were one of the most significant factors in the GAqP. GAqP also can create more value by increasing in farmers' household income. Felzensztein and Gimmon (2014) focused on how fisheries industries can improve their long term competitiveness and profitability upon financial pressure.It was found that leadership strategy, customer oriented strategies and focusing environment attributes can ensure the competitive strategies in fisheries industries. For the Sustainable Fish Farming, Waite (2004) suggested five strategies to get aquaculture growth right. He suggested that technological innovation and transfer, focusing beyond the farm, shifting to sustainability, using modern information technology and consuming fish in the food chain can help to grow the aquaculture. In a cross cultural consumers segment in European Union (EU) aquaculture market, Reinders, *et.al.,*(2016) found that involved traditional, involved innovators and ambiguous indifferent are the important elements market positioning strategies for aquaculture products.Dora (2015) noted that for creating value and gaining sustainable competitive advantages for the marine products in Asean Economic Community, industry should focus on SWOT (Strengths, Weakness, Opportunities and Threats) analysis method to get the right strategy for value creation on seafood products. SWOT analysis helps to obtain the information from the analysis of the situation and separating the internal and external issues, identify the weakness and propose for working where it is required. Like other industries, value creation in shrimp industries are related with many factors. It was found

that a comprehensive value creation strategy often aligns broadly under the business strategy, financial strategy, and investor strategy in shrimp industries.

2.3.1 Value chain and value chain analysis (VCA)

Michael Porter (1985) first introduced the concept of 'value chain' in his prominent book "Competitive advantage: creating and sustaining superior performance" where he explained how value is created within organizations. Considering the similarities, for the present study we have used his model in the shrimp industries/processing plants in Bangladesh. The Bangladeshi shrimp industry consists of different stakeholders among them the shrimp processing and preservation plants also known as shrimp industry/company/factory/firm. There are 162 shrimp processing plants in Bangladesh each of them are business organization (Kabir,2013). In the organizational perspectives, Porter explained that a value chain is a set of activities that an organization carries out to create value or add value for its consumers. It provides a systematic way to divide an organization into the activities and examine how the activities are grouped for performing operations. Porter (1985) discussed that value chain activities are performed determines costs and affects profits, so this tool can help understand the sources of value for organization. Using this viewpoint, Porter described a chain of activities common to all businesses, and divided them into primary and support activities. After introducing the concept of value chain in the organizational perspective, it has become useful management strategy for many different industries and business firms. Taking a value chain approach to business firms or industries mean addressing the chain activities, identify the gap and reduce the gap by value adding activities at multiple levels of the value chain. Value chain analysis (VCA) is a continuous process of examining all the activities of value creation that help to identify all the value-creating activities of firms. In other word, VCA is a tool that focuses on the activity links. Porter (1985) treated it as the bridge between both the primary and secondary functions of a department, business unit, or enterprise. Grant (2010) discussed that the goal of VCA is to recognize, which activities are the most valuable to the firm. By looking those activities, the analysis reveals where a firm's competitive advantages or disadvantages are. In general, by undertaking value chain analysis, firms can get benefit from low cost advantage,

differentiation and identification of core competencies and activities. In the whole shrimp sector of Bangladesh only the shrimp processing plants and the FIQC can be defined as organization. In this study, the value chain analysis was applied in the shrimp industries of Bangladesh in which most of them are private organizations of this sector.

For leveraging value, firms need to optimize their value chain activities. Porter (1985) described it as a series of activities (primary & secondary). The primary activities related directly to manufacture, sales and distribution, and secondary activities which support primary activities, such as planning, finance, research and development (R&D) and human resources. Donovan, *et.al,* (2013) present a review of eleven guidelines for value chain along six different dimensions and they build a useful framework for understanding markets and engaging with chain stakeholders. Porter (1985) and Kapilinsky and Morris (2001) discussed how the different phases of chain bring a product or service from conception and deliver to the consumers. Shank (1989) states value chain is value creating activities all the way from basic raw material to deliver products to the consumer. Kaplinsky (2000) identifies value chain is the full range of activities which are required to bring a product or service from conception to delivery to final consumers through the different phases. Trienekens (2011) shows value chain as a vehicle where every steps of business go through from raw materials to the eventual end user. The goal is to deliver maximum value for the least possible total cost. Ferris *et. al*., (2001) explain that value chain aims to provide information on profitability for the various agents along the market chain. Prajogo, McDermott and Goh (2008) found four elements namely marketing, research and development, procurement, and operations of value chain are associated with product quality and product innovation. Fearne, Martinez and Dent (2012) show the operational misalignments and misallocation of resources which proper alignment and allocation with the chain can offer more value and economic sustainability. They propose why and how VCA is needed for the sustainable competitive advantage. Fearne *et al.* (2009) look at the wine value chain in South Australia to The UK the world's largest importer of Australian wine. Along with other key features of this study, they showed the identification of the main activities along the chain, and their contribution towards value creation.

The relation between competences and the value chain is relatively straight forward. Porter (1985) argues that firm's value chain is the sum total of linked activities that firm executes internally to achieve performance. In shrimp firms, performing value chain activities in ways that would give a shrimp firm the capability to gain competitive advantage. Grunert*, et.al.,* (2005) conducted four case studies on value chains within the areas of agribusiness and fisheries. They found that degree of market orientation of value chain is found to be related heterogeneity and dynamism of end users served, nature of chain relationships, regulations and prevailing mental models of decision makers. Short and balanced chains are believed to further upstream market orientation. Hastings, Howieson and Lawley (2016) identified that the business to business relationships in the early stages of the relationship can influence the successful creation of value chains. They were identified that fifteen relational characteristics that facilitate the engagement before initiating the next step in the Value chain analysis process. It was found that pre relationships and early relationships within the value chain provide a strong indication of the chains ability to conduct successful VCA.

In a review paper, Mwirigi and Theuri (2012) looked closely at the key value chain activities of the sea food industry. They identified the gaps that exist in the chain and recommends measures that can be implemented to improve the chains of sea food industry in Kenya. Yusuf & Trondsen (2014) examine what innovation strategies are needed for the Indonesian crab industries. They found that strengthening the value chain position by supplying raw materials, manufacturing facilities and consistency of quality can ensure competitive position. Routroy & Behera (2017) reviewed the Agriculture Supply Chain (ASC) literature along many dimensions. They found that demand forecasting and ASC integration were found to be important areas of ASC, but they were less focused, studied and researched. Howieson (2015) referred value chain analysis (VCA) as a diagnostic tool and applied it in the agri-food chains as a strategic process. Two fisheries completed the revised VCA, and the findings show that a relational approach is crucial in creating value.

Several studies have linked the Porter's work and value chain activities to firm performance (Hines, 1993). However, despite the popular notion that best in industry proficiency in performing value chain activities may yield competitive superiority, empirical work on the role of the different value chain activities is still emerging. Particularly in the food and

shrimp firms, very few studies mapping the Porter's chain activities. A very few research were conducted on marketing and value chain system of shrimp produced in Bangladesh (Islam *et al*., 2014; Islam *et al*. 2016; Roheim, 2008 and Taylor, 2005). This is the first study that has been focusing Porter's chain in the context of Bangladeshi shrimp firms.

2.3.2 E-traceability: Food industry

Nowadays, food traceability has gained importance and has become an important issue in food industry. Various studies have focused and explored the information management, design, architecture, stratification and consumer perception of a food traceability system. In case of food value chain, various quality and safety issues in the chain can influence food value. Consumers are increasingly concerned about what they eat, whether a food is from a sustainable source, whether it is produced using ecofriendly methods, and whether the production, transportation, and storage conditions guarantee food safety (Chang, Tseng and Chu, 2013). Traceability system in food industry indicates detailed information on food production,processing, transfer, and distribution which can add value in food exchange.Considering the importance and value creating strategy, at present many firms have begun to pay attention to the emerging issue of food traceability (Lupien, 2005).Coppens, Silva & Pettman (2006) mention in their paper where the European Union (EU) General Food Law Regulation (No. 178/2002) defines traceability as "the ability to trace and follow a food, feed, food producing animal, or substance through all stages of production and distribution.p.1". As a system, traceability provides supply chain related all information which conveys detailed information of processing, production and distribution (Schulz and Tonsor, 2010). Canavari *et al.*, (2010) treated it as an information management platform which assist global consumers and respective organizations all information from food production to distribution. As a result, the traceability system creates significant incentives for firms to improve food quality. Firms with traceability systems can gain competitive advantages to differentiate themselves from their competitors (Canavari*et al*., 2010). Chang, Tseng and Chu (2013) noted that when a company sells product, traceability offers more detailed information of the products which add value to their products. By doing this; company helps the consumers or buyers to make adequate purchase decision. Many studies found that absent of a proper managed traceability system loss the consumer

trust, a well managed traceability ensures the food quality & reduce uncertainty (Kelepouris*et al*., 2007; Choe *et al*., 2009).

In case of shrimp industries, shrimp products and its system at all levels of the shrimp products chain facilitate the identification (tracing) of all shrimp products, feed ingredients, shrimp products and food input, such as animals, for food use. Therefore, deploying traceability systems can improve shrimp products safety by enabling firms to identify and resolve food safety or quality problems (Chryssochoidis *et al*., 2009).For shrimp food items, the introduction of the traceability system is not currently required but rather the responsibility of shrimp industry. For shrimp products, an effective traceability system refers to track shrimp product one step forward and one step back at any point in the supply chain. It allows consumer to know where their shrimp come from. With this system producers, suppliers, customers and product's records are kept including the name and address of suppliers, description of products, name and addresses of customers and others stakeholders information which are relevant for the system. Djatna & Ginantaka (2014) presented an analysis and design for traceability system of frozen Vanname shrimp based on digital business ecosystems (DBE) model. They showed how traceability system work in digital business ecosystem which involved on dispersed stakeholders. O'Connor (2007) shows how the Thai shrimp exporters use RFID for automation traceability. He also discussed that this RFID technology helps the shrimp companies reduce labor costs, and improve the ability to trace the products. Maralit, *et.al*., (2013) highlighted the importance of increasing national concern and government effort in food traceability. They showed that DNA bar coding provides a robust method of assessment for species identification and authenticity testing of commercial fishery products.The revolution of modern ICT and technological devices have changed and reshaped the modern food supply chains. It has opened many promising business prospects that most deals with the consumers and buyers globally. For many food industries, e-traceability creates "income-centric" values beyond the conventional "traceability-centric" values. For getting the product information, users are ready to pay the extra money (Pang, *et.al*., 2015). In a paper 'Value-Centric Design of the Internet of Things Solution for Food Supply Chain: Value Creation, Sensor Portfolio and

Information Fusion' Pang, et.al. (2015) proposed a value-centric business technology joint design framework.

To ensure continuing access to export markets for Bangladesh seafood, and in particular to the EU, Bangladesh needed a proven traceability system. It is particularly difficult in Bangladesh and other similar shrimp exporting countries, due to the large number of very small suppliers and a complex and irregular system of intermediaries. While in many shrimp exporting countries are working on the standard traceability system, Bangladesh is in a nascent stage. In co-operation with FIQC/DOF and BFFEA, BQSP/UNDP project develop paper based traceability framework and introduced a complete traceability system since 2009 (Alam, 2013). However, there are very few literatures or templates on how this process should be undertaken in the shrimp industries in Bangladesh. A big hurdle in traceability is a lack of clear knowledge as to how to apply these activities to shrimp industries and the set of processes and phases involved.Thus, the present study fills the research gap regarding therelationship between the value creation and traceability in the shrimp industry.

2.3.3 KM and Knowledge creation

In the past few decades, many researchers and practitioners have shown the value of applying knowledge management (KM) in many organizations so as to serve the patron better and to innovate services. Knowledge Management (KM) has been widely accepted in many organizations. KM is a process adopted by organizations both for profit and non-profit to address challenges, increase efficiency and effectiveness, and to achieve organizational goals, by applying various strategies, technologies, and tools in the business process (Abell & Oxbrow, 2001), and by harnessing the knowledge potential of its employees and other resources. Nonaka & Takeuchi (1995) define KM as the capability of "a company or any other organization…to create new knowledge, disseminate it throughout the organization, and embody it in products, services and systems" (p. 3). It is more important for industries to distinguish themselves through KM strategies. Without a constant creation of knowledge, an organization is condemned to poor performance. In organizational perspective, knowledge creation has relations and associations with the KM strategies of the

organization. Applying proper KM strategies speed up the knowledge creation activities and the application of new knowledge enhances the enterprises' competitiveness (Zhuang & Tongxin, 2010). Ability to create new knowledge is the prime source of firms' sustainable competitive advantage (Nonaka *et al*., 2000). Nonaka and Takeuchi (1995) identified the process of knowledge creation activities in Japanese companies where they showed that the mutual conversion and function between explicit knowledge and tacit knowledge in the individual or organization create new knowledge. Lehaney *et. al*., (2004) noted that new knowledge is a key factor in competitive advantages. Creating new ideas and methods refer to market the existing products, upgraded old products and brand new products which altogether lead to value creation for the industry. Creating and transferring knowledge in innovation and product development processes has been becoming an area where many researchers discussed widely in many literatures (Stanica & Peydro, 2016) and (Costa & Monteiro, 2016), For many years, research and development in the food industry has been given priority in many countries. For instance, in the United States, the US Department of Agriculture is the major player in agricultural research (Earle and Anderson, 2001). Apart from that, many United Nations (UN) organizations and agencies are doing research on variety of food industries. Considering the livelihood, farming and fishing are essential for most of the populations in many countries. Zakaria and Nagata (2010) discussed how the Japanese agricultural extension department creates new knowledge and share among the advisors, farmers and other stakeholders. They found that extension advisers work as intermediaries and catalysts between farmers and agencies to create new knowledge.

Boateng (2006) identified how the agriculture extension department in Ghana suggested applying the tacit knowledge for increasing the agricultural productivity. Morales (2007) illustrated how the knowledge creation facilitates to grow organic agriculture in Mexico. It illustrated organic food and its attractiveness of the market change the rural setting by promoting knowledge creation and application in the field. Massa and Testa (2009) applied a comparative case study approach to investigate how two small Italian food producers manage their knowledge. They have found that there is relationship between knowledge management (KM) and competitive advantages in food industry. Like other food industries if

the shrimp industry is to keep producing more and better shrimp quality products for their consumers, industries need to be constantly developing new knowledge and technologies. Many researchers, agriculture specialists and experts on sustainable agriculture have given considerable attention to issues of knowledge management and knowledge creation agricultural areas, but in general they have not engaged particularly in the seafood products like shrimp. While there have been limited studies on the Knowledge and innovation relationships in the shrimp industry in Thailand and Mexico (Lebel., *et.al.,* 2016); Shrimp cultivation and food safety (Ramnauth, Driver and Bhugaloo, 2008); competitive forces and innovation strategies in the Indonesian crab industries (Yusuf &Trondsen, 2014); innovation of marine shrimp seed production and farming in Vietnam (Hai, *et.al*., 2015) and recent technological innovations in aquaculture (Subasinghe, *et.al.,* 2003), we do not have found studies on knowledge/innovation in the shrimp industries of Bangladesh. This exploratory study investigates the role of FIQC in the shrimp industry, how do they create new knowledge for offering new value to the global consumers.

2.3.4 Value co-creation

Value creation is a process in industry whereby products flow from the provider to the consumer in a unidirectional, one way manner (Prahalad and Ramaswamy, 2004). Industry have used the traditional good-dominant (G-D) logic (value-in-exchange) where value is created by the firm in the form of the products it manufactures (Vargo and Lusch, 2004). However, consumers today have more choices of product than before. Therefore, in an alternate service-dominant (S-D) logic (value-in-use), value is created jointly by the service/product providers and consumers through the integration of resources and application of competencies (Vargo and Lusch, 2004). Here, the customer is always the cocreator of value. This interaction between the service/product provider and the customer in S-D logic in a bidirectional process forms the root concept of value co-creation (Vargo and Lusch, 2004).

Value co-creation helps the companies adding value to their products and helps them to reduce the risk. Interaction among all the stakeholders is the prerequisition of value co-

creation (Roser,*et.al*.,2009). Orcik, Stojanova and Freund (2013) cite few examples of value co-creation in food industry. Some of these are;

A. Milk and Yoghurt Packaging

Orcik, Stojanova and Freund (2013) showed an example where a large food company in Serbia 'Imlek' specialized in processing milk and dairy products. For refreshing the best brand 'Moja kravica', Imlek had to gather customers' ideas to get some feedback from the market. The company has challenged its customers to design their own personalized cow and send their designs. Anyone could participate by submitting their own designs or by voting for them.

B. New Ice-Cream Taste

In another example, Orcik, Stojanova and Freund (2013) have showed that Ledo, a Croatian ice-cream and frozen food producer made a platform for co-creation of the new ice cream called "Ledonardo". Customers made different combinations of more than fifty tastes and aromas, and had the possibility to choose from four different ice-cream shapes. Ice-creams were evaluated by customers and the jury. At the end of the contest the most popular ice cream, named 'dream-come-true' was chosen as the best tasted ice-cream. The winning ice-cream is planned to be produced and integrated "voices of the customers" this c-creation contest will represent the inspiration for future products. In this way, company Ledo engaged the crowd of people in the co-creation of new ice-cream, while increasing their devotion to this brand, strengthening customers' loyalty, as well as, attracting potential customers to its products.

For the shrimp companies to remain relevant to its local and international consumers, they must offer new shrimp product and services. It must work actively not just to create value for the consumer, but to involve the consumer in co-creating value for shrimp product innovation in the market (Ferdous and Ikeda, 2015). In shrimp food sector, value co-creation can satisfy the consumers and improve the shrimp industry as well.Considering consumer demand and interests, value co-creationin shrimp food can be performed by offering organic shrimp, ready to cook shrimp or ready to eat/fry/grill, or free from harmful antibiotics, appearance or size limits. The value added shrimp also varied with the different types of cuts which are applied to the product according to buyers wish such as

peeled/deveined/butter fly shape. In restaurants, customer's favorite shrimp products are peeled and deveined shrimp with tails or skewered shrimp. Pre-battered or coated or ready to eat microwaveable shrimp products are very popular in restaurant chains. Shrimp industries have to consider these issues whenthey processed their products. Inviting customers to what kind of food they want, consider customer opinion, create ideas and solutions by themselves for shrimp product development can help for the co-creation of shrimp product (Piller, *et.al.*, 2012).

In a study conceptualization of value co-creation for shrimp products in Bangladesh, Ferdous and Ikeda (2015) came up with a framework of value co-creation for the shrimp industries in Bangladesh. They identified the shrimp industry chain and showed actors are shrimp firming (farm/saline water/marine water), harvesting/collecting shrimp, short time preservation in the firm with ice, middle man (broker), deport,fish processing industry and finally consume locally or export. Ferdous and Ikeda (2015) found that in Bangladesh, industries usually use co-creation as a marketing strategy. They start with their co-creation initiatives when their products are in the final stage for marketing or promoting. They put focus only between fish processing industry and consumers. Ferdous and Ikeda (2015) discussed by utilizing S-D logic, shrimp industries can perform value co-creation activities in the following ways;

A. Breaded, Burger, Coated and Ready Meals Shrimp

In shrimp industry, many forms of consumer involvement for the new shrimp product can be done. To launch a new shrimp product or collect new ideas of shrimp foods, inviting consumers can lead to new opportunities for the shrimp industry. Shrimp industry may invite consumers for ideas like shrimp burgers, shrimp meals and other categories and can get their ideas. Survey, interviewing, ICT tools and different social networking tools can be used as a platform for this contest. Anyone can participate by submitting their own products or by voting for them.

B. Food Safety Standards

For fishery products, there are, for instance, limits on the maximum amount of heavy metals (led, cadmium, mercury), dioxins and dioxin-like polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) (Henson,*et.al*.,2000). Shrimp industry could involve

EU consultants, local experts, and representatives from concerned authority to check certain health and safety requirements before entering into theEU/USA/Japan and others international market. By addressing safety standards properly for the international consumers, shrimp industries in Bangladesh can excel the shrimp products export.

C. Social Media

Shrimp Industry can invite consumers to blog for the shrimp products, and feature consumers active in social media or physically in the market as star users. They can also have competitions inviting video and animation entries to be used in marketing campaigns. Consumers could be involved in creation of logos, photos of shrimp products and other projects.

Ferdous and Ikeda (2015) suggested that by utilizing such approaches, the consumer-industry relationship can be defined through a dialogical, personalized interaction, enabling a joint creation of value (Prahalad and Ramaswamy, 2004). They made a framework which is consisted of two parts. First, the industry part with shrimp value chain at the left part, and second, the consumer sphere with local and international consumers at the right. Co-creation happens in the middle joint sphere, where interaction and encounter processes take place between the company and consumer communities. The focus of the framework is in the middle joint sphere where the industry people and the consumer interact to jointly co-create value. They suggested that shrimp industries must redefine its role, leverage its strengths, focus on user involvement and close the gap between user expectations and the industry's ability to meet them. Knowing the consumers by market research and coming up with strategies for greater consumer involvement would help in there shaping of shrimp product.

2.3.5 Value addition

Adding value to the products is the key concept of business which offers competitive advantages. By offering value added products to the consumers ensure the benefit of the industry. Calvert (2013) noted that creating value is something more than value addition. In this process, first need to identify what would be of value to buyer/consumers and then making ways for that unique value to be realized. She also noted that unlike added value,

created value is original and unique to the one buyer it suits. Peteraf and Barney (2003) discussed the value in a business context. By appreciating or using the product or service, the end user values the consumption. After the consumption, the consumer returns the value by paying to the business firm. The economic value is determined by the subtraction of cost (effort) from the perceived benefit of using the product in question. Perceived benefits can be anything like satisfaction, attraction to the products, excitement or whatever the user gets from the product. Dare, Jönsson & Knutsson (2013) discussed that 'adding' value to raw ingredients (by doing many activities) and processing them in a way that increases economic return. Value adding could be seen as the reinvention of product for economic gain. Tracy (2016) identified that seven factors can add value to the business. He suggested that the seven ways e.g., the faster the better, offer better quality, add value, increase convenience, improve customer services, changing life styles and offer planned discount can faster the value addition process in the industry. Hyde (2008) noted that the largest component of American agriculture was, and is, focused on the production of commodities which are sold from the farm to be processed somewhere else before arriving on our dinner plates.

Considering the industry and consumer interest, adding value in the food industry and various food products has been an important and appealing area. Salin, Atkins & Salame (2002) wrote that 'farm groups want value added to enhance the demand for the commodities they grow, and have viewed value-added processing ventures as an investment opportunity to capture more of the consumers 'food dollar' p.136. Food industries like shrimp, Denmark (2008) discussed that value-added shrimp products can be defined in different ways. He noted that a shrimp farmer can peel a percentage of his crop that is soft-shelled and thus increase its value, rather than decrease income by having to sell the shrimp as a second-grade product.He suggested that to gain value, a shrimp or lobster processor can differentiate its productsfrom those of other producers and present a greater variety to importers. Denmark (2008) brought out some of the value added shrimp products like varied cuts, coated shrimp, ready meals, chemical free, natural or organic product and moisture. He also suggested that apart from adding value to products, product can also be differentiated by its means of culture, such as"chemical-free" or "organic." Considering the

export value, value-added shrimp products are considered to have the best potential for export from developing countries tothe EU, USA, Japan and other importing countries.

Banrie (2013) noted that supplying of shrimp products to EU market, Asia is the major supplier in the shrimp sectors. In the report, it was found that Vietnam, Indonesia, The Philippines, Bangladesh, Pakistan and Srilanka are the major players in Asia. It was found that there are good opportunities for increasing export in the product chains analyzed, but such an increase would require further investment and continuing support (Banrie, 2013). Islam (2008) focused on shrimp chain in Bangladeshi shrimp aquaculture. He identified that shrimp aquaculture in Bangladesh is moving towards a twin-driven commodity chain in which lead firms govern supply network. The Shrimp Seal of Quality Organization (SSOQ), a recently emerged third-party certifier, as well as other environmental NGOs define regulatory aspects of the industry. Now, Bangladesh is exporting various types of value added shrimp products to EU countries, USA, Japan etc. But unfortunately the variety of product is the same like other shrimp exporting countries. The products need to be diverted in many forms so that Bangladeshi shrimp can attract all type of consumers. Cato & Dos Santos (2000) identified that Bangladesh have three types of value added shrimp products Block, Semi-Individual Quick Frozen (head on shell on/head less shell less) skewers and Individual Quick Frozen (IQF). They discussed that upgrading the shrimp processing machine for producing new products and maintaining the HACCP program, industries can add value to the shrimp products.Paul and Vogl (2013) found that Organic shrimp aquaculture has emerged as an alternative farming enterprise for farmers. They concluded that improved livelihoods can be achieved by adopting organic shrimpfarming in Bangladesh. Nuruzzaman (2006) discussed that shrimp processing industry in Bangladesh suffers from various obstacles which has affected its ability to upgrade further to produce more value added items. For that reason, market share of higher value added products is low compare to other countries in Asia.

2.3.6 Market/Consumer segment

Considering the consumer choice, criteria and purchasing capacity, consumer/market segmentation in food industry has been gaining more importance in the food industry. Segmentation of the market along with the standards is helpful to understand the food

markets. A new and more refined segmentation strategies could provide food industries new market. Thomas (2016) discussed the possibility of identifying market segments in multi stage markets. It was identified that market segments could provide a useful managerial approach to find competitive advantage and better understand market opportunities.Analyzing the customers across the multistage markets, author found that it was helpful for gaining competitive advantages in the markets. To determine their attitudes toward organic food consumption, Aslihan & Karakaya (2014) studied the profiles of consumers in organic foods market segments. The cluster analysis performed that there are three segments based on consumer attitudes toward organic foods: favorable, neutral and unfavorable. They found that consumer prefer the organic foods compared to other segments. Organic food consumption is growing at a fast pace despite economic problems around the world. Reinders, *et.al.*,(2016) investigated the possible cross-cultural consumer segments in the EU aquaculture market and provide direction and focus for marketing strategies for farmed fish products.They found different pan-European consumer segments and their characteristics that allow for a corresponding differentiation strategy within the aquaculture industry. Katz & Boland (2000) identified the value added strategies in the beef industry. They explored the cooperative partnership between all segments of the beef industry value chain. They also put focus equally on each segment in beef production and processing. Considering the 'Halal meat' consumption among the Muslim, Ali, Xiaoling, Sherwani & Ali (2017) investigated the Halal meat consumption within international Muslim students in China. Using the theory of planned behavior as a conceptual framework, they found that a positive personal attitude towards the consumption of Halal meat, personal conviction and the perceived control over consuming Halal meat predict the intention to eat Halal meat among Muslims. Polymeros, *et.al*. (2015) investigated the consumers' attitudes and behaviors towards wild and farmed fish.They identified two distinct consumer groups, the low-potential aquaculture consumers and the high-potential aquaculture consumers. The study provides evidence that there is a lesser preference towards farmed fish. Therefore, more efficient marketing strategies are probably needed in order to promote awareness in aquaculture consumption, and potentially contribute in integrity, of the whole sector.

Food industry, particularly shrimp food industry is changing as changes the taste of consumers. This industry needs to stay consumer focused to survive. Market segmentation is an ideal solution to develop customized marketing programs for each segment. While there are studies on market segments in multistage markets (Thomas, 2016); consumers in organic foods (Aslihan & Karakaya, 2014); possible cross-cultural consumer segments in the EU aquaculture market (Reinders, *et.al*., 2016) and Halal meats for the Muslim students (Ali, Xiaoling, Sherwani& Ali, 2017), none of these studies have focused on the shrimp industry and market segment. We have also examined the papers on shrimp industries and consumer segment in Bangladesh; so far we did not find papers on this area.

2.4 Shrimp industries and FIQC: Bangladesh Perspectives

In Bangladesh, Shrimp is known as white gold and it is the second largest export items of Bangladesh. Bangladesh is one of the major shrimp-producing countries in the world. Since mid-1980s, it has been blessed with an advantageous natural setting for shrimp farming and contributes the national economy of Bangladesh (Islam and Bhuiyan, 2016).Considering that many farmers have shifted their lands from rice farming to shrimp farming. The impact of global competition and ecological and managerial changes have forced the small shrimp farmers to restructure their farming plan. This restructuring has changed the local supply chain and many farmers are struggling to survive for the ownership of their farms (Ito, 2004). Traditionally, Southwest coastal Bangladesh is suitable for the shrimp farming. The strategic geographic position brings many opportunities to support fisheries potential. FAO (2016) reported that Bangladesh is ranked 5th in world aquaculture production. Shamsuzzaman, *et.al*, (2017) identified two types of aquaculture such as freshwater and coastal aquacultures are practicing in Bangladesh. Freshwater aquaculture is mainly comprised of pond farming and coastal aquaculture is mainly comprised of shrimp and prawn farming in ghers (coastal pond or enclosures). A total of fresh water species are 260, marine water fish 475 and exotic species are 12. Apart from that 24 prawn species and 36 marine shrimp species have been recorded in the fisheries industries in Bangladesh (DoF, 2017); (IUCN, 2000).

As per the FRSS (2016) information, this sector plays significant role in the national economy. It is contributing to 3.69% to the Gross Domestic Product (GDP) of the country and 22.60% to the agricultural GDP. The overall growth performance from inland aquaculture shows a moderate increased trend. The fish production has increased more than five times 7.54 metric ton (MT) in 1983-84 to 38.78 lakh MT in 2015-16 over the last three decades. Among these, shrimp or prawn production was 234188 MT (2015-2016) and 230244 MT (2014-2015) where the increased growth rate was 1.71% (FRSS, 2017).

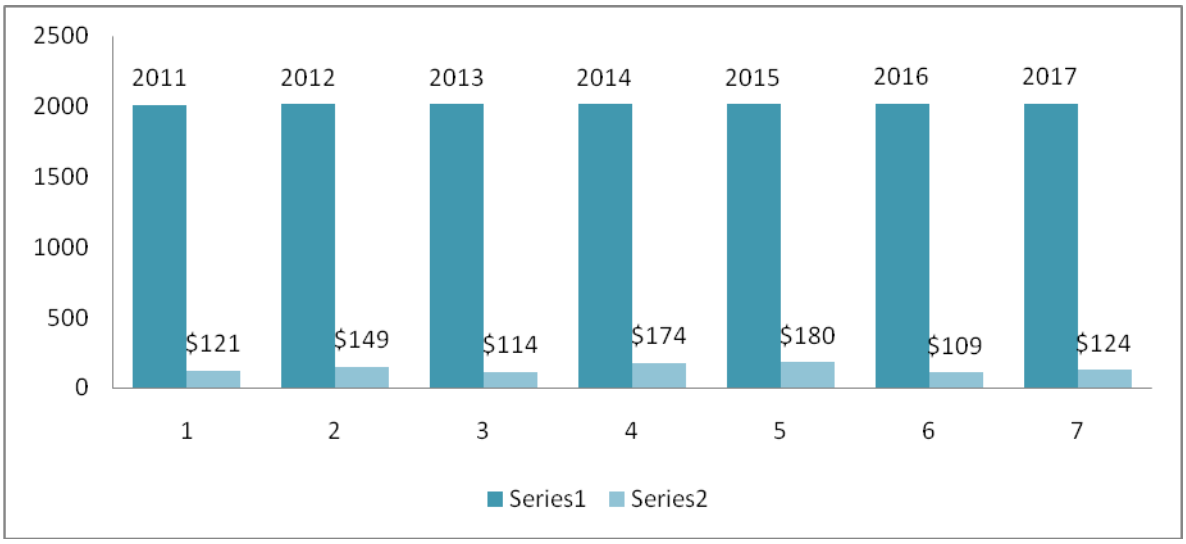

Figure 2.1: Shrimp exports in millions of dollars (July-Sept.) (EPB, 2016)

Bangladesh exports frozen shrimp and other fish and fisheries products to more than 50 countries, including *Belgium, UK*, Netherlands, Germany, USA, China, France, Russian Federation, Japan and Saudi Arabia. Following several macroeconomic hurdles, Shrimp exports picked up in the first quarter of fiscal 2016-17 after remaining on the down turn over the past two fiscal years (Figure 2.1) (EPB, 2016). Seaman and WIetecha (2016) focused that shrimp production in Bangladesh is set to grow over the next few years, passing 100,000 metric tons by 2018.

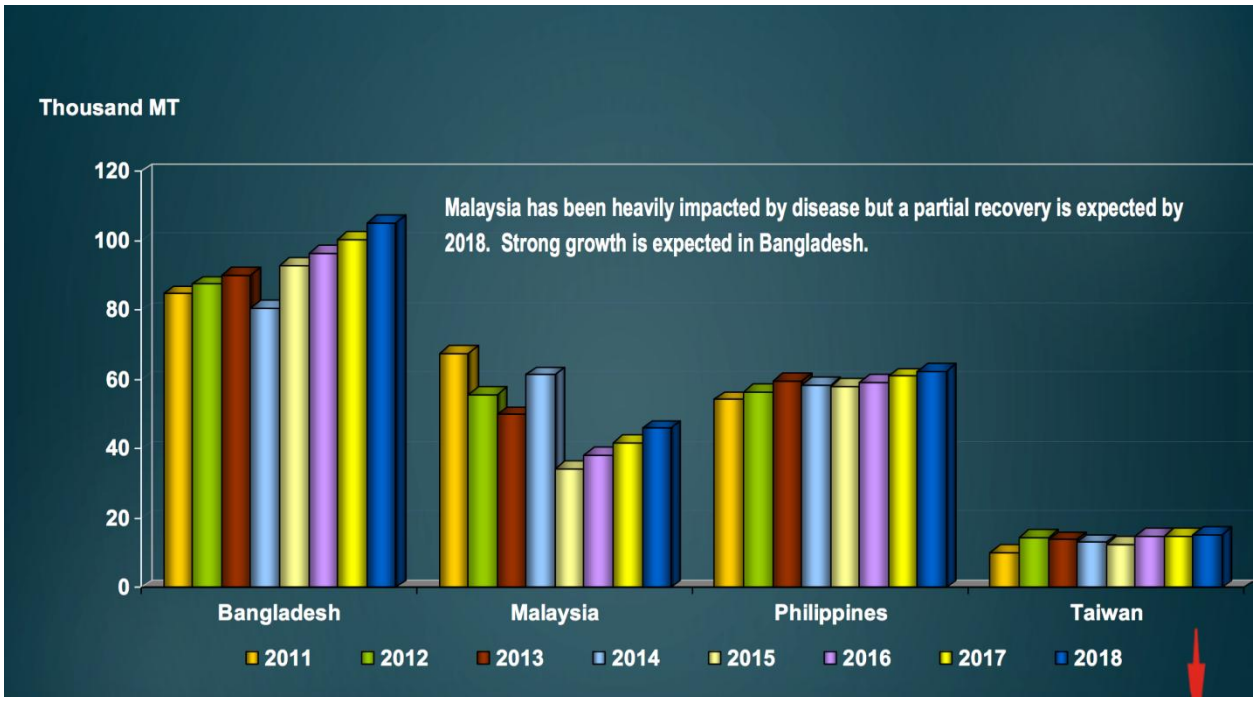

Figure 2.2: Shrimp productions (2011-2018)(Seaman and Wietecha, 2016)

Bangladesh Frozen Foods Exporters Association (BFFEA) noted that the country has 14.7 million shrimp and fish farmers along with 1.3 million fishermen. As per the BFFEA (2016) information, there are 162 export oriented fish processing plants (including Public and Private sector) which operate for processing shrimp products to meet the market demand of global consumers. Processing plants is the core part of the shrimp value chain in Bangladesh. In the processing plant, shrimps are processed at shrimp factories, and the final products are exported to the global market. To support these processing plants for the quality product exportation, assure the quality and safety in compliance with the international food safety and trade regulations, FIQC has been established during 1975-1976 by the DoF (DTC, 2013). Under the Ministry of Fisheries and Livestock (MOFL), FIQC of the Department of Fisheries (DoF) is headed by the Principal Scientific Officer (PSO) supported by three Deputy Directors (DD) and three Quality Assurance Managers at three regional competent authority (RCA) divisional laboratories. Figure 2.3 shows the organizational structure of the FIQC in Bangladesh.

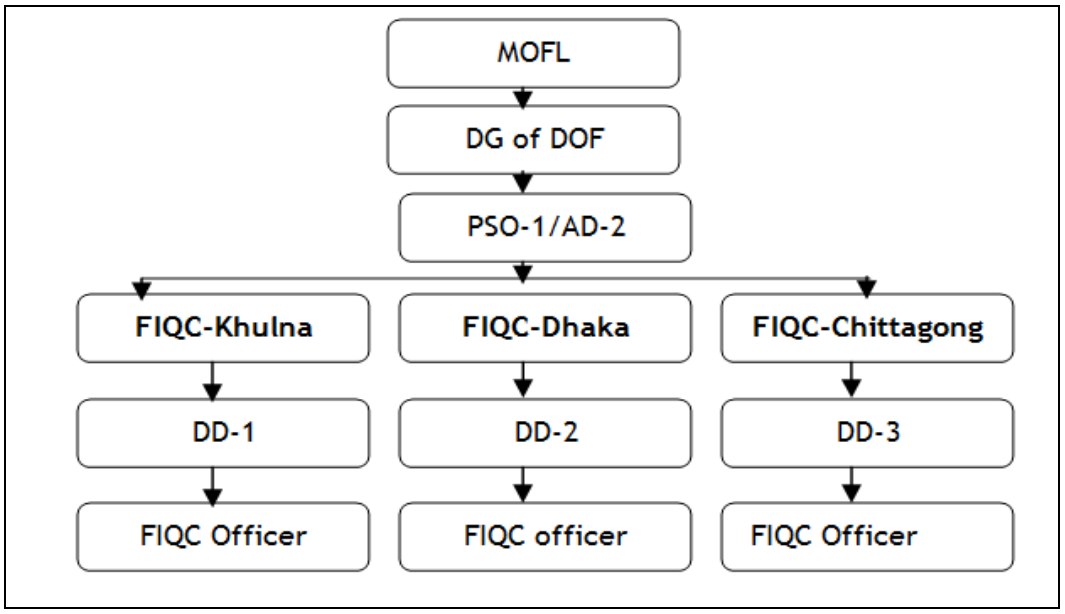

Figure 2.3: Organogram of FIQC under DOF (revised) (DTC, 2013)

Under the FIQC office, FIQC officers and inspectors inspects the processing plants, service center, depot and help the processing plants to follow Hazard Analysis and Critical Control Points (HACCP), International Standard Organization (ISO) rules to improve their standard up to global market. Apart from that they perform the chemical, microbiological, organoleptic and filth tests of the products. They also support the HACCP implementation in the field level and detect where pollution can be done from origin of the product to delivery of the product in the port and solve the problem.

2.5 Farm to fork: Value chain of shrimp industries in Bangladesh

In the shrimp industry, shrimp's value chain integrates a combination of different actors (works alongdifferent areas of the shrimp industry) with their organizational arrangements and activities frombrood shrimp collection to exports shrimp products. In Bangladesh, shrimp produced in the farm is marketed to overseas consumers' througha number of channels that is from farm to village traders, purchasing agents, depot owners and final delivery to the processing plants (Uddin, 2008).

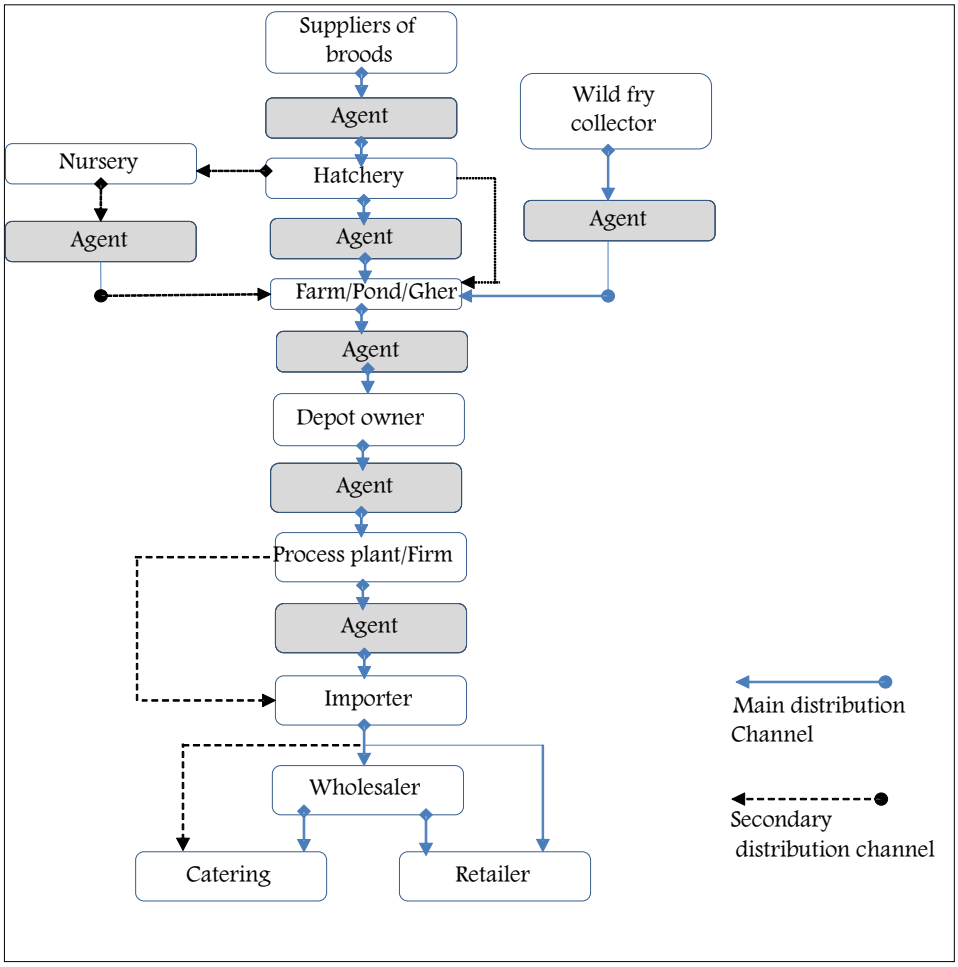

Figure 2.4: Shrimp value chain in Bangladesh (Dietsche, 2009) (Revised)

In figure 2.4, we can see that the traditional shrimp and prawn supply chain in Southwest Bangladesh is characterized by a large number of middlemen (Suppliers, collectors, agent, depots, industry people, importers, and wholesaler). These middlemen provide financial or other services (e.g. collecting, auctioning or transportation) and consolidate raw material along the supply chain.The chain is started from collecting the broods from freshwater prawn hatcheries, then processing the quality shrimp seed in a Gher by providing supplementary food and water, after that the deport owner send shrimps to the processing plants. After buying from aratdar through commission agents, the processors/exporters export shrimp/prawn using their own brand name or buyers/importers' brand. European Union (EU), USA and Japan are the main export markets for Bangladeshi shrimp/prawn. Prawn processing plants process fresh water prawn, shrimps, white fish and other aquatic fauna.

Chapter Three: A Value Chain Approach for the Value Creation and Competitive Advantages

3.1 Background of the study

Since 1990, industrial changes have been taken in the agri-food chains. After that it has changed the chain process (firms to consumer) of food industry. Nationally and internationally consumers and supermarkets in many advanced countries have been playing major actors in food chain (Reardon *et al*., 2003). It is widely recognized that chains of food consumption have followed these changes over the past few decades. Business marketing has been paying attention to the creation of value. For creating value, value chain is a way of understanding the creation of value through out a vertical configuration (Stabell and Fjeldstad, 1998). In shrimp industry, value creation is a set of activities that a shrimp firm operates to deliver valuable shrimp products to the market. Shrimp industries create value by acquiring raw materials and using them to produce something useful to the consumer.

Configuring value by maintaining standard activities are vital for competitive advantages (Stabell and Fjeldstad, 1998). In Bangladesh, value chain and understanding how firms create value are still in the nascent stage. Although the exportation and cultivation of shrimp in Bangladesh has been rapidly expanding for the last two decades, difficulties remain to adopt a standard value chain. The constraints are the lack of skilled labor force; proper handling of shrimp from pond to processor, lack of traceability, and irregular quality makes it difficult to access high value markets (Islam, 2008). Murray and Little (2016) noted biosecurity investments & exclusion of smaller farmers, market failures at processor level, lack of proper finance, the poor linkage with EU & other buyers are the challenges that Bangladeshi shrimp industries are facing. Moreover comparing with other exporting countries, branding and marketing are not in a good position.

Chapter Three: A Value Chain Approach for the Value Creation and Competitive Advantages

Maintaining a standard value chain can bring the new opportunity for Bangladeshi shrimp industries to gain competitive advantages, and create more value for the consumers. Porter (1985) suggested that standard value chain and following this chain by different activities of firms can create more value to the products and gain competitive advantage. Porter (1985) also noted that value chain looks business, competitors and the respective places in the industry's value system. If the chains and activities run efficiently, the company gains profit and consumer gets more value from the products. While there are number of studies to offer value in firms, to date very few research exists on value creation through value chain approach. Particularly in Bangladesh, there have been limited studies on pond to plate chain (Islam, 2008); shrimp export from Bangladesh (Sabur, *et.al.,* 2010); marketing of major fish species (Alam, *et.al*., 2012); Bangladeshi sea food sector and value chain analysis (Van & Van, 2012); impact of shrimp farming & organic shrimp aquaculture for sustainable household livelihoods in Bangladesh (Paul & Vogl, 2011, 2013); and sustainable shrimp firming (Afroz & Alam, 2013). None have addressed specifically value creation through the analyzing of value chain. So far, this is the first study of conceptualizing value creation through value chain approach for the shrimp industries in Bangladesh. This exploratory study investigates the role of value chain and particularly mapping the Porter's value chain activities into shrimp industries of Bangladesh.

3.2 Objectives of the study

This study seeks to interrogate the key value chain activities of the shrimp firms in Bangladesh. The major research questions of this study are;

RQ1. How do firm managers familiar of the value chain? What are the strategies do they employ to ensure the competitive advantages for their firms? How are they planning to increase their exports?

RQ2. How does the shrimp industry perform the primary activities of value chain?

RQ3. How does the shrimp industry perform the supporting activities of value chain?

RQ4. To what extent do they think that this value chain will help the shrimp industry to create more value?

To answer these research questions, we examine Porter's (1985) theoretical framework of value chain for the shrimp industry. We also recommend how to initiate the process of value creation through the value chain activities. Following a standard value chain process, shrimp industries in Bangladesh will be in a better position to offer more value for the global consumers. Data gathered, identified gap, and the recommendations thereof will help to create a more complete and efficient chain. The rest of the writing is organized as follows. In the next section, we come up with the theoretical framework of the study, methodology, findings and then discussion. Then we conclude with a discussion of their implications and offer some suggestions for further research.

3.3 Theoretical background: Value chain analysis and competitive advantages

A big hurdle of shrimp value chain is lack of clear knowledge 'how to maintain the standard chain activities' of shrimp firms and the set of processes and phases involved. For the present study, we have adopted Porter's (1985) value chain model. Porter's model of value chain is one of the best known and widely applied models of company's value creation and competitive advantages processes (Sanchez and Heene, 2004). Porter (1985, p. 36) pointed that "every firm is a collection of activities that are performed to design, produce, market, deliver, and support its product."

Shrimp value chain includes the suppliers that provide the inputs necessary to the firm along with their value chains. After making the products from firm, products pass through the chains of distributors to the consumers. All parts of these chains are included in the value system (Porter, 1985). We suggest that the proper combination of primary and support activities of this chain model can create value and offer competitive advantages

for the shrimp firms in Bangladesh. Using Porter's (1985) value chain framework as a theoretical lens to guide the data analysis, we propose a revised framework for value creation and competitive advantages for the shrimp firms in Bangladesh. We have used this model to examine all of its activities in the process of converting inputs to outputs.

3.3.1 Primary activities

These activities are involved with shrimp product's creation; its sale and distribution to buyers. Porter (1985) explained these activities as 'primary' because these are the most important ones as they add value to the shrimp products or those involved in either producing or selling the product.

3.3.2 Supporting activities

These activities provide the assistance required for the primary activities to take place (consist of procurement, technology development, HRM, and infrastructure)

3.3.3 Value creation/competitive advantages

The primary and supporting activities are systematically representing value creation strategies. Here, Porter defines value as company's benefit and consumer satisfaction that leads to competitive advantages. In his opinion, profitability, consumer satisfaction and competitive advantages are the values that organization creates. As a result, the firms gain competitive advantage by performing these activities more cheaply than its competitors.

3.4 Methodology

For the present study, we relied upon the exploratory qualitative research approach with semi-structured questionnaire. In depth, semi-structured interviews were conducted with the shrimp industry managers for getting a deeper understanding of the chain. It gave a

better insight into the process we were studying. Merriam noted that, 'Qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of their work and the experiences they have in the world' (Merriam 1998: 6). Maxwell (1997) maintains that qualitative research is useful to understand the experiences of participants, the context in which they act, the influences on their behavior and the processes surrounding their behavior.

3.4.1 Study population and sample

The target population of the study was the shrimp firm managers in the Southern part of Bangladesh. For the present study, we selected shrimp firms from Khulna, Bagerhat, Jessore and Chittagong regions where most of the shrimp firms were located. The marine water shrimp and freshwater prawn is commercially cultured in this region and thousands of farmers in this area have converted their paddy fields to shrimp and prawn farms (Dev, 2006). The scope of the study is limited to firm managers because they have played a significant role in the overall chain process which starts from collecting raw shrimps and sent it out for exporting to the global consumer.

Considering the distances of regions and shrimp industries, we utilized purposive sampling to reach out to the firm managers. We collected the list of shrimp firms from the Fish Inspection & Quality Control (FIQC) office, Khulna where all the registered firms are listed. FIQC is the apex body which certifies the quality, requirements, ISO standard and chemical and microbiological test of all the shrimp products to export. After having a series of discussion with the Deputy Director (DD) & FIQC officers, we have chosen these firms. The purpose was to reach out to the firms whose contact details were available, had good export records, followed rules and regulations offered by FIQC and were agreed with interviewing.

3.4.2 Instrument development

The items primarily developed for the two variables of Porter's model (primary and supporting activities) as well as other variables relating to value creation and competitive

advantages. Demographic variables are listed in Table 1 below. The two variables, i.e., primary and secondary were the theoretical interest part of our study and others were the result. Where possible, questionnaire items were taken from prior studies or adapted to suit the needs of this study. In total, 5 open-ended and 8 structured questions were designed. There was a mixed of self-developed questions and some are adapted from prior studies such as Alam, *et. al.*, (2012); Grunert, *et.al.,* (2005); Islam (2008); Paul and Vogl (2011) and Prajogo, McDermott and Goh (2008). The questionnaire contained mostly structured guiding questions covering the major aspects of shrimp value chain practices in the industries. Some of the questions used the 5-point Likert scale.

3.4.3 Data collection

The draft interview questions were pre-tested with some of the firm managers with the help of the FIQC officer. In this pre-testing stage, much attention was given to elicit new information which was originally not designed to be asked and filled in the draft interview questions. Thus, some parts of drafted questions were improved, rearranged and modified in the light of the actual experiences gained from the pretest. Then the final interview schedules were prepared based on the result of the pretest. About 120 printed questionnaires were sent out to the firm managers inviting them (including informed consent) to participate in this study, as well as phoned them to invite for participating in the interview process. In total, 43 managers from 43 firms were agreed to participate in the interview. The response rate was about 35.83% after multiple follow up of phone calls. After arranging an appointment with the firm managers, FIQC officer and first author of this study visited the selected firms to interview the managers. The interview process was face to face with the given printed questionnaire. Sometimes, the respondents' answers are recorded using tape recorder (mostly for the open ended part). With the help of FIQC officer (they inspect the firms everyday), author visited the firms inner operations and others processing units of the firms. Moreover, a series of discussions were held with the firm managers for further information needed for this

study. Thus, opinions and experiences were voiced and shared. Interviews were conducted from September to December, 2016.

3.5 Analysis

For analyzing the interviewed questions and answers, we entered all the data in an Excel spreadsheet and came up with candidate categories for each question to synthesize the findings. Following Corbin and Strauss (1990) coding techniques, three kinds of coding were carried out. Open coding included an initial pass through the data to come up with candidate concepts for categories. After an initial level of analysis, categories were combined into major categories (axial coding). Finally, the focus shifted to core categories (selective coding). Categories were reconciled for inter-rater reliability.

3.5.1 Demographics

Table 3.1 shows the demographic distribution of the respondents. It is apparent that most of the firms were situated in Khulna district (58.13%). Majority of the firms (46.51%) have employees between 101-150 people. The work roles or positions specified by the respondents were classified into 3 categories based on firm's hierarchy (see Table 3.1). The table also shows that majority of the firms (46.51) were run by manager.

Table 3.1: Demographics (N=43)

District name	Percentage	No. of employees	Designation
Khulna	Khulna: 25 (58.13%)	50-100: 12 (27.90%)	QCM : 12 (27.90%)
Bagerhat	Bagerhat : 09 (20.93%)	101-150: 20 (46.51%)	Manager: 20 (46.51%)
Jessore	Jessore : 07 (16.27%)	151-200: 06 (13.95%)	MD: 08 (18.61%)
Chittagong:	Chittagong: 02 (4.65%)	201> : 5 (11.62%)	Others : 3 (6.97%)

In table 3.2, it is apparent that firms communicate with the buyers through internet, phone/fax and meeting through agent. 76.77% shrimp firms communicate through

Internet and most of the firms (81.39%) have their own website. As shrimp industries are run by the local businessmen and community people, it is revealed that most of the firms are private in type and only one shrimp firm 'Gemini Seafood Ltd.' is run by government.

Table 3.2: Communication and company website (N= 43)

Way of communication	Website	Type of company
Internet: 33 (76.77%) Phone Fax: 06 (13.95%) Buyer's meeting/agent: 04(9.30%)	Yes: 32 (81.39%) No: 11(25.58%)	Private: 42 (97.67) Public: 01 (2.32%)

3.6 Findings

3.6.1 Familiarity of value chain, brand names, competitive advantages and strategy to increase export for the next five years.

More than 30 percent (13) of the respondents admitted that they have good knowledge on value chain, while another 4.65 percent (2) respondents replied that they do not have any knowledge on value chain. On the other hand, more than 23 percent (10) of the participants indicated that they are familiar with value chain and 16.27 percent (7) have heard of value chain but it has been a challenge for them to understand what it is all about. Only about 9.3 percent (4) of the respondents indicated that they had never heard of value chain until now. Thus, most respondents had heard of value chain in some forms.

3.6.2 Brand name and export of shrimp products

Respondents were asked 'do they have any brand name of their products and is it important? All the respondents replied that they have brand name of their products. While 25.58 percent (11) of the respondents agreed, 74.74 percent (32) strongly agreed that brand name is critical for their products. Some of the notable brand names of their products are 'Seanymph' 'Bright' 'Sea pride' 'Sea pearl' 'Meena' 'Bright' 'NSFIL' 'Rainbow' and many more. They noted that branding helps them for designing marketing strategy and make familiar their products to the consumers. For exporting shrimp products, most

respondents replied variety of product names which were coded into separate categories (7) (see the list below), leading to 39 coded responses by the 43 respondents. Name of the products, species, freezing process and style are shown in table 3.3.

Table 3.3: Name of species, brand, products and processing

Name of species : Black tiger shrimps/Fresh water prawn **Brand name** Seapearl, Seapride, NSFIL, Rainbow, Seanymph, Bright, Meena, Bright, Rainbow and others.	**Name of the products (7 categories)**	**Freezing style**
	Headless Shellon, (HLSO) (11)	Block frozen/IQF
	Head on Shell on, (HOSO) (8)	Block frozen/IQF
	Peeled Deveined & Tail on Round (7)	IQF
	Peeled, Deveined & Tail on Full Butter Fly cut (7)	IQF
	Peeled &Undeveined Tail on Skewer (3)	Block frozen /Cooked
	Garlic marinated shrimp, BBQ shrimp (2)	IQF/BF/SemiIQF
	Organic (1)	IQF/BF/SemiIQF

The numbers within brackets indicate the sum total for all responses in that category. Considering consumer demand, headless shell on, head on shell on and peeled, deveined & tail on full butterfly cut were the top exported shrimp products listed.

Table 3.4: Competitive advantages and shrimp industry (N=43, multiple responses)

Competitive advantages of the company	**Frequency**	**Percentage**
Efficient production system	13	30.23%
Loyal to the consumer	24	55.81%
Addressing consumer needs continuously	22	51.16%
We always focus on creating value for consumer	26	60.46%
Offer value added products to the consumers	12	27.90%
Monitoring/surveying market	11	25.58%
Good relations with suppliers	09	20.93%
Brand campaign	14	32.55%
Ensuring products quality	25	58.13%

Transportation route optimization	11	25.58%
Fine-Tune production plans in response to changing conditions	03	6.97%
Risk management: responding to sustained market volatility	11	25.58%
Merger and acquisition strategy	13	30.23%
SWOT (strengths, weaknesses, opportunities and threats) analysis	22	51.16%
HACCP (Hazard analysis and critical control points)	23	53.48%
Ethical trade practice	19	44.18%
Traceability	26	60.46%
Third party certification	12	27.90%
All of these	4	9.30%

Respondents were asked what they do for their firm's competitive advantages. Most respondents referred more than one strategy, the strategies that they apply for their firms. Factors about the competitive and comparative advantage of shrimp production becomes very important for the firm managers. Many ideas on how to improve the competitive advantages of Bangladeshi shrimp sector were raised in recent days. Majority of the firms (60.46) have focused to apply the traceability tools and focus on creating value for consumer for their competitive advantages which is followed by ensuring products quality (58.13%), loyal to the consumer (55.81%) and following HACCP (53.48%). This information would be an important input to policy makers in designing policies that would help shrimp growers improve their income and provide basis for the planners in formulating long term programs for the effective use of resources.

Table 3.5: Strategy to increase export (N=43, multiple responses)

Strategy to increase export	Frequency	Percentage
New shrimp products	26	60.46%
Organic products	28	65.11%
Ensuring reliability (delivery shrimp product on time)	12	27.90%
Applying new marketing strategies	16	37.20%
Promoting marketing activities	19	44.18%

Promoting brand value	23	53.48%
More value added products	31	72.09%
Improving safety and quality	31	72.09%
Improved traceability/e-traceability	12	27.90%
All of these	3	6.97%

Table 3.5 focuses the strategies to increase the export of shrimp products to abroad. Considering the demand of value added products and safety & quality issue, most of the firm managers (equal number for each category 72.09%) respondents that they are giving high priority on value addition and safety & quality areas. Second highest, 65.11% firms managers are working to produce organic products which are followed by new shrimp products (60.46%), promoting brand value (53.48%) and promoting marketing activities (44.18%).

Table 3.6: Global competitors and shrimp industry (multiple choices)

Name of the country	Frequency	(%)
India, Vietnam	23	53.48%
India, Vietnam and Thailand	13	30.23%
India, Vietnam and China	28	65.11%
India, Vietnam and Myanmar	24	55.81%
India	12	27.90%
Vietnam	18	41.86%
Thailand	19	44.18%

Considering the global competitors of shrimp industry, most of the managers (65.11%) replied that India, Vietnam and China are the competitors of Bangladesh.

3.7 Primary activities of value chain in shrimp industries in Bangladesh

There were 43 responses stating what sets their companies for the primary activities. Answers were multiple and these were coded into separate categories (see the list below). We have chosen the significant responses (the highest number of responses) only which are very much relevant for this study. In some cases, to ensure the anonymity of the Firm Manager (FM), we used a coding system for each interviewee like FM1, FM2, FM3 ...and FM43.

3.7.1 Inbound logistics

These are all the processes related to receiving, storing, and distributing inputs internally. In inbound logistics, we have chosen the following responses. Some of the responses are; 'poor transportation system of collecting raw shrimps' (29); 'we have communication gap to receive shrimps from the suppliers' (28); 'we always suffer with raw shrimps. We cannot utilize the maximum capacity of our processing plants' (22). One of the firm manager reported that "we usually collect shrimps and metal check from farias/bapari/agent. They have lack of quality standards. They cannot follow the standard process to acquire the shrimps" (FM23).

3.7.2 Operations

These are the transformation activities that change inputs into outputs that are sold to the consumer. Some of the responses are; 'we have shortage of electricity supply' (23); 'we have standard processing, packaging and testing of products systems' (22); 'lack of semi-intensive shrimp culture' (22); 'we buy the shrimps from agents, grade, deveined, freeze, preservation and packages'(19); 'our transformation of raw shrimps into final products are good' (19). The interviewee FM10 noted that "during production stringent measures for safety and quality is maintained with well experienced, qualified and dedicated team of production and quality control personnel. The grading, testing and packaging of the products in our firm in quite standard."

3.7.3 Outbound logistics

These activities deliver the shrimp products to the consumer. These are things like collection, storage, and distribution systems, and these may be internal or external to firm. Some of respondents responses are; 'effective outbound logistics operation' (23); 'we have well storage, processing orders, and distribution system' (22); 'we deliver products on time with best quality' (18). For FM 9, FM11, 12 & 13, they said that "We have our good stock control & inventory system, transportation channel to deliver the final product to buyers/exporters."

3.7.4 Marketing and sales/services

These are the processes where firms persuade consumers to purchase from them. Some of the firm managers responses are ; 'lack of advertisement and promotional activities' (25); 'we have our own distribution channel and customer segment for global consumers' (17); 'attending seafood expo in different countries' 'further communication through e-mail & reply consumer queries accordingly' (11).

3.8 Supporting activities of value chain in shrimp industries

3.8.1 Procurement

This is what the firm does to get the resources it needs to operate. This includes finding vendors and negotiating best prices. Some of the significant responses are; 'our firm purchases shrimps of all sizes directly from agents/faria/bapary and then process for exporting' (26); 'we always check for the freshness and avoid shrimp that are limp, slimy, or falling apart, all of which are signs of decay' (22). FM 36 replied that 'we consider the flavor, price and the quality when purchasing shrimp. It is all about the consumer need, demand and want that we take into consideration in the procurement process".

3.8.2 Technology development

These activities relate to managing and processing products with the help of technology. Some of the significance responses are: 'we do not have e-traceability system at this moment but we are planning to introduce it in our firms' (33); 'In our firms, we do use technological tools but at this moment it is not sufficient. We have plan to use more modern technology in future' (32); 'we do not use modern shrimp processing machine for processing the shrimp products' (27);'lack of modern lab facilities' (23). FM 18 described that "modern fish processing needs new machinery and technology to meet the international standard. In my firm, we do not have fish cleaning machine, fish descaling machine, fish skinning machine, and fish meat separating machine, etc."

3.8.3 Human resource management

It consists of all activities involved in recruiting, hiring, training, developing, compensating and (if necessary) dismissing or laying off personnel. We got the following responses of HRM in shrimp industries of Bangladesh. 'Most of the workers are experienced; maintain the international labor law, health checkup in every week. As per the labor law, we offer the workers standard wage, sick leave and vacation pay. We prohibit children under age 18 from working and provides maternity leave after six months on the job' (27); 'we often arrange training program for the new employees and make them well trained to meet up the standard that set by the buyers' (21). Besides these, many of the firm managers replied that they recruit staff through formal process, offer bonus, reward and most of them are educated.

3.8.4 Firm infrastructure

These are the company's support systems, and the functions that allow it to maintain daily operations. Some of the significance responses are ; 'our firm has poor infrastructural facilities and we are suffering with many things., e.g., poor transportation and road, machinery and others, lengthy process of microbiological test by DoF & FIQC , high bank interest rate, lack of semi-intensive shrimp culture' (27); 'lack of financial subsidy' (24); 'our company has good culture and working environment' (24); 'we put focus on environmental issue and follow the business ethics' (23); 'Our company is financially not stable (22).

3.9 Discussion

RQ1: How do firm manager's familiar of the value chain? What are the strategy do they employ to ensure the competitive advantages for their firms? How are they planning to increase their exports?

In shrimp firm, value chain looks at the stages of collecting raw shrimps, process and deliver it for the consumers. In the present study, we have focused only the chain which starts from firms (more of internal operations) to exporters/global consumers. Most of

the respondents admitted that they have good knowledge of value chain and some of them replied that they had never heard of value chain until now or it has been a challenge for them to understand. Trienekens (2011)'s study showed that value chain in developing countries face major constraints including market access restrictions, weak infrastructures, lack of awareness and institutional resources. Table 3.1 3.4 and 3.5 summarizes the responses by the firms managers about what sets them apart and the strategies they employ to ensure competitive advantages and strategy to increase exports. We can conclude three significant take aways from table 3.7. First column presents a big focus on variety of shrimp products. Major products of shrimp firms are HLSO, HOSO, Peeled Deveined & Tail on Round, and Peeled, Deveined & Tail on Full Butter Fly cut. It also ties in with most product promotion studies that recognizes name of the shrimp products are important for shrimp industry (Su, *et.al*,2014; Busch and Bain, 2004).

Table 3. 7: Brand, competitive advantages and strategy to increase export

Product name	Completive advantages	Export strategy
HLSO (11)	Creating value for global buyers/consumers (26); Traceability (26)	More value added products (31); safety and quality (31)
HOSO (8)	Ensuring product quality (25)	Organic products (28)
Peeled Deveined & Tail on Round (7)	Loyal to consumer (24)	New shrimp products (26)
Peeled, Deveined & Tail on Full Butter Fly cut (7)	Maintaining HACCP (23)	Promoting brand value (23)
Peeled &Undeveined Tail on Skewer (3)	SWOT analysis (22); addressing consumer needs continuously (22)	Promoting marketing activities (19)
Garlic marinated shrimp, BBQ shrimp (2); Organic (1)	Ethical trade practice (19)	improving traceability (12); ensuring reliability (12)

In second column, among other findings, for ensuring competitive advantages with other countries (Table 6: India, Vietnam, Thailand and China) Bangladeshi shrimp industries are working for creating more value/traceability, ensuring product quality and maintaining HACCP for the global consumers to make them more loyal to their products. A recent reports noted that export and demand of Bangladesh shrimps has increased in the US and EU markets (Khan, 2013). The findings are also consistent with Ongsritrakul and

Hubbard (1996)'s study where they showed that creating new value, ensuring product quality, SWOT analysis and improved HACCP can help to gain competitive advantages. Finally, in the third column represents that Bangladeshi shrimp industries are increasingly focusing on value added products, organic products and promoting brand & marketing strategies to increase export. Cato and Dos Santos (2000) identified that one way Bangladesh can improve its own export position by improving the safety and quality of its shrimp products.

RQ2. How does Bangladeshi shrimp industry perform the primary activities of value chain?

Shrimp firms are responsible for exporting the frozen shrimp products for the global consumers. Processing plants have to do critical job to process the raw shrimps following several stages to make the products prepared for export. Table 3.8 presents the major primary activities of the shrimp industries.

Table 3. 8: Primary activities

Inbound logistics	Operations	Outbound logistics	Sales and marketing
Poor transportation (29); communication gap (28); good relation with suppliers (22)	Shortage to power supply (23); testing & packaging(23)	Effective outbound (23); well storage & distribution (22);	Good Promotion & advertisement (25); consumer segment (17)
shortage of raw shrimps (22); lack of quality standard (14)	Transformation (19); buying from agents (19); buying & grading (14);	Deliver product on time (18); own transport (14)	attending sea food expo(11); e-mail (11)
Internal distribution process good (16)	Quality Manufacture (16) HACCP (14); Safety & quality (12); environmental barriers (11)	Stock control & inventory (11)	Export abroad (4)

The first column represents inbound logistics where raw shrimps from the agents are collected and firms process it for export. Here it was identified that poor transportation and communication gaps with the shrimp stakeholders are the areas where firms have been suffering. The second column is the operation parts where raw shrimps are

processed into the final products. Value is added to the product at this stage as it moves through the production line. But due to the shortage of power supply and environmental barriers, firms are suffering. The third and fourth column focuses the outbound logistics where once the products have been processed, they are ready to be distributed to distribution centers, wholesalers, retailers or customers. In the outbound logistics, firms have effective inbound logistics operations and have good promotion & advertisement activities are seen in the sales and marketing parts. Improved knowledge is needed in at least two areas of the primary activities. First, firms need to better understand of the chain. Second, firms need to better understand the promotional activities of their products for the global consumers.

RQ3. How does Bangladeshi shrimp industry perform the supporting activities of value chain?

The support activities assist the primary activities in helping the organization to achieve its competitive advantage. In table 3.9, it is apparent that procurement department acquires the raw shrimps directly from the agents and sometimes negotiates for obtaining the best price. The use of technology to obtain a competitive advantage within the firm is very important.

Table 3.9: Supporting activities

Procurement	Technology	Human resource	Infrastructure
Directly & negotiate (26) Check freshness (22) Varieties (13)	no e-traceability (33); Do not have modern process machine (27); lack of modern lab (23) Plan for future (32)	Follow standard rules and labor law (27) More male (25); Contractual (22); training program (21); Staff recruit (09) Reward (9)	poor infrastructural facilities (27); good culture (24); Lack of subsidy (24) Business ethics (23); Financially Instable (22)

In table 3.9, we found that there is neither a traceability system nor modern processing machine in the shrimp industries in Bangladesh. In the third column, it is seen that firms are following the standard rules and labor law, offering training program and other

activities. Finally, it was found that most of the firms have poor infrastructure facilities and lack of subsidy. The findings of this study are in line with the study conducted by Nupur (2010) and Yasin (2016). They have noted that Bangladeshi shrimp industries are suffering with infrastructure facilities, availability of quality raw shrimps for the processing plants, dominant position of traders and commission agents, inadequate Government support and control, inefficiencies in the supply chain and export barriers.

RQ 4. To what extent, do they think that this value chain will help the shrimp industry to create more value?

Most of the firm managers (74.41%) felt that the overall value chain activities would be extremely helpful for the firms to create more value. Porter's (1985) noted that an analysis of the value chain, identifying value activities and comparing the value chains of competitors exposes differences that determine competitive advantage. The present study brings out the facts that some of the respondents are not familiar with these chains which would lead the other people to talk and be familiar. Ensign (2001) had found that the linkages in value chains can be finely tuned to get competitive advantages. He also noted that competitive advantage (using value chain analysis) and understanding the linkages and interrelationships between these activities create value.

3.10 Theoretical framework

For the present study, even though the sample size was small and exploratory study, we can bring some useful insights from the shrimp firms of Bangladesh. Here, we map the Porter's (1985) value chain as theoretical background for the shrimp industries in Bangladesh. The framework is to be seen from down to top and then look from right to left.

For value creation or gaining competitive advantages, being response to consumer needs and continuously follow the standard value chain is important. In the first stage, this can be done through primary activities which are a series of activities that a firm can do. There are four generic categories of primary activities involved in competing in any

industry. Each category is divisible into a number of distinct activities that depend on the particular industry and firm strategy. For example, in a shrimp industry it is always started with buying the raw shrimps from aratdar through commission agents, processing (deheading or with head), washing, grading, packaging, weighing, freezing and distributing to the buyer (importer). In the present study, we have found that two building blocks of primary activities (Inbound & Operations) have been suffering with the poor transportation, communication gap, shortage of raw shrimps and lack of quality standard. Due to poor infrastructure of roads and highway, traffic congestion and shortages of vehicles of the farmers, agents and other stakeholders, it gets delay to supply the raw shrimps to the firms. Perishable goods must be moved as early as possible from collecting center to the processing center. Alam*, et.al.,* (2012) reported that most of the fisherman, agents and retailers use non-mechanized man driven carrier, non-refrigerated cargo carrier, small lorry and other rides. Availability of raw shrimp is limited in Bangladesh which lead the firms do not utilize the maximum capacity of their firms. The other two building blocks 'outbound' and 'sales and marketing' are comparatively better than the earlier two building blocks. The outbound logistics from production site is of crucial importance as it impacts consumers' satisfaction. Shrimp industries offer full range of services including well storage, timely operations and distributions that enable the firm to react rapidly to changes in the market and to make firm logistics more reliable all the way to the final delivery point.The heart of the business lies in its marketing. For marketing and sales, market promotion, advertisement, consumer segment and attending sea food expo are the activities that shrimp industries are doing to get buyer to purchase products.It is apparent from the findings that primary activities have an immediate effect on the production, maintenance, sales and support of the products to be supplied.

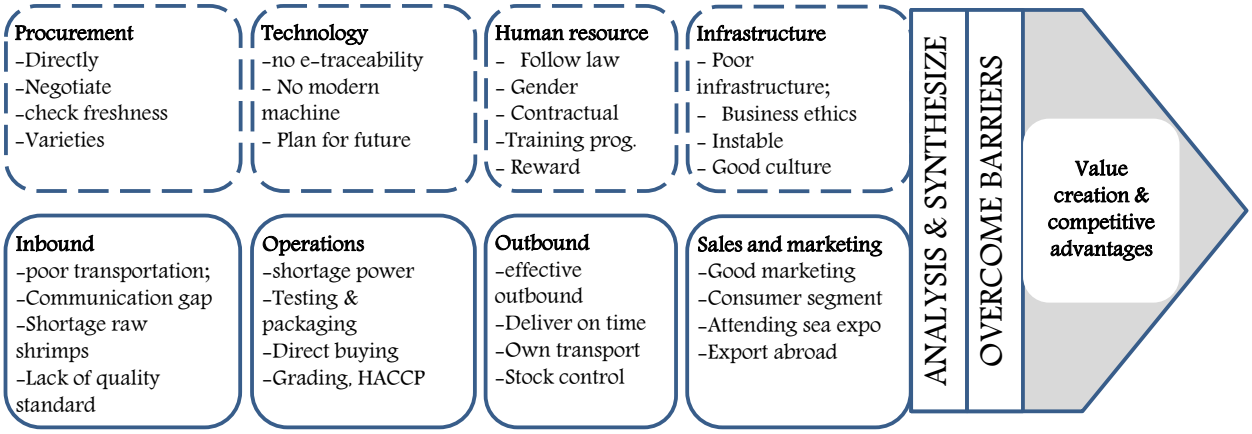

Figure 3.1: Shrimp firms value Chain Porter (1985) framework (Revised)

In the upper part of the framework, supporting activities can be divided into four generic categories and each category of support activities is divisible into a number of distinct value activities. Procurements refer to functions of purchasing raw shrimps, machinery, laboratory equipment, and other firm's apparatus. For example, purchasing raw shrimps directly or negotiating with the agents and procedures for dealing with the vendors for buying equipment. These are the activities related to procurement to serve the consumers from the firms. In the 2nd building blocks, shrimp firms use technology to process the raw shrimps that facilitate firm's transformation of inputs into outputs. In most of the processing units, shrimps are peeled by hand while a very few processing units use mechanical peelers as they are very costly and require shrimp within a fixed size range. Furthermore, no e-traceability and no modern equipment (particularly for cooked/ready to eat) are used in these firms. When technology is important for the competitive advantages in all industries, Bangladeshi shrimp industries are suffering in this area. In human resources areas, most of the firms are run by contractual employees, follow the international rules and regulations and offer training programs. It is important to note that firms need to follow the requirements of safety standards, labor law and other HRM issues that are imposed by EU, USA and other importers. Finally, in the last building blocks, it was identified that firms infrastructure were poor in Bangladesh. To establish a prawn/shrimp processing plant, large amounts of investment is required. But the exploratory study brings out the findings that high bank interest rate, lack of semi-

intensive shrimp culture and lack of financial subsidy lead the poor infrastructure of the shrimp firms.

To diagnose and gaining competitive advantages, it is necessary to define firm's value chain and unlock the chain activities if it is needed. Based on the findings of this exploratory study, we have found that some of the building blocks of both primary and secondary activities are not satisfactory. Strengthening the building blocks, doing differently better than the competitors, analysis the chain process and managing interrelationships of chain activities can ensure the competitiveness of the shrimp industries. However, even if the managers follow the Porter's chain, know what the consumer wants, and can imagine the possibilities, they cannot move much ahead if they do not understand systemic and other barriers prevalent in the industry. Synthesizing and analyzing of these barriers and identifying the existing situation to overcome these barriers can lead to value creation and competitive advantages for the shrimp industries in Bangladesh.

3.11 Conclusion and future studies

The whole point of conducting value chain analysis is to understand how different activities along a chain are coordinated and governed. The present study is largely focused on activities at the processing plants. Considering the time frame and long chains of the shrimp industries, we did not focus on the other actors e.g., farmers, middlemen, aratdar, depots in the chains. For the present study, we made four research questions to answer. The responses brought forth a rich set of findings, which are limited by the size of the sample. Likewise other industries, shrimp firms must guard, nurture, and unlock all the complexities that are the sources of sustainable competitive advantage. Porter' (1985) value chain in industry is such a window that looking through the lens of the value chain. The primary & supporting activities and interrelationships between these activities in the value chain provide opportunities for joint optimization and co-ordination. This optimization leads to reduce redundancy, bring out the superior profits and one step ahead the firms from the rivals in the market.

Some of the building blocks of this framework are empirically supported and some are not in a position to support the framework. Remote rural areas are still facing effective accessibility which includes inadequate supply of broods, high production costs, high transformation costs, and low profit margins. Though it is the 2nd largest export products in Bangladesh, literature suggests that a developed service market has not yet emerged in Bangladesh because of poor market involvement (Muir, 2003). This is because of the lacking in the dynamics of market infrastructures. Moreover, export oriented prawn farming should be highly interlinked with international markets such as price, demand, supply and quality issues. This normally requires a cooperative effort between a country's industry and government and its external partners.

However, the findings of the present study and the framework have important implications for more in depth research in the shrimp industries in Bangladesh. The framework can serve as a starting point to develop models for value chain and value creation. While this study was exploratory, a bigger study will look at each part of the proposed theoretical framework and test it against a larger sample.With the lack of previous studies on this in the industry domain in Bangladesh, it should trigger more interest for similar studies to be carried out.

Chapter Four: Quality and Safety Standards: E-traceability of Shrimp Industries in Bangladesh

4.1 Background of the study

For tracking the product information in the value chain and make the chain connected in shrimp industries, vitality of e-traceability has increased substantially. In the whole value chain, reliable tracking system is important to ensure the safety and quality of sea food reaching to the consumer. Nowadays, the food industry has been more consumer-oriented and providing faster response times to deal with food scandals and incidents. Good traceability systems help to minimize the production and distribution of unsafe or poor quality products, thereby minimizing the potential for bad publicity, liability, and recalls. The current food labeling system cannot guarantee that the food is authentic, good quality and safe. Therefore, traceability is applied as a tool to assist in the assurance of food safety and quality as well as to achieve consumer confidence (Aung & Chang, 2014). Aung & Chang (2014) noted that the term 'traceability' has become so widely used in recent times in various industries not only in the food industry . Many researchers proposed frameworks and models in order to deal with the increasing complexity of food chain traceability.

Like food industries, shrimp industry must comply with certain health and safety requirements before entering to the global market. Shrimps can only be exported to the international market if they come from an authorized country, are caught by approved vessels (wild shrimps) or were produced in registered farms (aquaculture), are accompanied by the proper health certificates, and have passed the different countries border inspection control. The shrimp industry must ensure that their fish handling, processing and transportation facilities meet requisite standards. Ensuring high standards for quality and safety is good economics, minimizing losses that result from spoilage, damage to trade and from illness among consumers (EU, 2017& FAO, 2017). At the

present time, consumers are more sensitive to safety and quality issues than the price of the product. Global consumers even give the high priority to the safety and quality than the prices of the products. Fish exporting countries must have a system in place to make sure that its fishing vessels implement, control and enforce conservation laws, and they need to carry out regular checks to ensure this system operates properly (EU, 2017). Considering the safety and quality issues, many check points like International Standard Organizations (ISO), The Hazard Analysis Critical Control Point (HACCP), traceability, Good Aquaculture Practice (GAP), Best Aquaculture Process (BAP), Good Manufacturing Process (GMP), e-traceability, standard value chain and other techniques are applied by many shrimp exporting countries. While there have been many studies on the traceability areas in Bangladesh, none have focused on the e-traceability system for the shrimp products in Bangladesh. While many of the shrimp exporting countries have already implemented or in the process of applying to check the safety and quality measures of shrimp products by e-traceability, Bangladesh is still in nascent stage. Thus, we believe, this is the first study conceptualizing e-traceability for the shrimp industry and we have been prompted to investigate the following research questions:

- This chapter aims to study the main requirements of traceability and examine how the technologies of Barcode address these requirements.
- It seeks to outline a framework with the supply chain and technology that will make traceability feasible and easily deployable across a supply chain.

To answer these, we propose a theoretical framework of e-traceability for the shrimp value chain and present here both a detailed framework. We also recommend how to initiate the process of e-traceability.

4.2 Safety and quality measures: Bangladesh perspective

Shrimp, the second largest export earner, is potentially the next to garment sector of Bangladesh. The fisheries sector has a great influence in the economy of this country. Fisheries resources have great job potentiality for the male and female of all classes.

Among all the agricultural crops, shrimp is one of the most important crops in export sector of Bangladesh (Alam, 2013). Bangladesh ranks among the top five freshwater fish producers in the world and 12th largest cultured shrimp producer in the world. The EU, USA and Japan are the world's major importers of shrimp from Bangladesh. It is already among the top 10 exporters in the world. As the continued success in Bangladesh shrimp industry depends on the ability to successfully confront the challenges currently shaping the global food industry, increasing focus is being placed on the safety of foods along with buyers' changing requirements. On the international level, buyers and consumers are increasingly demanding that shrimp is produced and exported in compliance with the recognized codes of conduct (Uddin, 2008).

In July, 1997 the European Commission (EC) imposed a ban on imports of shrimp products from Bangladesh into the EU. EC imposed this banned for the lack of health safeguard, quality control, hygiene, trust, and this commodity did not meet the standard process of EC's HACCP regulations. Even, this commission raises questions that consuming shrimp products processed in Bangladesh caused a significant risk to public health in EU member countries (Yunus, 2009). The Ministry of Fisheries and Livestock of the Government of Bangladesh (GOB) has established a Fish Inspection and Quality Control (FIQC) wing in the Department of Fisheries to provide statutory support to processing- plants and to fulfill the international requirement and achieve international recognition regarding Fishery products (Naureen, *et.al.,* 2006). However, recognizing both the potential for exports and the problems with safety and quality of the product, the Food and Agriculture Organization of the United Nations (FAO) assisted Bangladesh to develop product standards and regulations. Some of these are;

4.2.1 Hazard Analysis and Critical Control Point (HACCP)

Recently, Bangladesh government has taken some initiatives to assure the quality and the safety of the fishery products. Bangladesh has 'Fish and Fish Product (Inspection & Quality control) Rules 1989' which has been updated under the guidelines of US FDA (Food and Drug Administration) HACCP regulations. It is also instructed by the European

Union (EU) guidelines. Now these guidelines are applied all stages of production, aquaculture, transportation, processing, distribution and shipment and so on (Uddin, 2008).

4.2.2 Good Aquaculture Practice (GAP)

Good Aquaculture Practice (GAP) has become a mandatory task for implementation of HACCP system in a better way and these protocols ensure the product quality, safety and environmental sustainability. In good aquaculture practices, Bangladeshi shrimp industries are not in a well condition. Department of fisheries, Bangladesh Shrimp and Fish Foundation (BSFF) and other NGOs are working together to establish a standard GAP in Bangladesh (Uddin, 2008).

4.2.3 Best Aquaculture Process (BAP) & Good Manufacturing Process (GMP)

BAP a third party certification system that certified farms, feed mills, processing plants and repacking plants. In Bangladesh, very few shrimp firms follow this process. GMP is the international method for ensuring safe and good quality food in the production line. The shrimp industries of Bangladesh follow the GMP in every steps of shrimp products production from collecting the shrimps from the supplier to packaging. The buyers prefer to see the "Seal of Quality" on the package for the mental satisfaction that the product is safe to eat.

4.2.4 Traceability

The major buyer requirement in the EU and USA is traceability. It is the requirements of the buyers that each product can be traced back to the farm. Although Bangladesh has traceability system that is accepted by the EU commission, this system is not yet operating optimally. The large number of small scale farmers makes it very difficult for Bangladesh to guarantee full traceability. Bangladesh will have to improve its system in order to maintain market access.

4.3 E-traceability and shrimp products: Global and Bangladesh scenario

The global seafood market is expanding rapidly. The consumers are demanding more and more information about the product. Their requirement cannot be fulfilled by the manual traceability system. Only electronic traceability system is able to collect and manage vast amount of data efficiently and collaborate the information among all the stakeholders. By offering e-traceability, consumers receive essential information to make an informed choice when purchasing shrimp products. In electronic-traceability or e-traceability, the consumers or any stakeholders get the access over the border .The product information are recorded, stored, shared, and accessed through electronic elements such as computerized databases, bar codes or RFID systems. In the global market, the buyers from Japan, EU and USA is paying 20% more for traceable shrimps than non-traceable shrimp from Indonesia (Van der Roest, Lehr & Yong, 2010). Ratanasoponchai (2008) discussed the electronic traceability system of a Thai company where Betagro agro-industrial and food Business Company introduces e-traceability system. Since 2002, it was the Thailand's first official e-traceability system in the exporting poultry integration by using traceability software. They have computerized trace back system for quick response to food safety issues. Food information are linked together with at least one factor (Lot no, Sub Lot no, Product ID, Farm Code, Shipment no). Every processing of supply chain must fill in information via internet and system will analyze by its self. With the simple input of Lot Number, the system can quickly and accurately trace back to sources of food products from the finished product to any stage of productions.

Ratanasoponchai (2008) also noted that consumers in Bangkok can trace back sources of Betagro's products via kiosk in Bangkok. Chicken and Pork marked with a serialized bar code can be scanned and supplier's traceability information is displayed on the Kiosk. It confirms that chickens are from a region free of bird flu and come from a reputable farm and slaughter house. The e-Traceability system can be used to examine by both buyers and consumers via the internet and Kiosk. Thailand is using "*Traceshrimp"* system for tracking and maintenance of electronic record from various stakeholders along the

supply chain of aquaculture products. This system is using for sharing product information and links individual stakeholders through a secure and automated product tracking system. Here, the data is exchanged only within the Thailand's shrimp industry (SEAFDEC, 2017). Thailand has implemented food traceability system in the shrimp processing industry since 2006 by using RFID technology which is making them more competitive than Indonesia(Wati,2018).Kadir, *et.al.,* (2015) discussed how the Electronic Product Code Information Services (EPCIS) standard and Radio Frequency Identification (RFID) technology support to identify the food traceability in the supply chain process. They have identified that applying of this system with the help of EPCIS and RFID can track and trace of food product information that can be use or require by user or logistic companies. Ayalew, *et. al.,* (2006) have identified that how printed graphic identifiers, radio frequency identifiers, and electronic data interchange protocols have potential for the traceability of food and feed. Hsu, Chen and Wang (2008) proposed an RFID-enabled traceability system for the live fish supply chain which consists of aquaculture farms, inspectors, logistic center, and the restaurants. The RFID tag is put on each live fish and it links to all stages of the live fish supply chain and information was exchanged by a web based system.

E-traceability reduces recall times and enhances robustness of the sustainability certification of the product (Miller, 2014). To ensure gulf shrimp to consumers Gulf Seafood Trace (GST) program along with the Mississippi Hospitality and Restaurant Association called Every Shrimp Has a Tale used "trace maps" accessible by smartphone QR codes printed on point of sale materials (Miller, 2014). After the terrorist attacks on the World Trade Center on September 11, 2001 the U.S. government initiated traceability in the food supply Chain for avoiding Bioterrorism (Hyldig & Green-Petersen, 2005). Frederiksen *et. al.*, (2002) developed an Internet based traceability system for fresh fish. Senneset *et al*., (2007) studied challenges regarding implementation of electronic chain traceability for farmed salmon. RFID tags for real time traceability was developed by Abad *et.al*., (2009). They also monitored the cold chain for fresh fish. Huang and Yang (2009) described an RFID tag and quick-response code based system for in-house

management of shrimp. Karlsen, *et.al.,*(2011) studied the implementation of electronic traceability in a fresh fish supply chain. An improved internet based traceability system has been developed for fresh fish supply chains in the Danish domestic market where date are transferred safely and accurately from all steps (five) in the chain from fisherman to retailer (Frederiksen *et. al.,* 2002). In Japan Traceable food is referred as ‘‘food with a visible face”. Ishii and Takeyasu (2006) found that 45% of Japanese consumer preferred getting information provided by a traceability system through home computers, 35% consumers use store computer terminals and 17% consumers use smart phones to scan barcodes. Denmark launched an electronic national traceability system for the fish industry where the system collects data from RFID tags, the fishing vessels’ computers, and the fish auctions’ systems (Lyngsoe Systems, 2012). Most frameworks of e-traceability have focused on characterizing the supply chain of the products within the company (internal traceability) and trace the product information through the supply chain .It may consist of origin of raw materials, product production and distribution and location of the product after delivery. Using of ICT devices, database, mobile apps and other relevant tools the whole functions of the e-traceability is done by the system.

While many studies have looked at the traceability in shrimp industries, they have not investigated the e-traceability system and process for the shrimp industries adequately. There is no literature or template on how this process should be undertaken in shrimp products. Recent news on e-traceability has been published in newspaper. It was noted that a USAID supported project ‘WorldFish’ launches the app, eServices Everywhere (ESE) of SourceTrace, can process and analyze data from all aspects of shrimp farming to offer traceability details throughout the production process, from hatchery to harvest. It is pilot project which has not started fully yet. Currently, only wholesale buyers with access to the ESE software can use the pilot app (WorldFish, 2016). Kamal (2014) discussed on the electronic traceability initiatives and smallholder integration in Bangladesh and focuses the challenges and opportunities of shrimp industries in Bangladesh. He presented concept note and models of different approaches of electronic traceability with their advantages and disadvantages in shrimp value chain of Bangladesh. In

Bangladesh, a pilot project of computer based traceability in shrimp value chain was started in 2014 but later the project was not in operation. At present the government of Bangladesh and NGOs are working together to introduce e-traceability in the shrimp industry of Bangladesh. Many donor agencies take initiatives for establishing e-traceability. Among these three projects e.g., BEST-BFQ (The Better Fisheries Quality), Sustainable Agriculture, Food Security and Linkages (SaFaL) & Aquaculture for Income and Nutrition (AIN) are very prominent (Van der Pijl, 2014). Very recent, a proto-type of the planned e-traceability system was launched on May, 2018 in Khulna. It is also a pilot project and the technical details, procedures and IT application have been developed by BSFF (BSFF, 2018).

4.4 Towards a framework of e-traceability: Bangladesh perspective

Today's business environment is challenging due to various reasons. Requirements are continuing to increase from the buyer's side. Consumers/buyers are more concerned than ever before and want to know where their food comes from, how it was produced and what it contains especially for the food industries. For gaining competitive advantages, ensuring continuous access to export markets in particular to EU, Bangladesh needs a proven traceability system. But due to the large number of very small suppliers, highly fragmented and small size of ponds, a complex and irregular system of intermediaries, make the process very challenging to keep track. One of the requirements is to ensure the traceability systems of farms produces from farm to fork. But field level traceability was found very challenging due to changing pattern of Gher ownership, large number of transaction points relates in the chain and farmers are in cluster but not being organized ever (Islam, Rahman and Haque, 2017). Due to the massive changes of *Gher* ownership happened over the last 10 years, existing traceability system cannot sustain for a long time. Therefore, database of shrimp industries (no. of farmers, Gher, ownership, product information of processing plants) should come under digital system and e-traceability needs to be implemented. In Bangladesh, it is identified that paper-based traceability was introduced in 2009 by FIQC/DoF and BFFEA, BQSP/UNIDO project.

In the perspective of Vietnamese shrimp industries Mai, *et.al*., (2010); Kabir (2013) and Kalam (2014) from Bangladeshi shrimp industries noted that considering the expenses, technological requirements and implementation time, most of the companies are currently practicing paper-based traceability in Bangladesh and Vietnam. They also discussed that paper-based traceability has some disadvantages as it requires huge documentation, farmers are reluctant to provide information, very slow in process, possibilities of paper lose, and data manipulation. Moreover, paper is vulnerable to humidity, retrieving document is time consuming and information exchanges is possible only at certain times and locations in paper based traceability. Considering that initially in the pilot-based, BEST-BFQ, UNIDO has developed a framework of e-traceability in 2014 for the shrimp value chain in Bangladesh. It was noted that e-traceability in shrimp value chain will help to control the collecting and processing of shrimp information, consuming less time, simple handling, updating/editing of continuous information on shrimps and no manipulation will possible. However, lack of technical knowledge of computer based traceability among the industry people and farmers, maintenance of hardware and software, complex installation, cost of maintenance and other expenses are the areas where the pilot project is struggling.

To establish a well-designed e-traceability system, we need to focus on the value chain process of the shrimp industries in Bangladesh. Shrimp chain is very fragmented. In other words, from farm to fork there are many people are working hard to provide the finest product to the consumers. The shrimp value chain in Bangladesh starts with the brood suppliers ends to the consumers. For building the e-traceability system, the main stakeholders are needed to be recorded and stored in the database. The figure 2.4 shows the whole shrimp value chain in Bangladesh. By utilizing those activities/chain with the help of product scanner, data storage system, Internet, RFID, Barcode, Internet Kioski and other relevant devices that help to trace and track the products for both the company and consumers. We have adopted two models/frameworks from the business literature to serve as a theoretical lens for our study. The first framework Kadir, *et. al.,* (2015) emphasizes the RFID and EPCIS technologies; and the second framework Aung & Chang

(2013) focuses the internal and external traceability of the supply chain. We suggest the combination of these frameworks to propose an e-traceability framework for the shrimp industries in Bangladesh that that supports to create more value for the shrimp products in the global market. The framework (figure 4.1) consists of the following two parts: (1) the shrimp value chain, (work flow of different activities 1-6) external part of the framework; and (2) the system sphere (using ICT devices to store, trace, track and disseminate information) at the middle. Electronic traceability happens when the different activities of shrimp value chain with the barcode interacts and encounter with the system database, server and other parts of the system. Barcode and barcode reader is a technology can be used product identification and traceability.

In the external part of figure 4.1 shows a traceability of shrimp products started from wild fry, or nursery (step 1). After that it can be collected from hatchery or farm or deport owner. Due to the large number of very small suppliers and various sources, monitoring sources become challenging in Bangladesh. In this situation it is difficult to establish traceability system from single pond to single product. The only possibility is to develop area coding system for the farms and bring all the farms under registration. It is very much similar to the European dairy traceability system. After that every product labeled and tagged with a Barcode which is programmed with original information then brings to processing plant (step 2). Once the products and its sources are tagged, the processing industry with its individual barcode can start processing (storing, packaging, labeling, distribution and others) for exporting to the retailer, wholesaler and global importer (step 3, 4 & 5). Like this, all the chain process will have barcode for each phase.

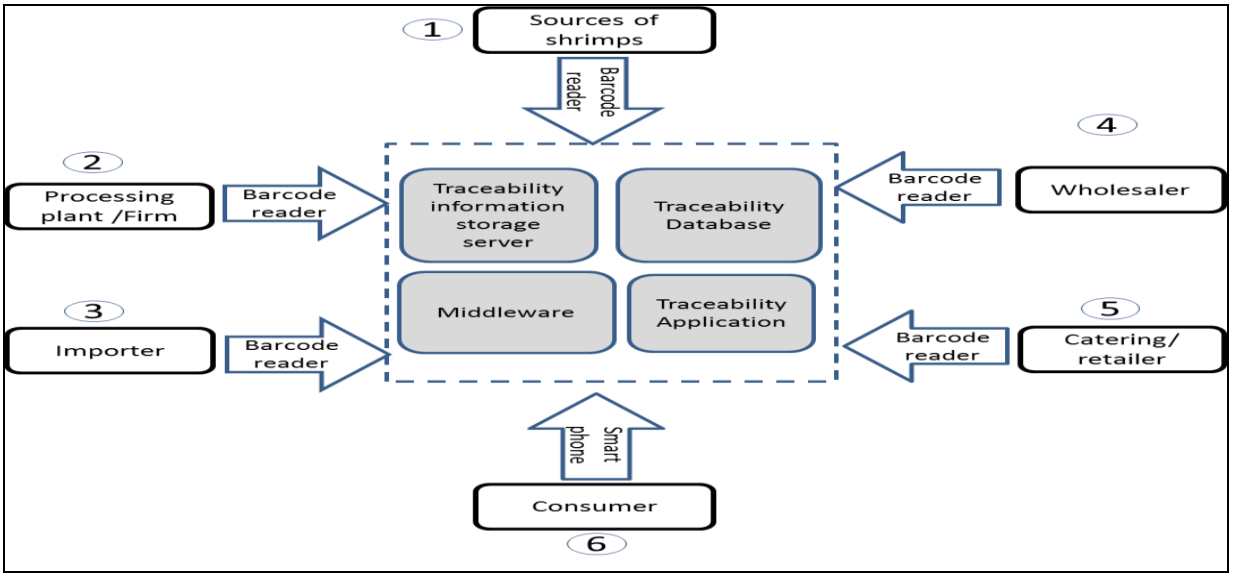

Figure 4.1: Electronic shrimp traceability in Bangladesh (Author proposed)

In the middle part of the figure 4.1 mainly works with supply chain barcode and the information system. Once item tagged with information tag, every step of delivery process can be trace by system and all the information will send to data center then user or customer able to see the location and status of goods. Normally, every retailer or supermarket has own warehouse for stocking the goods and before entering warehouse every product scanned by barcode reader system at the entrance to make sure correct product and in good condition. Retailer shows or display product to sell at dedicated location then customer be able to check the goods especially food product before buying. With this system consumer by using smart phone or tablet able to scan selected product to check all the information and status. In figure 4.1, the consumer can identify every information of the product where and how the product is prepared on the last phase (6) by using application software .The users can easily scan selected product to check the information and others related detail of product. The present conceptualized framework is the first framework that incorporates the major stakeholders from where the shrimps are collected, processed and distributed to the consumers. The other pilot projects were kind of initiatives that deal with the certain stakeholders of introducing e-traceability for the shrimp industries in Bangladesh.

4.5 Challenges of the framework

A well-organized value chain is the prerequisite to establish a well-managed e-traceability system for any products. When all the stakeholders communicate with each other and accordingly performs, it becomes easier to trace and track of the supply line. Considering the various sources of the shrimp products and lots of intermediaries, it is very challenging to establish well organized traceability by taping them in structured ways. Sharing huge amount of data with different stakeholders is also the challenging task. Many studies showed that the successful implementation of an electronic chain traceability system depend on a number of factors. In addition to that strong management commitment is of critical importance. In Bangladesh, many processing plants are giving priority for the e-traceability on which products are highly value added for the global consumers. Alam (2013) rightly stated that the challenges of establishing e-traceability in the shrimp industry are small sized culture ponds with little amount of shrimp production of each farmer; large number of transaction points in the supply chain; lack of organization among farmers ; intermediaries oriented business and producers do not receive enough appreciations in the terms of price. Alam (2013) also noted that there are three challenges for the e-traceability in Bangladesh. First one is Food safety Management, second one is record keeping and third one is information sharing. Alam (2013) suggested that in Bangladeshi shrimp industry cluster approach is more viable than individual traceability. To overcome the challenges and make e-traceability successful in Bangladesh, we need to focus the critical success factors like laws, regulations and standards for the different stakeholders, maintaining database of Gher ownership/ponds, government support, effective management and communication, top management and vendor support, information and system quality.

4.6 Conclusions and implications

From the literature review and practical observation, we have found that many pilot projects and initiatives have been taken to introduce the computer-based/e-traceability for the shrimp industries in Bangladesh. But due to the lack of awareness, shortage of technological tools and skills, cost of technological apparatus, unwillingness, shortage of power supply and lack of management support hinder the implementation of e-traceability in shrimp industries. The proposed framework incorporates several streams of work within the supply chain and electronic database of shrimp industry. It combines the supply chain activities, ICT part and consumer. The framework highlights the role of ICT and its interaction with the supply chain. This is the first framework of e-traceability developed for a shrimp industry context. It can serve as the base for future food e-traceability studies in this area.

The present study has few limitations. First, most of the studies cited from the industries which are not from shrimp industry. Second the model is based on conceptualization. The model needs to be tested against actual adoption and use by industry people. The organizational implications of electronic supply chain traceability concepts also need to be investigated further. Future work will involve designing interviews and surveys to gather the perceptions of industry personnel in adopting the framework.

In Bangladesh, to establish an e-traceability the prime role must be played by the government because only government has the power to enforce law. Government has the authority and access to initiate the primary level works. The government along with local NGOs and other international organizations like EU, UNIDO and FDA should support the initial financial cost for the betterment of the shrimp industry. The NGOs can play a vital role by engaging the stakeholders in a constructive dialog or settlement. The government, NGOs and the donor agencies can work together for a fruitful outcome for the entire shrimp industry with different contribution. Consumer friendly e-traceability system is possible when the government, NGOs and the donor agencies associate properly for the better future of this industry and its stakeholders.

Chapter Five: Knowledge Creation and Flow of Shrimp Industries in Bangladesh: An Exploratory Study on FIQC

5.1 Background and introduction

In Bangladesh, value chain in shrimp industries has large number of middlemen and long channels. Confining and creating value in the long chain is now widely used approach which is taken by many top management to ensure competitiveness. In the knowledge based economy, Foray (2004) and Quinn (1992) noted that incorporating value in the chain is possible for products and services when organization largely depend on the development of its internal knowledge resources. Considering that in the Knowledge value chain (KVC) model in industries, Carlucci *et. al*., (2004) stated that value chain activities is considered as knowledge processes and knowledge activities in the long chains. The KVC gives a framework to analyse the added value in the industry. KVC is a chain of activities acting on the knowledge assets of the firm. In the long value chain of shrimp industries, we have examined the FIQC activities in processing plants (which are the major actors in the value chain) and identified how do they create new knowledge through different activities. Creating knowledge in the shrimp value chain (FIQC and processing plants) and applying that knowledge in the chain add value for the shrimp industries in Bangladesh.

Nowadays many commercial and non-profit organizations have realized that knowledge is one of the key points of sustainable competitive advantages. Proper acquisition, effective use and utilization of new knowledge lead the organization to reach its zenith success. The value of knowledge has grown and Beazley, Boenisch and Harden (2002) rightly addressed that the emergence of knowledge economy transformed the knowledge into assets. Knowledge generated within and outside the organization becomes asset for creating value of that organization. Schiuma, et.al, (2012) noted that "an effective exploitation and management of knowledge resources are the basis of the

development of those capabilities that ground the organization's capacity to deliver successfully targeted value propositions, p.4". Based on DIKW hierarchy, Ermine (2013) proposed a knowledge value chain (KVC), which is interpreted as a continuum of knowledge processes adding new value at each step in the chain of industries. Like other industry, there has been a growing interest of utilizing knowledge management (KM) in the food industry.

For the food industry to remain relevant to their consumer, it needs to redefine its role with the help of KM. It can be noted as practices which can be used by companies to identify, create, share, transfer and turn knowledge into value creation. The drivers of the changes in the food industry are both from consumers and market-based. Hagen (2002) identified that in food industry the supply chain, food processing and quality maintaining are the areas where KM could help to improve the food products. From food industry literature, it has come out that accountability and traceability of food ingredients, handling process, quality control, preservation and branding are the areas where KM can facilitate (Hagen, 2002) and Attia & Salama (2018). Attia & Salama (2018) also found that supply chain management practices in food industry are positively affected by knowledge management capabilities. In fish industry like shrimp, knowledge on food safety management in the shrimp producing and processing is must. Ramnauth, Driver and Bhugaloo (2008) discussed that the depth knowledge on shrimp cultivating, acquiring, processing and exporting to global consumer for the industries is essential. It is because of the requirements of importing countries that all companies must have a documented food safety management system. By taking the findings of Sporleder & Moss (2002), we can endorse that KM can enrich to shrimp industry by systematic collecting raw materials, processing in the plants and distribute to the consumers.

Due to the globalization of industrial market, technological advancement, variations of consumers demand and safety and quality concern, the competition among the shrimp industries in different countries is intense. Shrimp industries in Bangladesh needs to create new knowledge and use this knowledge for value creation and maintain their competitiveness. For the present study, we shed light on how the Fish Inspection and Quality Control (FIQC) office create new knowledge for the stakeholders of shrimp industries in Bangladesh.

5.2 Objectives of the study

This exploratory study examines the Nonaka's (1995) SECI (Socialization, externalization, combination, internalization) model of knowledge creation in the context of shrimp industries in Bangladesh. Particularly the present study focuses on knowledge creation and the role of FIQC officers in shrimp processing plants. In the shrimp value chain, FIQC is the department which plays very important role for the certification of shrimp products. To support the quality exportation, inspection, quality control, create general awareness regarding safety and quality of shrimp products, and efficiently train all relevant stakeholders, FIQC facilitates all those activities. The following research questions guide the study:

RQ1. How do FIQC officers socialize, externalize, combine and internalize their knowledge to support the industry stakeholders?

RQ2. How does new knowledge create value for the shrimp industry?

RQ3: What are the barriers of knowledge creation process in FIQC to improve the shrimp industries in Bangladesh?

5.3 Theoretical lens: Knowledge creation in shrimp industries

Nonaka and Takeuchi (1995) identified the four types of knowledge creation process in the organization. There is a spiral of knowledge involved, where the explicit and tacit knowledge interact with each other in a continuous process. This process leads to the creation of new knowledge. Each quadrant represents the process of conversion of knowledge between the tacit and explicit forms. For example in the shrimp industry, knowledge held by FIQC office is shared with other stakeholders e.g., farmer, industry people, manager etc. so it interconnects to form a new knowledge. Taking the lens of Nonaka and Takeuchi (1995)'s knowledge creation process in the shrimp industries; we have examined the following phases.

5.3.1 Socialization

It focuses on individual knowledge linking among FIQC office and industry people. As a result, new knowledge is created by using the process of visiting the shrimp industry, interacting, training, observing and discussing with the company people.

5.3.2 Externalization

Externalization process in shrimp industries focus on tacit to explicit knowledge which generate new concept, e.g., value added products. For example, identifying the new bacteria and heavy metal ingredients in the shrimp products and report it to industry through internal report.

5.3.3 Combination

Combination in shrimp industries happens when new and existing knowledge transforms from explicit to explicit. Under this, activities like FIQC officer inspect the industry, collect the sample, certify the products and approved for the export can come. Creative use of those reports to get export statistics of shrimp exporting, sorting, adding, categorizing are some examples of combination process.

5.3.4 Internalization

In shrimp industries, by internalization explicit knowledge e.g., report, manual, brochures etc. is created using tacit knowledge and is shared across the industries.

We have taken the lens that creating new knowledge through SECI in shrimp industries by analyzing the needs of the industry people and identifying the barriers lead to offer new value for the industry. Schiuma, Carlucci and Lerro (2012) noted that new knowledge often lead to offer new value for the organization.

5.4 Methodology

The present study is qualitative in nature. We relied on e-mail interview method for collecting the FIQC activities. We sent out questionnaire to the forty five FIQC officers via e-mail. Most of the questions were open ended.

5.4.1 Sample area and population

The sample area for this study was the Fish Inspection and Quality Control (FIQC) offices in Dhaka, Chittagong and Khulna division. Department of Fisheries (DOF) has set up FIQC wing to strengthen the quality assurance in the form of internal and external monitoring of the shrimp products (DTC, 2013). Each FIQC office is headed by a Deputy Director (DD) to ensure the quality assurance of exportable fish and shrimp products. Most of the FIQC office has traditionally been regarded as a bridge between research laboratories and shrimp firms, farmers and other stakeholders. Testing of shrimp and shrimp products for microbiological, chemical, filth and organoleptic tests are the pre-requisite for exporting shrimp products. FIQC conducts those tests, inspect the processing industry, conduct awareness program for the farmers, suppliers, processing plant people and other actors of the shrimp value chain (DTC, 2013). The target population was the FIQC officers who visit the processing plants and certify the products to export.

5.4.2 Interview protocol and data collection

The questionnaire was pre-tested to check for any inconsistency. The test aimed to iron out ambiguities from the interview guide and ensure that all parts of the questionnaire are covered. We had a discussion session with the three FIQC officers. After that finally forty five FIQC officers were purposively selected based on their professional knowledge, skills and experiences, and personally contacted them via e-mail. After multiple follow up of e-mails and efforts, twenty eight officers responded with the filled up questionnaire. The response rate was 62.22%.

5.4.3 Instrument development and data analysis

The items developed for the interview questions were basically on the construct of knowledge creation. Largely it focused on the four phases of the SECI model. There was a mix of self-developed questions. We partly depended and adopted some of the questions from the prior studies such as Zakaria and Nagata (2010); Easa (2012) and Andreeva, & Ikhilchik (2011). Study participants generated rich details of the process of knowledge creation in FIQC. For instance, study findings provided insight to understand: (a) the socialization process, (b) externalization process, (c) how they combine and internalize, and (d) their barriers of knowledge creation process in the industry. For instance, by

applying grounded theory principles, we developed open, axial, and selective codes manually to identify SECI process, respondent's opinion of value creation and barriers to knowledge creation. In the analysis part, different tables demonstrated how we used open, axial and selective codes to identify the SECI process. For the inter-coder reliability, first author and research assistant coded the responses independently and the inter-coder reliability was around 85%.

5.5 Data analysis

For the qualitative data analysis, all answered were entered in an Excel spreadsheet. For explaining the SECI process, we used open coding, axial coding and selective coding (Corbin and Strauss, 1990). We had relied on grounded theory approach where the theory was developed inductively. The approach is to read (and re-read) a textual data, discover the variables by identifying categories, concepts and properties and finally come up with the core categories (Glaser & Strauss, 2017). All of the respondent responses were categorized under these coding and the findings for each question are discussed below. These helped to come up with the theoretical framework or explain theory with the variables. In the table 5.1, 5.2, 5.3 and 5.4, we have analyzed the responses of the FIQC officers what do they do for the SECI process. After analyzing/classifying the open and axial codes, we have used selective codes (final category) in the Figure 5.2.

Table 5.1: Selective codes – Phases of SECI (Socialization)

Open Codes (Socialization) (Tacit-Tacit exchange of FIQC and stakeholders)	*Axial Codes (Clustering of Socialization)*
We often rotate our office duties/ we have weekly plan of systematic activities/Doing in a project works/ Daily f2f interaction in office time/	***Office time talk/systematic work plan/daily activities/f2f discussion/visit processing plant/mobile court/laboratory test/value added products.***
Visiting the processing plant /discussion with the farmers for quality shrimps	
Conducting mobile court for the malpractices/ discussion in the laboratory for chemical test/discussion for the value added product.	
Guest lecturers// daily meeting/ weekly meeting/ attending seminar /training/workshop/cross functional team meeting for HACCP/Traceability/compliance training/	***Invited talk /training/workshop/seminar*** awareness program/ hygiene condition/organic food/
Arranging awareness program with the shrimp stakeholders/discussion with the industry people for hygiene and sanitation condition of the processing plants/knowledge sharing session for the organic food with the farmers/talking with the health condition of the labour in the industry	
Informal meeting during snacks and tea/lunch time/ Everyday communication/Phone calls/e-mail/	***Lunch time talk/informal communication***
Discussion time with the head of the office/achievement/ difficulties/work plan for next days	***Reporting/planning***

In table 5.2, we have analyzed the externalization responses of the respondents. The externalization describes the conversion of tacit knowledge into explicit knowledge in the FIQC and shrimp industry. Documenting the personal (tacit) knowledge, it facilitates group knowledge in the shrimp industry.

Table 5.2: Selective codes – Phases of SECI (Externalization)

Open Codes (Externalization) (Tacit-explicit knowledge)	*Axial Codes (Clustering of Externalization)*
FIQC officer records all sorts of official documents relevant to shrimp industry inspection/we maintain the log book for the daily activities/ put the activities and schedule in the register book/Prescribed form.	***Reporting events/maintaining logbook of activities/follow the schedule/meeting memo/reporting /conference/workshop outcome/FGD/Preparing test report/***
Make a memo for further discussion with colleagues/ filled up the inspecting form and submit to office for analysis/Submitting test report/Bringing sample and prepare chemical/microbiological test.	
Records the findings of meeting/seminar/workshops/ conference/training program/ reports of experiences on various matter/Focused Group Discussion (FGD)	
Prepare handbooks/brochures for the farmers to make them knowledgeable for the healthy and quality broods/ we offer new business model to the industry people/Guideline for value added products	***Handbooks/manual/guidelines/research papers/newspaper write up/new concept creation/product development/attending workshop abroad/***
Publishing research papers in locally, nationally and internationally/Attending conference abroad/ Quite good number of models, procedures collects for better practice from abroad/Brochures/concept creation and new product development/write up in daily newspaper for awaring people/	
HACCP guideline/Traceability brochures/Global market info/Celebrating fisheries day/	

Table 5.3: Selective codes – Phases of SECI (Combination)

Open Codes (Combination) (explicit – explicit reformulation of knowledge))	*Axial Codes (Clustering of Combination)*
We have large computerized database of shrimp firms/Monthly reports based on daily report/Statistical year book/yearly fish processing establishment evaluation	Databases/Annual reports/social media/policy formulation/Bulletin board
Social media such as Facebook pages/classify information in database, networks and reports/Bulletin board	
Formulate national fisheries policy/ National Residue Control Plan (NRCP)	

Table 5. 4: Selective codes – Phases of SECI (Internalization)

Open Codes (Internalization) (Explicit to tacit conversion of knowledge)	*Axial Codes (Clustering of Internalization)*
Working in the field level/learning by doing/ visiting the processing plant/	Training/Practically visit the firms/learning by doing/Forums/Access to various reports
Working with the seniors/ community of practice/Access to FIQC directory/learning by attending training/Using fisheries forums	
Discussion on banned report by EU/USA and other countries/Printed firm/buyers list to contact.	

5.6 SECI and value creation

In case of value creation, most of the respondents (80%) believed that they create value by offering new knowledge to the industry people. The significant finding of the study is that the majority of the respondents positively argued that new knowledge created by FIQC often leads to new value creation. While few of the respondents (20%) argued that value creation parts go to the industry side. It is all about the shrimp firm's responsibility and we do help them to work accordingly in the journey of value creation. They also noted that FIQC may work more actively to excel the value creation process by changing the regulations.

We summarized the responses and found that to improve the quality and food safety of shrimp products, FIQC add value by preventing contamination and assuring hygienic

measures in all stages of productions, harvesting and preservation, handling, transportation, processing, storage and export. Some of the FIQC officers responded "We help to sustain in the international food business market through increasing export of good quality and safe shrimp product as per consumer's demand and increase export earning to achieve the MDGs". "FIQC initiates for designing new value added products based on consumer needs and government order to compete the global market"; "We are working on organic shrimp project in Bangladesh. Without few exceptions, organic farming in Bangladesh is still on experimental basis". According to another respondent "FIQC tracks the relevant research studies, identify the value addition strategies of different countries and facilitate to initiate in the shrimp firms in Bangladesh". One of the FIQC officers pointed out that "we create general awareness regarding food safety and quality of fish/shrimp products and efficiently train all relevant stakeholders in order to implement food safety measure through various training, workshop, seminars and other mass communication". Some of the significant activities of FIQC's as described by some of the interviewees, most of which are supported by DTC (2013);

- Follow HACCP to improve the product quality;
- Work on the traceability;
- Value added products;
- Product quality by doing chemical/microbiological/organoleptic /filth test;
- Increase export earnings through quality assurance and product development.
- Sample collection for NRCP
- Sample collection for tests.

However, most of the interviewees suggested that the FIQC activities like HACCP, traceability, inspection, product development idea, renovation and modernization of existing FIQC laboratory facilities excel the value addition process in the shrimp industry.

5.7 Barriers of knowledge creation: FIQC

We have summarized some of the barriers of knowledge creation activities of the FIQC and industry as a whole. Lack of training, less research on products diversification, no research and development section in FIQC, unaware and poor literacy of the shrimp

farmers and suitability of the industry are the areas where this industry is suffering. Most of the respondents replied (70%) that they do not have much more training opportunities, while training for the chemical /microbiological test, traceability and compliance of HACCP system is must for the export of shrimp products. An interviewee asserted that "training is important for them to change their mindset from the traditional approach of quality control and end product testing". It was also found that industry people has lack of training and other activities to enhance the skill efficient production. Considering the manpower, one FIQC officer from Khulna remarked "We have 145 export oriented shrimp processing plants and the number of FIQC officer is limited. We daily visit the processing plants and spent all the day in inspection. We spend less time for the knowledge creation activities". Considering the global market and demand, the industry faces new challenges for ensuring safety and quality. One of the respondent concerns "Sustainability of the shrimp production in Bangladesh is the big challenge as the processing plants are operating merely 20% of their production capacity due to limited supplies of shrimp". Lastly, we have summarized some of the barriers what they face in knowledge creation is;

- Poor awareness and realization of the value and benefit of possessed knowledge by other officers and lack of knowledge sharing culture;
- Lack of contact time and interaction between knowledge sources and recipients;
- Lack of rewards and recognition that would motivate officer to create new knowledge;
- Unwillingness to use ICT tools due to lack of familiarity and experiences.

5.8 Discussion and findings

The present study has focused on the FIQC, a respective organization of Bangladesh government which is largely associated with maintaining the quality and exporting of shrimp products. To strengthen the industry people through various activities, building standard HACCP and traceability, improve the quality and safety of products through value addition, create general awareness through various training, workshop, seminars

and other mass communication, FIQC has been playing significant role in the shrimp industries of Bangladesh.

Based on the findings of this qualitative interview of twenty eight FIQC officers, we have examined the Nonaka and Takeuchi (1995)'s model of knowledge creation in the shrimp industry setting. Based on the data analysis of the study, a few key strategies emerged as important for knowledge creation activities in FIQC. The each quadrant in the Figure 5.1 represents the process of conversion of knowledge between the tacit and explicit forms in the FIQC.

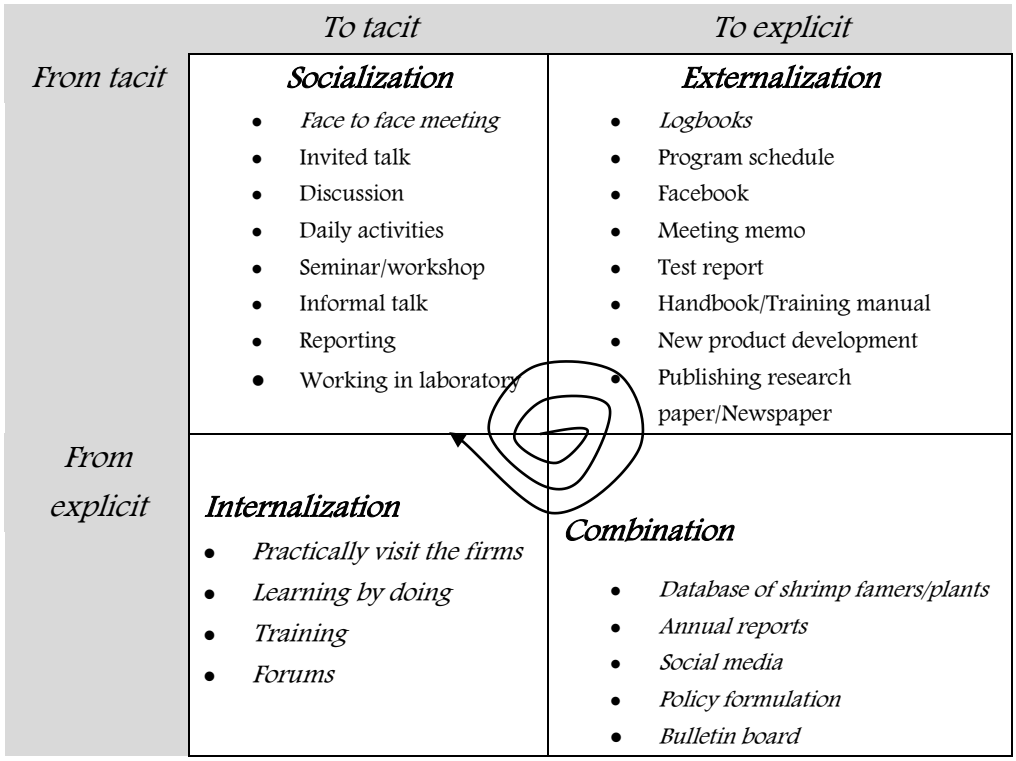

Figure 5.1: Nonaka and Takeuchi (1995)'s model of knowledge creation in shrimp industries

It demonstrates how knowledge creates (based on the study findings) within the FIQC. In each quadrant, the strategies listed using the bullet points are those identified by the respondents as pertaining to knowledge creation activities. Figure 5.1 summarizes the responses by the FIQC officers about what do they do to create new knowledge. We can conclude that there is a big focus on the socialization parts as FIQC officers have more opportunities or room to socialize their activities. The essence of socialization is knowledge sharing and they do that by F2F meeting, discussion, attending seminar/workshop and working in the laboratory. While Nonaka & Takeuchi (1995)

claims that socialization as the mode of knowledge conversion is strongly practiced by Japanese firms, but for this study in Bangladesh we found that it works well with the FIQC. The findings are inconsistent with the Liebowitz (2006)'s study where it was found that the aim of socialization is to encourage people to communicate, share knowledge and enhance group discussion.

For externalization, the knowledge of the FIQC people is compiled or captured through documentation like preparing logbook, meeting memo, prepare training manual, publishing new concept in research papers and writing features in national daily's. For example, Better Work and Standards- Better Fisheries Quality (BEST-BFQ), a unique programme with farm to fork approach that focuses on strengthening the national fisheries quality infrastructure of Bangladesh. With the help of European Union (EU), Norwegian Agency for Development Cooperation (NORAD) and United Nations Industrial Development Organization (UNIDO) and training on Good Aquaculture Practice (GAP), FIQC produced various brochures and training manuals for the farmers and industry people. We found that through the externalization process, the created knowledge is used by other FIQC units, officers, stakeholders and overall fisheries industries which ensure better products and sustainable shrimp industry. It is in line with the Turban, Sharda and Delen (2011) and Bachmaier & Seeber (2018) 's study where it was found that through externalization knowledge can be used by more people, organizations and society which ensures better decision making and solving the problems. Bachmaier & Seeber (2018) also found that knowledge externalization facilitates the better utilization.

In the combination part, knowledge creation is not possible without the externalization mode. Combination refers to the "process of assembling new and existing explicit knowledge held by individuals into a knowledge system" (Nonaka &Takeuchi, 1995, p207). Apart from posting about events/publications in social media such as Facebook, preparing database of shrimp famers/plants, annual reports, policy formulation and bulletin board, there aren't any identified opportunities for explicit to explicit conversion of member knowledge in FIQC. The monthly, annual reports of FIQC and other organization related to shrimp industries could be combined, edited or processed, which would lead to new knowledge. The new explicit knowledge could then be disseminated among the FIQC members. Finally, FIQC officers internalize their knowledge when they

practically visit the firms, learning by doing, and can stay current with industry trends via its discussion lists (forum). For example, FIQC department arranges training programs for the FIQC officers at different stages of their working with the processing plants. By reading these training manuals and documents, FIQC officers internalize the tacit knowledge and try to create new knowledge after the internalization process. Nonaka & Takeuchi (1995) calls the knowledge created by an internalization process as operational knowledge and organization is also regarded as learning organization (Natek & Zwilling, 2014). After scanning all the phases, we summarized that socialization and externalization processes of SECI were practiced largely by FIQC. However, some limitations of combination and internalization of the FIQC office minimized the knowledge creation activities. Adachi (2011) examined a study on SECI where it was found that information communication technology like Internet/Intranet has vastly increased the opportunities for knowledge combination. But for the present study we found that in FIQC did not use these tools for the combination activities. By solving industry problem thorough visit, hands on training and decision making by individual FIQC officer, the other officers receive the new knowledge which becomes assets the organization.

We examined and summarized the SECI model which is expected to support for creating value (e.g., new value add, improved safety and quality, ensure export standards, certification) for the shrimp industries in Bangladesh. As per the respondent's opinion, many new value added products comes in the market which occupied the new markets. Utilization of explicit and tacit knowledge, nurturing the knowledge sharing culture and establishing a knowledge link or knowledge networking within the stakeholders in the industries can ensure the knowledge creation environment. The study suggested that the SECI processes positively influenced innovation by increasing the generation of ideas for shrimp industries. The present study has also brought a set of barriers that are hindering the knowledge creation activities. Absence of knowledge sharing culture, lack of training facilities and unawareness of the farmers and industry people are the areas where proper attention should be given. Apart from those, offering incentives and encouraging of using ICT tools should be taken into consideration. By overcoming these, creating new knowledge and offering new products to the global market, Bangladeshi shrimp industry

can successfully face the challenges of the global market. Many studies e.g., knowledge creation support new product development (Hoegl & Schulze, 2005) and knowledge creation in new project (Schulze & Hoegl, 2006) have identified that new knowledge often leads to new product development. In shrimp industry, new knowledge will ensure the safety and quality standard, offering diversified shrimp products and adding value in the shrimp products which will help to get a strong position in the global shrimp markets.

5.9 Conclusions and future study

For the present study, we set out to answer three research questions. The responses brought forth a rich set of findings, which are limited by the size of the sample. Primarily the model is explained to allow for a deep understanding of FIQC activities. From this model, we have found that the essence of socialization is knowledge sharing, externalization is coding of knowledge, combination is storage, systemization and processing of data, and finally, the essence of internalization is learning in the FIQC. By doing this, FIQC is creating new knowledge in the industry. The findings of this study have provided some insights as how knowledge is created and shared within an organization and how it leads to value creation activities.

Shrimp industries in Bangladesh are always blessed with lower cost of production and wages. As a developing country, Bangladesh can produce the export shrimp products at a lower cost than in developed countries (Cato and Subasinge, 2003). Having new knowledge and applying this knowledge in the industry, overcoming the obstacles, pro-environment of value creation activities and lower cost of production will lead the Bangladeshi shrimp industries to gain competitive advantages in the global market. The present study is empirically supported and with the lack of previous studies on this in the shrimp industry domain, it should trigger interest for similar studies to be carried out. Findings from the study could assist in the formulation of more established policies in knowledge creation in shrimp industries where more knowledge creation activities could be carried out in FIQC. The study has few major limitations. It was limited to open-ended responses and the sample size was small. A larger quantitative study with a bigger sample size and a comprehensive case study would bring out the more significant findings of this study.

Chapter Six: Discussion and Conclusion

After examining the substantial amount of relevant literatures, we have come up with the theoretical lens for the present study. In the previous chapters, we have explored the value chain activities of Bangladeshi shrimp industries by examining the Porter (1985)'s value chain model, came up with a model of e-traceability in the shrimp industry and examined knowledge creation activities using Nonaka and Takeuchi (1995)'s model in the shrimp industry. After analyzing data in the earlier chapters, we re-examined the objectives and research questions of the study, summarized the findings, and proposed a theoretical research model of analyzing value chain for value creation in shrimp industries. Then we talk about findings and the theoretical model. This is followed by implications, limitations and directions for future work.

6.1 Answer to the Subsidiary Research Questions (SRQ's)

SRQ1: How does shrimp industry perform the value chain activities?

For addressing this research question, value chain analysis literatures have been reviewed from the relevant literatures and interviewed selected firm managers in chapter three. Interviews were conducted with the shrimp industry managers in the southern region of Bangladesh. Exploratory qualitative research method was used and the questionnaire was semi-structured. First research question aims to analyze the value chain activities of shrimp firms in Bangladesh, and mapping the Porter's (1985) value chain framework to see if it works or not. The importance of value chain analysis in shrimp industry always gets priority because value chain looks at every steps of production which is required to create a product. The overall goal of value chain analysis in the shrimp industry is to deliver maximum value for the least possible total cost. Porter (1985) noted that industries optimize value when properly managing the chain of production and sales from inbound logistics to operations, outbound logistics, marketing and sales. In the present study, most of the firm managers admitted that they have good

knowledge on value chain and they follow it in their industries. Apparently, we can come up with the findings that firm managers have good degree of knowledge on value chain and they believe that value chain analysis can play good role to follow up this chain activity in the operations. Taking the lens of Porter (1985) value chain, we have examined the primary and supporting activities of the shrimp industries in Bangladesh. After analyzing of those activities, we found that both in primary and supporting activities of the chain were suffering with the variable factors. The primary value chain activities of the shrimp industries are logistics/inbound, operations, logistics/outbound and finally sales and marketing. For the present study, we found that some of the building blocks of the primary activities are suffering poor transportation, communication gap between the suppliers (farmers) and receivers (industry), shortage of raw shrimps, preservation problem and power supply. It is in line with the Quader (2012) and Nupur (2010)'s where they found that shrimp farming in Bangladesh facing problems in availability of raw shrimps, inadequate and irregular supplies of electricity, inconsistent availability of high-quality water and ice and poor transportation facilities. The findings of the present study also supported by the Rahman and Hossain (2013)'s study where they brought a set of problems of the relation between farmers and processing plants and quality compliance arise at pre-processing phase at the stage of handling of raw shrimps (harvesting, sorting by size and color, removal of heads and peeling which are often carried out under conditions and facilities that are unsuitable from hygiene perspective).

For the present study, we have examined and analyzed the primary and supporting value chains with the building blocks of procurement, technology, human resources and infrastructure of the shrimp industries in Bangladesh. After analyzing the chain, we found rich set of findings where the industries are facing challenges. We found that technology and infrastructure building blocks are the areas where most of the processing plants are suffering. Absence of e-traceability, lack of modern processing machines and modern lab, poor infrastructure of the processing plants, lack of good aquaculture and subsidy, instability of finance and poor business ethics are areas where supporting activities are facing challenges. These findings are supported by Rahman, *et.al.* (2013)'s study on

shrimp cultivation with an ecological model in Bangladesh; Star Business Report (2017)'s report on use of modern technology to promote shrimp farming; Chowdhury and Khairun (2014)'s extensive shrimp farming systems in local Bangladesh and Nupur (2010)'s study on problems of shrimp farming in Bangladesh. We summarized their findings and identified that in case of using modern technology in shrimp farming, Bangladesh lags behind most other countries. Shrimp farmers are experiencing with initiatives their need based technology developed by their own knowledge. We also found that poor traceability, lack of infrastructure and limited flow of finance and subsidy from the government lags the industry's development. In traceability and HACCP, recently e-traceability project is being started which is not operationalized fully (Alam, 2013).

In coastal Bangladesh, shrimp industries have many problems that led the Bangladeshi shrimp industries put forth behind the other exporting countries in Asia. The major items of fisheries exports are frozen shrimp and shrimps are largely cultivated and processed for the global markets. In seafood markets, shrimps are one of the most demandablecommodity but many challenges remains with this product. Large shrimp markets in USA, EU and other importing countries require the quality, food hygiene, traceability, development of technological and certain trade policy. For gaining competitive advantages and creating value in shrimp industries, it is necessary to unwrap the firm's value chain and unlock the chain activities by analyzing if it is needed. For understanding and finding out the loophole, we have analyzed the value chain of shrimp industries and found the gap to tap those activities. After identifying the primary and support activities, shrimp industry should identify the driver points for each activity. For example, by utilizing modern technology, traceability driver could include e-traceability for offering information how products can be traced by the consumers, know the history to track and trace the information at each stage of production, processing and distribution. Like e-traceability, there is a shortage of raw materials in terms of capacity utilization of shrimp processing industries. Shrimp industries could focus on ensuring the availability of raw shrimps for the processing plants. Like these drivers, shrimp industry should then identify links between activities, knowing that if the chain is improved in one

area, it might positively affect the other chains. Industries can then identify opportunities to create more value.

Finally, the Bangladesh shrimp industries have ample scope of development to strengthen the markets globally. To realize the potential, there is a need to follow the value chain analysis guidelines for the integrated chain management. Bangladeshi shrimp farmers, traders, processors, industry people and government as a whole need to understand the importance of VCA. If the Bangladesh shrimp industry wishes to outperform its competitors through differentiating itself through quality activities, they will have to perform its value chain activities better than the oppositions.

SRQ2: How does e-traceability effect value creation in shrimp industries?

We have addressed this research question based on existing frameworks of e-traceability . We had relied on Kadir, *et. al.,* (2015) and Aung & Chang (2013)'s framework where they have focused the internal and external traceability of the supply chain with the technology. We have examined the present status of e-traceability situations of shrimp industries in Bangladesh and proposed a model in the chapter four. Ito (2007) identified that the export of shrimp from developing countries like Bangladesh is growing and at the same time food safety, traceability and other standards of shrimp foods are continuously imposing by global buyers. It was identified from the literature review that shrimp food safety has been an increasing concern among EU, North America, Japan and other countries over the last decades. Using chemical in the shrimp and shrimp products could be transmitted to the humans. Shrimp industries in Bangladesh has faced embargoes in earlier years. The impact of ban has forced the shrimp industries of Bangladesh to think of the traceability in their products. Tracing shrimp products through the production and distribution chain helps to identify the risks. As a risk-management tool, traceability allows shrimp industry authority to withdraw or recall products which have been identified as unsafe. Considering the importance of traceability, with the help of Food and Agriculture Organization of the United Nations (FAO), US FDA (Food and Drug Administration) and supports from other organization, Bangladesh has established

traceability systems. In corporation with DoF, the UNIDO project developed traceability framework and introduced a complete traceability system in shrimp farming areas since 2009 (Islam, Rahman and Haque, 2017). Some of these are Hazard Analysis and Critical Control Point (HACCP), Good Aquaculture Practice (GAP), Best Aquaculture Process (BAP) and Good Manufacturing Process (GMP).

As traceability going forward and consumer's instant information need of products is increasing, the traditional traceability system will not work. Many traceability systems in shrimp industries simply track a few key chains back to a single point in the processing plants. But new technology provides full traceability across industries. Technological revolution, availability of apps and different features of smartphone makes the e-traceability process easier than before. Once the consumers plan to buy a particular product, consumers are now able to scan a product label with an app on their smart phone and can immediately track its journey through the chain. It helps consumers to take the decisions to buy the product and at the same time shrimp industries get the opportunity to show the full chain of it's products. The more the consumers retrieve the product information, the more they will buy the products. Through e-traceability, consumers in the global market make an informed choice when they purchase shrimp products. Even the global consumers would like to pay more for the e-traceability (Lorbiecki, 2016).

Having this demand and global scenario, we have posed this research question and examined the e-traceability scenarios of the shrimp industries in Bangladesh. At present, there are no e-traceability system works in the shrimp industries of Bangladesh. Recently, WorldFish and SourceTrace introduce a new technology for shrimp farmers in the Southern part of Bangladesh (WorldFish, 2016). Using an app eServices Everywhere (ESE), SourceTrace can offer traceability details throughout the production process, from hatchery to harvest. However, the project is not operationalized fully yet. Apart from that many NGO's, government organizations and international organizations are working for introducing e-traceability in the shrimp industries. After reviewing substantial amount of literatures and observing the existing situation of shrimp industries in Bangladesh, we

have come up with a model in chapter four (Figure 4.1: Electronic shrimp traceability in Bangladesh).

In the figure 4.1 we have identified, e-traceability can happen in the Bangladeshi shrimp industries when the value chain will be connected, linked, stored data and encounter with the system database, server and other parts of the system. For example, in the chain process for identifying the sources of raw shrimps, we have come up with the concept where all the registered shrimp firms of a particular region can come under the one registration number. Once the product origin is traced and sources are tagged, then for the 2nd phase can come where the products is being processed with the individual tag. Like this in the chain, we offered tag number for every stage in the chain. After having these tag numbers for every chain process, the central part processes the data with the help of data storage server, traceability database, middleware and traceability. Finally the products are labeled with the barcode. The barcode contains the country code, origin from where the shrimp is collected, date of issue, company name, weight, category and traceability code.

Shrimp industry and consumers in developed countries demand for greater e-traceability in the shrimp food industry in recent years. 'Knowing how and where shrimp was caught' is not just a topic for the global consumers but it has opened a new area of interest in the food industry. Shrimp experts, exporters and importers from home and abroad emphasized to ensure the traceability. We have focused that if the e-traceability system is established in Bangladesh, shrimp industries will gain competitive advantages from other shrimp exporting countries. The major importers from EU, USA, Japan and other countries will import more products from Bangladesh. Shrimp export will be increased.

SRQ3: How is knowledge created in shrimp industries?

The purpose of this research question was to empirically examine the SECI (Socialization, Externalization, Combination, Internalization) knowledge creation model offered by Nonaka and Tekeuchi (1995) in the shrimp industry settings of Bangladesh. Particularly it has examined the knowledge creation activities of Fish Inspection and Quality Control

(FIQC) office under the Department of Fisheries (DoF) in Bangladesh. We have examined the knowledge creation model in the chapter five. We have identified that proper value chain analysis and offering e-traceability facilities in the products can offer more value for the Bangladeshi shrimp products. In the knowledge creation process, it was found that FIQC officers create new knowledge in their daily activities. Capturing the employee knowledge through proper channels like regular meeting, discussion, reporting and externalizing this knowledge through meeting memo, logbook, and publishing papers lead the knowledge better utilization. Through externalization, the new knowledge is being used by the stakeholders of shrimp industries. Preparing a database of shrimp industry stakeholders, use annual reports for preparing national policy formulation are the areas how the FIQC combined the new knowledge and finally by visiting the firms and working practically in the industry, they internalize their new knowledge. After examining all the phases, we came to conclusion that socialization and externalization phases of the SECI were practiced largely by FIQC. Finally, we summarized that F2F discussion, meeting, preparing meeting memo, handbook and training manual, annual report, database, learning by doing and forums are the strategies to create knowledge in FIQC. However, we found that some limitations of combination and internalization of the FIQC office minimized the knowledge creation activities.

As FIQC does not have any research and development department, FIQC faces some barriers in the knowledge process. We have identified that lack of training on the technical areas like HACCP, laboratory test and e-traceability, less priority on product diversion and poor literacy of the shrimp farmers set the knowledge creation process slower in the industry. Moreover the poor knowledge sharing culture, lack of reward and recognition and less use of ICT tools in their daily activities are the barriers of knowledge creation in FIQC. The significant findings of this research question is most of the officers felt that knowledge creation is important for gaining competitive advantages for the industry. They replied that creating new knowledge would bring more value for the shrimp industries in Bangladesh. Creating new knowledge in food safety and quality, value addition, diversification in the products, organic farming, HACCP and e-traceability,

Bangladeshi shrimps export will be increased in the EU, USA and other importing countries. The increased demand pushed the export prices of Bangladeshi products up.
Fort the present study, we have identified that FIQC is creating new knowledge and this knowledge leads to value creation in shrimp industries. Giving emphasis of using FIQC people's knowledge, tailoring stakeholder needs, positive support from management and applying them for overcoming barriers ensure the new shrimp market internationally. Thus, knowledge creation can influence the innovative products by offering new ways of addressing industry and consumer needs and coming up with novel products for shrimp industries.

6.2 Answer to the Major Research Question

MRQ: What is the role of value chain analysis (VCA) for facilitating value creation in the shrimp industries?

To address the major research question of this study, we have come up with the three subsidiary research questions (SRQ's). For coming up with the research question, we have reviewed substantial amount of literature, focus background of the study and arrived with the theoretical lens. After reviewing the relevant literatures and examine the different case studies of shrimp industries, we have come up with some of the enabling factors that creates value for the shrimp industries.The traditional shrimp value chain in the coastal areas in Bangladesh is characterized by a large number of middlemen, actors and stakeholders. In the Bangladeshi shrimp industries four main categories of actors can be distinguished which are suppliers, farmers & fishermen, middlemen and processors/exporters (Figure 6.1). For entering into a new market, Bangladeshi shrimp industries are competing with the other competitors (India, China, Thailand and Vietnam), buyer requirements, safety and quality of products, successful marketing strategies, traceability and certification, consistency of supplying raw shrimps and

increased consumer demands. For unlocking the value and organizing the chain activities, value chain analysis (VCA) allows shrimp industries to offer more value for gaining advantages over their competitors. Taking the VCA as an enabling factor for value creation in the industry, industries can create the greatest possible value for their global consumers. Analyzing the value chain and adding value link by link make the industry stronger and find the path to go further for the industry. Taking VCA as a tool of value creation, value chain of shrimp industries were examined and found that it would be useful for the industries. This indicates that VCA phenomenon and its implications on the shrimp industry yield better possibilities of offering advantages in shrimp industries.

More efficient value chain management ensures the competitive advantage and nowadays, a rising number of industries are looking for the VCA for chain management. Once the activities of the long chain of shrimp industries are identified by the VCA, we have focused individually the other two factors e.g., e-traceability and knowledge creation for this study. Under the holistic approach of value chain analysis, we have extracted e-traceability and knowledge creation factors. By using e-traceability, the consumers can trace the product information. To address the consumer need and their demand for the product information, e-traceability of products help consumers to buy the particular products. Managing the different information in the chain (farm to fork) is one of the biggest challenges of shrimp industries. Shrimp industries in Bangladesh do not have e-traceability system to address these challenges. Linking the chains and using numbers for different chains, storing product information in the database and using apps to retrieve products information in the sales and distribution channels play a key role in selling the product. We have conceptualized an e-traceability framework for the shrimp industries in Bangladesh.

Like other industries, knowledge creation in shrimp industries plays an invaluable role foroffering innovation in products. In chapter five, we have brought the findings from many studies that the industries that are able to stimulate employees to create new knowledge are much more prepared for offering value for their consumers. Considering the importance of knowledge creation, the right combination of interaction between the FIQC officers, farmers, industry peoples of shrimp industries are addressed. FIQC officers

manages their knowledge through interacting with officers by discussion, addressing industry people need, working with the stakeholders, informal dialogues, sharing codified knowledge and applying them properly in the processing plants. Industries should overcome the barriers of knowledge creation and focus on the value of tacit knowledge of employees, promoting knowledge sharing culture and leverage to take place for the industry.

6.3 Theoretical model: VCA for value creation in shrimp industries of Bangladesh

The major outcome of this study is to propose a theoretical model of shrimp industries where the analysis of value chain, e-traceability and knowledge creation approach facilitates value creation in the shrimp industries of Bangladesh. The relationships between these variables were identified in many studies and showed how do these concepts are connected to create value. For example, e-traceability is one of the emerging technologies that can make the shrimp value chain smarter through tracking the all information of the industries. Like the e-traceability, knowledge creation approach in the chain can lead to offer more value for the industries. Creating knowledge is not enough. The value of knowledge is realized when it is used in the chain. Examining the chain, unlocking the gap and addressing those gaps by doing research add value in the shrimp industries. Based on the background study, literature review and findings of the research questions, we have come up with the following model for this dissertation (see Figure 6.2). The arrived model is unique in the field of shrimp industries in Bangladesh as the proposed model explores how the shrimp industries can create value for their consumers and gain competitive advantages. By systematic literature review, observations and interviewing the industry people we come up with this new approaches of value creation. It is empirically supported that the current study presents a new angle to the findings, and new perspectives. We have to analyze and see this model from the left to the right. The model is composed of five key elements –existing status of the shrimp industries, value creating enablers/transformers, examining the chain activities,

synthesize (value creating funnel) and overcome barriers and finally the result or outcome.

The first part on the left side of the model refers to the present status of the shrimp industries in Bangladesh. After visiting the shrimp processing plants and commercial shrimp cultivation in coastal areas, interviewing, analyzing data from previous chapters, we found that shrimp industries in Bangladesh are suffering with the raw materials, variation of value added products, e-traceability, traditional or manual process of shrimp products, and research and development. There was no e-traceability process for the shrimp products. Processing plants are utilizing only 25% of their total capacity due to the shortage of raw materials and inefficiencies in various steps of the shrimp value chain.Moreover, traditional culture method of shrimp, manual processing, less priority in research and development, set safety and quality requirements from buyers (EU, USA, Japan and others) put the shrimp industries in challenging position. At the same time, the impact of global competition is forcing the industry to adoptso-called global standards concerning food safety. Industries are also continuously competing with other players/exporting countries like India, China, Thailand, Vietnam and Indonesia.

Second part from the left side of the model refers how shrimp industries could transform. Transforming shrimp industries into a better position and gaining wider access to the global market, industry should actively focus on the value creation. Industry needs to study the global market strategy, measuring the consumer need and demand and identify what value important to the buyers. For creating new, more and better value, industries have to work in different ways. Creating new value is most difficult approach as it needs to create from the scratch. This strategy refers something new for developing new products or entering into the new market. Creating more and better value always focuses the strategy to improve the chain that making the process more efficient to deliver the products. One of the best examples of this approach is Value Chain Analysis which unlocks the value for improving the chains that already exists. Owusu & Darko (2017), Yoshida (2017), Dora (2015), Kao, *et.al.* (2016), Merchant (2014) and Haghiri (2014) list major value creating enablers or factors for industries. Some of these are co-creating with the consumers, value chain analysis, process improvement, e-traceability, value

addition, consumer segments, well marketing strategy, research on new product development and using modern technology. An integrated strategy at each stage of value chain, respond the emerging trends and fit the enablers where it is needed can increase the value creation possibilities of shrimp industries in Bangladesh. For the present study, we have examined three enabling factors (two empirically and one theoretically) for value creation in shrimp industries.

The third part of this model refers to the examined/not-examined factors of value creation i.e., value chain analysis, e-traceability and knowledge creation which are also interconnected in the whole chain. Considering all the activities, we have summarized the shrimp chains under three building blocks. Value chain may be long or short for a particular commodity depending on the qualities of products, size and nature of consumers and producers. For shrimps, more than ninety percent of the products are processed for exporting to the overseas market. We have shortened the whole chain into the three building blocks (Figure 6.1). In the value chain process, it is started from collecting the raw shrimps from farmers, Bepari (middleman in the shrimp marketing chain), Aratdar (fish distribution system), Nikari (middleman) and account holders (intermediary and commission agent).

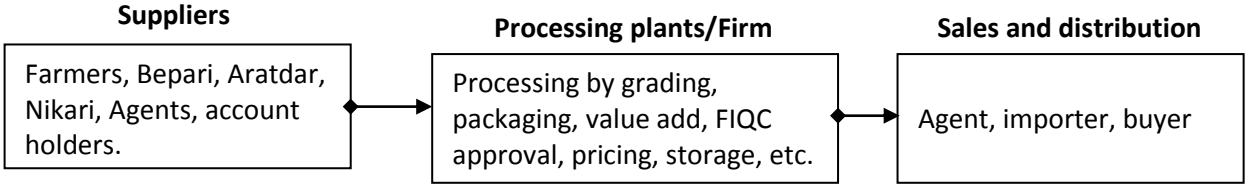

Figure 6.1: Shrimp value chain (Major building blocks)

Shrimp farmers and fishermen are the first link in the shrimp marketing channels. They are the supplier of shrimps to the processing plants. In the shrimp industry, only the processing plants processed the products using proper storage systems and prepared for exporting to the world market. For analyzing the processing plants/firm activities, we have examined the value chain of processing plants. Utilizing the Porter (1985) value chain, we have classified the whole chains of processing plants under two categories e.g., primary and supporting activities. Under the primary activities, we have categorized the

other works under four sub-activities; namely inbound logistics, operations, outbound logistics and marketing and sales/services. After analyzing the value chain of primary activities, we found the gaps where the chains are not working properly. Most of the shrimp processing plants were suffering with the transportation, raw shrimps, communication with the suppliers and power supplies. For unlocking value, industries have to work on these areas. Without having e-traceability, in absence of modern processing machine and poor infrastructural facilities, supporting activities were also suffering. For the e-traceability, shrimp industries in Bangladesh do not have e-traceability which is running at present. Recently, a prototype project is launched but not operating fully. E-traceability does not focus on the particular chain rather it connected the chains from farm to fork. For doing that, advanced value chain management tools like e-traceability is needed. For the present study, we have conceptualized an e-traceability framework. We have suggested to develop area code for farmers, registration numbers for farms, labeling the product with barcode. Finally through programmingthe information system will interact with the product's chain barcode. Lastly the consumer can get the product information using the apps in their mobile phone. We have suggested that connecting major stakeholders and products

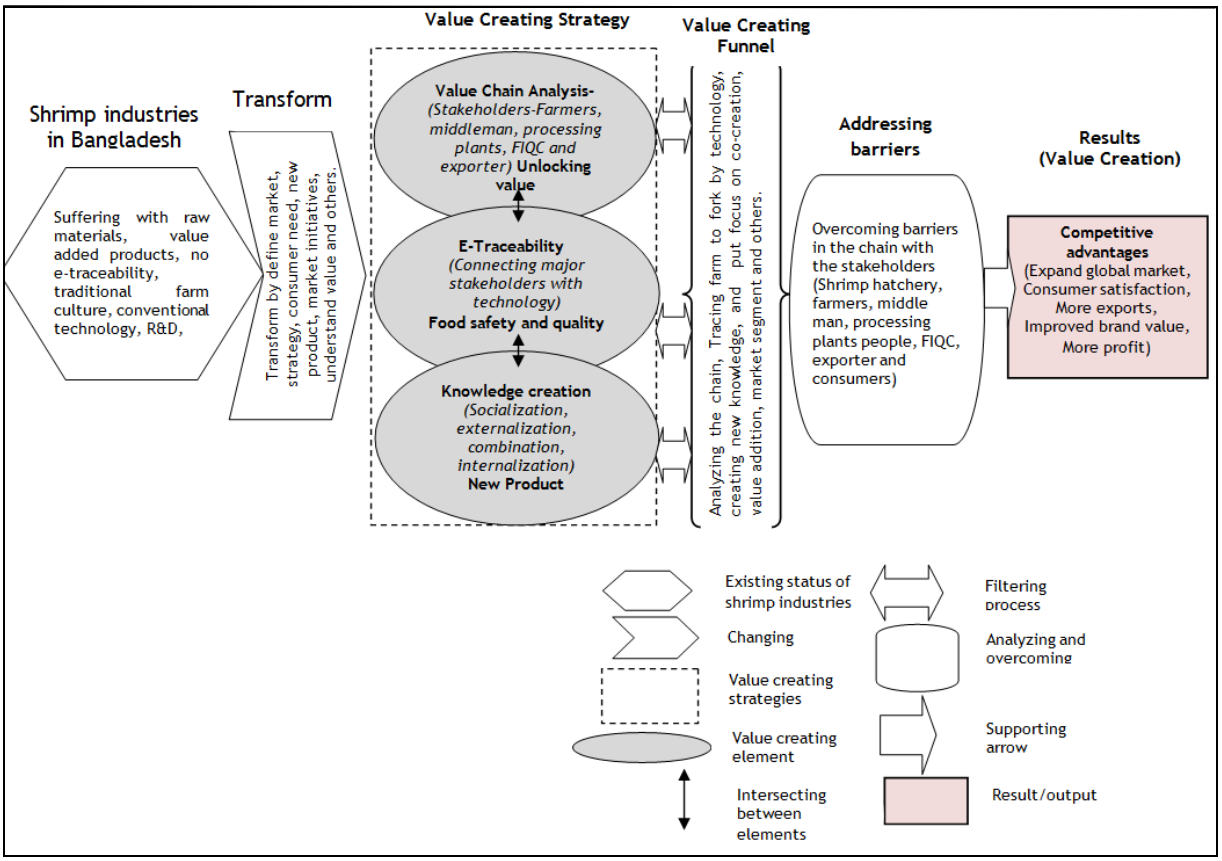

Figure 6.2: Value Chain Analysis (analyzing value creating factors) for value creation in shrimp industries

with tools and technology can ensure the food safety and quality. We have also examined the knowledge creation activities of the FIQC office. In the chain of shrimp industries, FIQC performs the most important task by giving the certification of products for exportation. In this study, we found that FIQC officers are performing many knowledge creating activities by their daily routine works, visiting the firms and conducting the chemical and microbiological test for the safety issues. We suggested that the better FIQC office will create new knowledge, the more industries will offer new products to the global consumers.To strengthen the industry people by giving quality training, ensuring to export chemical free products, conducting workshop and awareness program, FIQC is playing significant role for exporting the shrimp products. In the firm, the development of new products can be seen as a process where the FIQC officers and industry people work together. It can also be seen as community of practice between the processing plants people and FICQ officers.

In the fourth part of this model refers to funnel for filtering. Factors are not materialized until they make it all the way through the funnel. In this part, we have put the examined either empirically or theoretically value creating factors along with others that we neither examined theoretically nor empirically. In this stage, we have not examined either theoretically or empirically the value co-creation, value addition, market segments and other value creating factors for this study. Value co-creation, valued added product and market segments are important factors. For example, by inviting and listening to consumers, industries can offer more consumer-focused products. Adding value to the products always lead to more value creation. Like others market segments offer more opportunities, opens new horizons in terms of positioning and differentiation of shrimp products from the other competitors.

In the fifth part of this model refers to synthesize, unlock the value from the chain and overcome the barriers. After analyzing the value chains by empirically and theoretically, the most challenging parts are synthesizing and overcoming barriers. Generating value for the consumers, it's all about linkage the chain by getting stakeholders to work together. For different actors in a value chain to work together requires effective coordination of decisions and exchange. Here synthesize helps to regulate or coordinate the different chains into a complete chain. Industry people should synthesize the actors, chain and other stakeholders into a coherent whole. In the process of synthesizing of the chains from farm to fork, the barriers and other limitations of the chains would appear. Once the problems and barriers are identified, for turning into it success industries should assessthe industry situation, examine the chain and unlock, consulting experts, considering alternatives and taking action.Beside this, improve industry's capacity to assess business opportunities, diversify products, establish strategic partnerships, addressing feedback to the buyers, changes in the process and products, using modern technology in the plants and increase the communications or contacts with the suppliers could help to overcome the barriers in the industry.

Finally, the last part of this model refers to the outcome of VCA, e-traceability and knowledge creation which derived the value creation in shrimp industries. Porter (1985) suggested that competitive advantages cannot be detected by looking at the firm as a

whole. Considering that we have separated the chains into a series of activities, and look for the competitive advantagein one (or more) of such activities, e.g., VCA, e-traceability, knowledge creation. We support that value creation in shrimp industries can be competitive advantages e.g., superior business position compare to others, more profits etc. As a country, Bangladesh can also create competitive advantage. For example, Bangladesh exports low-cost products at a reasonable quality level. Considering to the standard of living, Bangladesh pay its workers less. Value creation through the food chain is always targeting at the final consumer. New products, improved the product features, brand names or unique consumer experiences may create additional value for food products. Apart from competitive advantages, the outcome of these factors can increase the global market access possibilities, satisfying the consumers or buyers, improve the products brand which leads the Bangladeshi shrimp industry to earn more foreign currency and profits. Based on the findings, export promotion bureau, shrimp industry stakeholders, Department of Fisheries, policy people and respective ministry can work more actively to strengthen the entire industry's capacity to comply with global standards.

6.4 Implications of the research

6.4.1 Implications for industry people, researchers and academicians

Government, Non-Government Organizations (NGO), Shrimp industry people, farmers, suppliers and other stakeholders of this industry would be made aware with the findings of this study. Analyzing the value chain, unlocking the gaps in the chain, tracking the product information through e-traceability, doing research and creating new knowledge in the industry, shrimp industries are gradually going forward. But this journey is not easy for the shrimp industries. From the supplier side, many chains are interlinked with the agents and this creates the gaps between the processing plants and the suppliers of the raw shrimps. Processing plants people should think of working closely with all the suppliers at all levels. The present study also provides the evidence of the importance of VCA, e-traceability and knowledge creation that promote value creation in shrimp

industries. The relationships between VCA, e-traceability and knowledge creation in shrimp industries may provide a direction how industries should work in future. Based on this, shrimp industries should address the factors and can redefine it's working role by promoting knowledge creation activities in the industry. Apart from shrimp industries, this study will bring the topics under the discussion platform among the academic communities. Particularly, marketing researchers in agro-business can be encouraged to focus on VCA areas which bring more value in the industry. The findings of this study will help to open a debate among the academicians, marketing researchers and industry people.

6.4.2 Implications for knowledge science

KM has been widely accepted as a process to address challenges, increase efficiency and effectiveness for achieving organizational goals by applying various strategiesin the business process. Creating new knowledge and applying knowledge in the business always leads to innovation.Crating new knowledge is the motto of knowledge science. Being an interdisciplinary science, knowledge science covers variousdisciplines. Tapping the diverse knowledge in the shrimp industry, and figuring out the best way to share it in a useable and meaningful way throughout the industry, shrimp industry could offer innovation in products. Taking the lens of knowledge management and incorporating shrimp value chain, knowledge value chain could offer better value creation strategies. A key aspect of knowledge management and the value chain is that knowledge only grows more valuable as it moves through an organization. Having KM in shrimp industry, industries can provide new value added products and address consumers demand. Creating new value for the industry, researchers and overallsociety, these findingswould further enrich knowledge science.

6.5 Limitations and future study

Firstly, the shrimp value chains have long channels with the suppliers, intermediaries, processors, exporters and other public and private organizations. The research area for the present study was broad. We have worked on the processing plants or firm's value

chain, e-traceability and knowledge creation activities in shrimp industries. Finally we have showed the outcome of these studies as value creation. Each of the factors e.g., VCA, e-traceability, and knowledge creation can be itself a separate dissertation. As a result it was challenging for us to give in-depth treatment for all of these.

Secondly, the sample population for this study was only the firmmanagers in the processing plants and FIQC inspectors from the DOF. We have not worked with the shrimp farmers, agents, intermediaries and other stakeholders in the chain. The scope of the study was limited to firms and FIQC office in the long chains. We had tried to count more number of firms and FIQC inspectors, but we failed to do that due to the communication, timing and working location of the researchers. Even though we reached to the good number of managers and FIQC people, the response rate was low for this study due to unwillingness to response, time and office formalities.

Thirdly, considering the sample sizethe result of this study is not representative of the shrimp industries as a whole. It might not be the existing features or pictures of value creation activities of the shrimp industries in Bangladesh. The biggersample, interviewing more people and conducting a big survey for the entire study would bring more data and findings.

Fourthly, in chapter four, we did not examine the e-traceability framework empirically. We focused only the different elements of the framework and shows how it can work. For examining the framework, we need to work on the traceability actors by interviewing, surveying and observing the whole chain. We believe that a bigger sample for each of these studies could increase the transferability of findings. Finally, the arrived model for this study should be tested in real setting. A case study with interviewing large number of people can bring the more insights and real scenarios of this study. While the present study, looked at the three enabling factors of value creation. The future study could focus on a single factor in details. Future studies also could focus more on value addition, value co-creation and market segments for the shrimp industries in Bangladesh.

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Appendices

Appendix -1

Project title: Value Creation and Competitive Advantages for the Shrimp Industries in Bangladesh: A Value Chain Approach

To
Manager/CEO
Name of shrimp industry/Firm/Company :
Area: [ ] Khulna [ ] Bagerhat [ ] Sathkhira

Subject: Seeking your time for a short interview session for the PhD study

Dear Sir/Madam,
My name is Subarna Ferdous, and before joining the PhD program in 2014, I was serving as a FIQC Inspector in Khulna. Under study leave (deputation), now I am a PhD student in the School of Knowledge Science at Japan Advanced Institute of Science & Technology (JAIST), Japan.I am conducting a study on the "**Value Creation and Competitive Advantages for the Shrimp Industries in Bangladesh: A Value Chain Approach**" where I am examining the Bangladeshi shrimp firms/company's activities through a standard value chain activities.

The present study will take place over a period of two months and I will visit to your company for interviewing. I sincerely hope that you will consider participating in this important effort to unlock the value creating activities of your company. I would appreciate the opportunity to meet with you briefly and discuss the practice of your company activities. Your participation is voluntary which means you can choose whether or not to participate. If you decide to participate or not to participate there will be no loss of benefits to which you are otherwise entitled.I do believe that your valuable insightwould be very helpful for my research.

Please feel free to ask any questions you may have about the study or about your rights as a research subject. If other questions occur to you later, you may get in touch with the me Subarna Ferdous (PhD Student, School of Knowledge Science, JAIST, Japan) at subarna@jaist.ac.jp , my research supervisor Professor Mitsuru Ikeda (School of Knowledge Science, JAIST) at ikeda@jaist.ac.jp +81 761 511735.

Sincerely,
Subarna Ferdous
PhD Student
School of Knowledge Science
Japan Advanced Institute of Science & Technology (JAIST), Japan

Questionnaire on
Value Creation and Competitive Advantages for the Shrimp Industries in Bangladesh: A Value Chain Approach

Please answer the following with respect to the farm you work for:

Q1. Company information

a. Name of the company :
b. Brand name :
c. District :
d. Year of establishment :
e. Type of the company : [ ] Public [ ] Private
f. How many employees :
g. What kind of shrimp products do you export?
[ ] Raw
[ ] Processed shrimp products
[ ] Others, name of top 5 shrimp species & products:

-
-
-

h. Which shrimp product is special/unique in your company?

i. How do you communicate to your consumer?
[ ] Phone [ ] Fax [ ] Internet e.g., e-mail [ ] others ----------

j. Do your company has website?
[ ] Yes [ ] No

k. Shrimp export last five years :

Year	Weight (mt.)	Value Bdt./USD
2015		
2014		
2013		
2012		
2011		

Q2. Are you familiar with the value chain activities in your company?

[ ] I had never heard of value until now
[ ] I have heard of value chain but not exactly sure of the concept
[ ] I have heard of value chain but it has been a challenge for me to understand what it is
[ ] I am familiar with value chain
[ ] I have good knowledge about value chain
[ ] I do not have any knowledge on value chain

Q3. Which business activities offer your company to get competitive advantages? (Organization focused)

[ ] Efficient production system
[ ] Loyal to the consumer

[ ] Addressing consumer needs continuously
[ ] We always focus on creating value for consumer
[ ] Offer value added products to the consumers
[ ] Monitoring/surveying market
[ ] Good relations with suppliers
[ ] Brand campaign
[ ] Ensuring products quality
[ ] Transportation route optimization: routing inbound shipments and consumers deliveries
[ ] Fine-Tune production plans in response to changing conditions
[ ] Risk management: responding to sustained market volatility
[ ] Merger and acquisition strategy: integrating new supply chains into an existing network
[ ] SWOT (strengths, weaknesses, opportunities and threats) analysis
[ ] HACCP
[ ] Ethical trade practice
[ ] Traceability
[ ] Others---

Q4. How is your company planning to increase its export for the next 5 years?

[ ] New shrimp products [ ] More value added products
[ ] Organic products [ ] Improved traceability/e-traceability
[ ] Ensuring reliability (delivery shrimp product on time)
[ ] Applying new marketing strategies
[ ] Promoting marketing activities
[ ] Promoting brand value
[ ] Others

Q5. Do you have any value adding activities or export value added shrimp products?

[ ] Yes [ ] No

Q6. Please check all that apply that goes well with your company's value added product

[ ] Whole shrimp
[ ] Varied cuts, e.g., easy peel, peeled and deveined (P&D)
[ ] Coated shrimp, ready meals
[ ] Natural products
[ ] Moisture treatment
[ ] Breaded shrimp
[ ] Organic shrimp
[ ] Others:

Q7. How frequently do you get support from the government organizations?

[ ] Never [ ] Rarely [ ] Occasionally [ ] Frequently
[ ] usually [ ] Every time [ ] Sometimes

Q8. From where do you get training for maintaining the shrimp quality? (NGO, National & International organizations)

[ ] FIQC [ ] DFO/SUFO [ ] FAO [ ] NGO [ ] Others

Q9. Please put your opinion in the following activities

Primary activities

1.Inbound logistics

These are all the processes related to receiving, storing, and distributing inputs internally. Your supplier relationships are a key factor in creating value here.Please rate the relationships with your suppliers in the following scale:

(1 strongly disagree 5 strongly agree)

We have good relation with farmers/receivers/agent	1	2	3	4	5
Our internal distribution process are good	1	2	3	4	5

Any other problems: --

2.Operations

These are the transformation activities that change inputs into outputs that are sold to consumers. Here, your operational systems create value.

(1 strongly disagree 5 strongly agree)

Transformation of input into final products are good	1	2	3	4	5
Processing, packaging and testing of products are good	1	2	3	4	5

Any other problems: ----------

3.Outbound Logistics

These activities deliver your product or service to your consumers. These are things like collection, storage, and distribution systems, and they may be internal or external to your organization.

(1 strongly disagree 5 strongly agree)

We have well storage, processing orders, transport and Distribution system of goods.	1	2	3	4	5
We have good stock control &inventory system, delivery of final product to buyers/exporters	1	2	3	4	5

Any other problems:

4.Marketing and sales

These are the processes you use to encourage clients to purchase from you instead of your competitors. The benefits you offer, and how well you communicate them, are sources of value here.

- Advertisement, [ ] Yes [ ] No
- Promotional activity, [ ] Yes [ ] No
- Persuading consumer to buy, [ ] Yes [ ] No
- Consumer segment, [ ] Yes [ ] No
- distribution channel [ ] Yes [ ] No

5. Service

These are the activities related to maintaining the value of your product or service to your customers, once it's been purchased.

Ensuring quality shrimp products by

[ ] Further communication [ ] Replying consumer queries [ ] Others

Supporting activities

Describe how the following support business activities help to improve efficiency and /or effectiveness of your industries value chain

1. Procurement

This is what the company does to get the resources it needs to operate. This includes finding vendors and negotiating best prices.

- How to find the vendors:
- Negotiating best practices:
- Purchasing of resources:

2. Technology development

- Fish Scaling Machine [ ] Yes [ ] No
- Fish Skinning Machine [ ] Yes [ ] No
- Fish Meat Separator [ ] Yes [ ] No
- E-traceability [ ] Yes [ ] No
- Others technology to support primary activities and operations:

3. Human Resources Management

This is how well a company recruits, hires, trains, motivates, rewards, and retains its workers. People are a significant source of value, so businesses can create a clear advantage with good HR practices.

- Gender: [ ] Male [ ] Female [ ] Both
- Training [ ] Yes [ ] No
- Recruitment [ ] Through process [ ] Hire
- Reward &motivation [ ] Yes [ ] No
- Educated [ ] Yes [ ] No [ ] Others
- Working experience [ ] New/Novice [ ] Experienced

4.Firm Infrastructure

These are a company's support systems, and the functions that allow it to maintain daily operations. Accounting, legal, administrative, and general management are examples of necessary infrastructure that businesses can use to their advantage.

(1 strongly disagree 5 strongly agree)

We have a good management body	1	2	3	4	5
My company is financially stable	1	2	3	4	5
We put focus on environmental issue	1	2	3	4	5
We have a good culture in our company	1	2	3	4	5
We follow the business ethics	1	2	3	4	5

Q10. What are the challenges that your companyfacing?

[ ] Lack of raw shrimps
[ ] Number of safety and food hygienic regulation imposed by consumers
[ ] Lack of financial subsidy
[ ] Shortage of electricity supply
[ ] Lack of quality standards in farms
[ ] Poor infrastructural facilities, i.e., transportation, road, building, machinery and others.
[ ] No foreign investors
[ ] Lengthy process of microbiological test by DoF-FIQC
[ ] Poor quality control
[ ] Lack of modern lab
[ ] High customs duties on seed imports
[ ] High bank interest rate.
[ ] Lack of semi-intensive shrimp culture
[ ] Environmental factors (environmentalists are against many things)
[ ] Others ----------

Q11. Who are the others global competitors of Bangladeshi shrimp industry?

[ ] China
[ ] Vietnam
[ ] India
[ ] Thailand
[ ] Indonesia
[ ] Others -

Q12. What kind of unique value your companies create for your consumers? (Customer focused)

[ ] Always consider global consumer perspective
[ ] Constantly work for the consumer satisfaction
[ ] Value added products
[ ] Maintaining safety and quality
[ ] We put emphasis what our consumer want
[ ] Value creating strategy for the consumers
[ ] Others

Q13. Please tick in the box that goes well with your company.

[ ] We do better than other companies
[ ] We do differently than other companies
[ ] We create unique benefit for our consumers
[ ] We offer at a lower cost than other companies

Thank you for your time and support.

Appendix -2

Project title: Knowledge Creation and Flow of Shrimp Industries in Bangladesh: An Exploratory Study on FIQC

Questionnaire

1. How would you explain the level of informal discussion and dialogue among the FIQC officers? How do your share your knowledge (between groups, up and down the hierarchy) freely in the FIQC?

---

2. How do the FIQC offices gather their expert knowledge? Do FIQC have any formal process to do this? Explain with examples.

---

3. Is there any database in FIQC? How does FIQC deal with reports issued by external agents (Newspaper, EU, FDA, other ministry)? Does FIQC add these reports to its database?

---

4. Do all FIQC officials have the access to its database and the related external reports? Does this action add knowledge to you? How?

---

5. How do knowledge creations leads to offer new value to the shrimp industry? What are the activities in shrimp industries can offer value to the industry and consumers? Explain with example.

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6. What are barriers of knowledge creation in shrimp industries in Bangladesh? What difficulties you face for knowledge creation in FIQC?

List of publications (Dissertation)

Journal paper

Ferdous, S. & Ikeda, M. (2018) Value Creation and Competitive Advantages for the Shrimp Industries in Bangladesh: A Value Chain Approach, *Journal of Agribusiness in Developing and Emerging Economics*,Vol. 18, No. (3), pp. (Emerald publisher)

Journal paper (Accepted with minor revision)

Ferdous, S. & Ikeda, M. (2018) Knowledge Creation and Flow of Shrimp Industries in Bangladesh: An Exploratory Study on FIQC, *VINE: Journal of Information and Knowledge Management Systems, (*Emerald publisher)(Submitted in March, 2018)

Conference Papers

Ferdous, S. & Ikeda, M. (2015).Conceptualization of Value Co-Creation for Shrimp Products in Bangladesh. *World Academy of Science, Engineering and Technology*, International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering, Vol. 9, No. 10: pp. 3331-3334.