



## Value chain analysis of shrimp of Dacope upazila in Bangladesh

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### Abstract

Shrimp farming of Bangladesh is one of the most important contributors for its economic development and rural employment generation. The study examined the value chain actors, functions, governance and value chain mapping; estimated value addition in terms of cost and margin in Chalna, Tildanga and Bajua villages of Dacope upazila under Khulna District. Twenty five farmers and 55 traders were interviewed for collecting primary data. Descriptive analysis was performed for reaching the objectives. The study found that farmer, *faria*, *bepari*, *aratdar*, depot owner, commission agent/supplier, processing plant and retailer were value chain actors for shrimp. It was observed that value chain governance was dominated by external parties (legislative governance) and national bodies dominate judicial government. It was identified that processing plants add highest value at Tk. 228 per kg. On the basis of share of profit and cost it was revealed that processing plant was the dominant actor in the chain. Highest value addition, marketing cost and net value addition was Tk. 22800 per quintal, Tk. 13988 per quintal and Tk. 8901 per quintal incurred by processing plant respectively. Percentage of total cost and percentage of total profit was highest for processing plant at 62.85% and 43.71% respectively. The policy implication is that it is necessary to establish storage facility and government monitoring of shrimp markets for the improvement of the present situation.

**Key words:** Value chain governance, aquaculture, shrimp, Bangladesh

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### Introduction

Bangladesh is ideally suited for fish production, having one of the highest man-water ratios in the world, at 20 persons per hectare of water area (Task Force, 1991). The fisheries sector contributed nearly 58% of animal protein to the daily diets of the country's population, about 3.69% to the Gross Domestic Product (GDP), 4% to the export earnings, and 22.60% to the agriculture GDP (FRSS, 2016). More than 17 million people partly or fully depend on fisheries sector for their livelihoods through fishing, farming, fish handling, and processing (BFTI, 2016).

This contribution of fisheries sector come from three broad areas: inland capture fisheries, inland aquaculture and marine fisheries, of which inland

aquaculture sub-sector is contributing more than 55% of the total production (DoF, 2016). Although aquaculture industry has grown significantly over these years but its full potential has not yet been revealed. Moreover, despite the existence of long coastline and large freshwater and marine water bodies in Bangladesh, fisheries are underdeveloped compared to other industry.

Shrimp industry of Bangladesh is one of the most important contributors for its economic development. In Bangladesh the main cultured shrimp is Tiger shrimp (locally known as "Bangda Shrimp") (Begum *et al.*, 2013). It is a marine shrimp which is cultured in salty water. There are two production zones for shrimp

in Bangladesh, the southern region and the Chittagong region. The southern region contributes about 70% of the total shrimp production (55513 MT of Bangladesh (BBS, 2011). The rest of the production is mostly concentrated in the coastal region in Chittagong and Cox's Bazaar. The total land under shrimp production in the southern region is estimated to be 183000 ha. This is about 75% of the total land under shrimp and prawn production in the region (World Fish, 2011).

Shrimp industry has a long, ups and down history in Bangladesh. After the full flourish in the late 1980s and 1990s the shrimp industry faces some problems mainly arises from the banned issue imposed by EU. Shrimp farming is having a positive impact on the livelihood of many people especially in the coastal region (Begum *et al.*, 2013).

Value chain analysis describes the range of activities required to bring a product to the final consumer and, in the case of international products, the extent to which intermediaries/agents gain from participating in the chain (Jacinto, 2004). Shrimp value chain in our country is very complex. Because shrimp is high perishability in nature and there is large number of middlemen between producer and final consumer. Shrimp farmers and their production system are also scattered and unorganized which shattered their bargaining position in the market. Updating the economic data of the actors of the value chain is necessary to have an insight look on the relationship between relevant institutions of shrimp industry. This will lead to the adjustment of the management and administration policies of the government which will lead to the further improvement of the market situation of shrimp industry. This study, therefore, aims to identify the actors and functions of the value chain players of shrimp with governance. It aims to generate some economic data on the value addition in terms of cost and margin in successive stages of shrimp value chain through different value chain actors which will help in formulating future policies and regulations for the shrimp industry.

## **Materials and Methods**

The study was conducted in Chalna, Tildanga and Bajua villages of Dacope Upazilla in Khulna District. These villages were selected for their high potentiality of shrimp growing farmer's availability and shrimp related trader's/middlemen's availability. Simple random sample technique was used for selecting the shrimp farmers. Twenty five shrimp farmers and 55 shrimp traders were interviewed through well-developed interview schedule during the months of September and October of the year 2016. Out of 55 actors 15 *faria*, 8 *bepari*, 5 deport owner, 7 *aratdar*, 18 retailer and 2 processing plant were selected for interview.

Descriptive statistics such as sum and average as a substantial part of data analysis were employed to analyze the data. Value chain actors and their functions and mapping were also investigated by using descriptive statistics.

The role of national and international institutions was examined as a governance indicator by following Kaplinsky and Morris (2001) value chain analytical framework where three realms of rulemaking and monitoring which refers to legislative, judicial, and executive governance is examined for better understanding of the governance. These three realms can be exercised by parties internal or external to the chain.

The extent of chain power can be related in complicated ways in relation to the relative size of the firms in the chain (Kaplinsky and Morris, 2001). The larger the farm the larger the influence are. From this analytical framework the used indicators are: share of chain sales, share of chain value added, share of chain profits, relative rate of profit, share of chain buying power, control over a key technology and distinctive competence and holder of chain "market identity" (e.g. brand name).

Value addition at producer's level was estimated by following the equation of  $VA = PP \times QF - (TVC + TFC)$

where PP is indicated price of produce, QF is indicated quantity of produce, TVC is indicated total variable cost and TFC is showed total fixed cost.

Traders' level value addition is calculated by using the formula of  $TVA = \text{Selling price} - \text{Purchase Price}$ . Net value addition = Gross value addition- minus marketing cost.

## Results and Discussion

**Socioeconomic profile:** Socioeconomic profile of shrimp farmers are shown in Table 1. Seventy six percent of the sampled farmers belong to the age group of 20-50 years. Illiteracy rate of the sample farmers was 12% which is lower than the national illiteracy rate (UNESCO, 2017).

**Table 1.** Socioeconomic characteristics of shrimp farmers

Socio-economic variables	Values
Age ranges between 20-50 years (%)	76
Illiteracy rate (%)	12
Shrimp farming as main occupation (%)	84
Agriculture as subsidiary occupation (%)	24
Average family size (number)	5.96
Received training (%)	32
Motivation in shrimp farming (neighbor) (%)	52
Land borrowing for shrimp purpose (%)	48 %
Average land size (for shrimp culture)	1.67 ha
Average net income per year (Taka)	41224.91
Involvements in social arrangements (%)	32

Among the total sample 84% take shrimp culture as their main occupation whereas 24% take agriculture as their subsidiary occupation. Average family size was 5.96 members per household which is slightly higher than the national average (HIES, 2016). Only thirty two percent shrimp farmers received training on shrimp farming that motivated them to be engaged in shrimp farming. Neighbor's motivated 52% of the total sample farmers for starting shrimp culture. About 48% farmer borrowed land for shrimp farming beside their own land. Average farm size in the study area was 1.67 hectares which is higher than the national average farm size (0.24 hectares) (FAO, 2015). Average net income per year of the sample farmers were Tk. 41224.91 (Table 1).

**Value chain actors and their functions:** In the study area, shrimp moves from farmer (producer) to ultimate consumer through different market actors like farmer, *faria*, *bepari*, *aratdar*, depot owner, commission agent/supplier, processing plants and retailers. These actors play a vital role in moving shrimp to the ultimate consumer from the production level. Actors and their functions are presented in Table 2. These indicate that shrimp must be passed through at least seven actors which make the shrimp industry complex.

Finding of other studies on value chain analysis is also similar to the present study. Quader (2012) found four main value chain actors of black Tiger shrimp value chain as farmers, wholesalers, commission agents and processors in Cox'sbazar district. Alam *et al.*(2012) found that *faria*, depot owner, paiker, *bepari*, account older, processing plant, retailer and consumer are the prime value chain actors for shrimp in Bangladesh. Islam *et al.* (2014) found also almost same actors such as farmer, *faria*, *aratdar*, *bepari*, inter district *aratdar* agent, depots, export farm, retailer, and consumer as the value chain actors.

**Value chain mapping:** According to McCormick and Schmitz (2002) value chain mapping enables to reveal the flow of product from idea to final consumer through various actors. It also helps to identify

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different actors in the value chain and role played by them and value addition at different stages by them. Value chain map is presented in Figure 1 and chains

actors are listed in Table 3, which indicates that there was domestic market as well as overseas market for shrimp.

**Table 2.** Value chain actors and their functions.

<b>Actors</b>	<b>Functions</b>
Farmer	Farmers are the producer of shrimp. They grow PL (post larvae) of shrimp in Gher and sell them to <i>faria</i> and depot owners.
<i>Faria</i>	<i>Faria</i> is an intermediary in shrimp businesses who buy small volume shrimp from farmers from remote areas and sell them to depot owner and <i>aratdar</i> . They do not have a place for buying and selling. They do their business on daily basis.
<i>Aratdar</i>	<i>Aratdar</i> have a permanent place for conducting their business. They only arrange the buying and selling of shrimp between the seller and buyer. In return they charge a certain amount or rate (3-5% per Tk. 100) of money from the seller ( <i>faria</i> or farmer).
<i>Bepari</i>	<i>Bepari</i> purchase shrimp from <i>faria</i> and farmers via <i>aratdar</i> and sell them to processing plants via suppliers or commission agent. They also sell shrimp to the retailers from local and distant markets. They buy in bulk volume.
Depot owner	Depot owner have place for storing and purchasing shrimp in the shrimp growing areas. They purchase shrimp from <i>faria</i> , farmer and <i>bepari</i> , sell it to processing plants via commission agent.
Suppliers/ commission agent	Commission agents charge commission on the selling of shrimp to the processing plants. They just conduct the buying and selling of shrimp between depot owners and processing plants on commission basis. They maintain transaction record, act as guarantor, ensures regular supply of shrimp.
Retailers	Retailers sell shrimp on local and distant market in retail price to the final consumer. They have shop in the market and they do some value adding activities in terms of marketing costs. They purchase shrimp from <i>bepari</i> via <i>aratdar</i> .
Processing plants	Processing plants add the value on shrimp purchased from depot owners via commission agents. They have permanent building complex for doing the high technology intensive processing activities. Destination of this produce from the plant is overseas consumer. High level of standard of products is ensured throughout the processing stages.

Source: Field survey (2016)

This study also identified some actors like *aratdar*, who operate at the both ends of markets at the upazila level which may refer as secondary market where *bepari* buy and sell, also in terminal markets situated in distant from the production end where consumption end starts and *bepari* and retailers operate. Usually long value chain map seemed to have this kind of actors. Figure 1 showed that shrimp production starts from the brood supply stage and ends to the end market consisting of domestic consumer and overseas

consumer. Between the starting and ending point it include Post larvae L and other inputs, nursing, growing out, trade and processing and exporting stages. These stages were functioned by different value chain actors like farmer, *faria*, *bepari*, *aratdar*, depot owner, retailer, commission agents and processing plant. In the study area farmer grow out shrimp PL with their nursing and then they sold it to the traders. Traders like *faria*, *bepari*, depot owner, *aratdar*, commission agent and processing plant did the business in-between them.

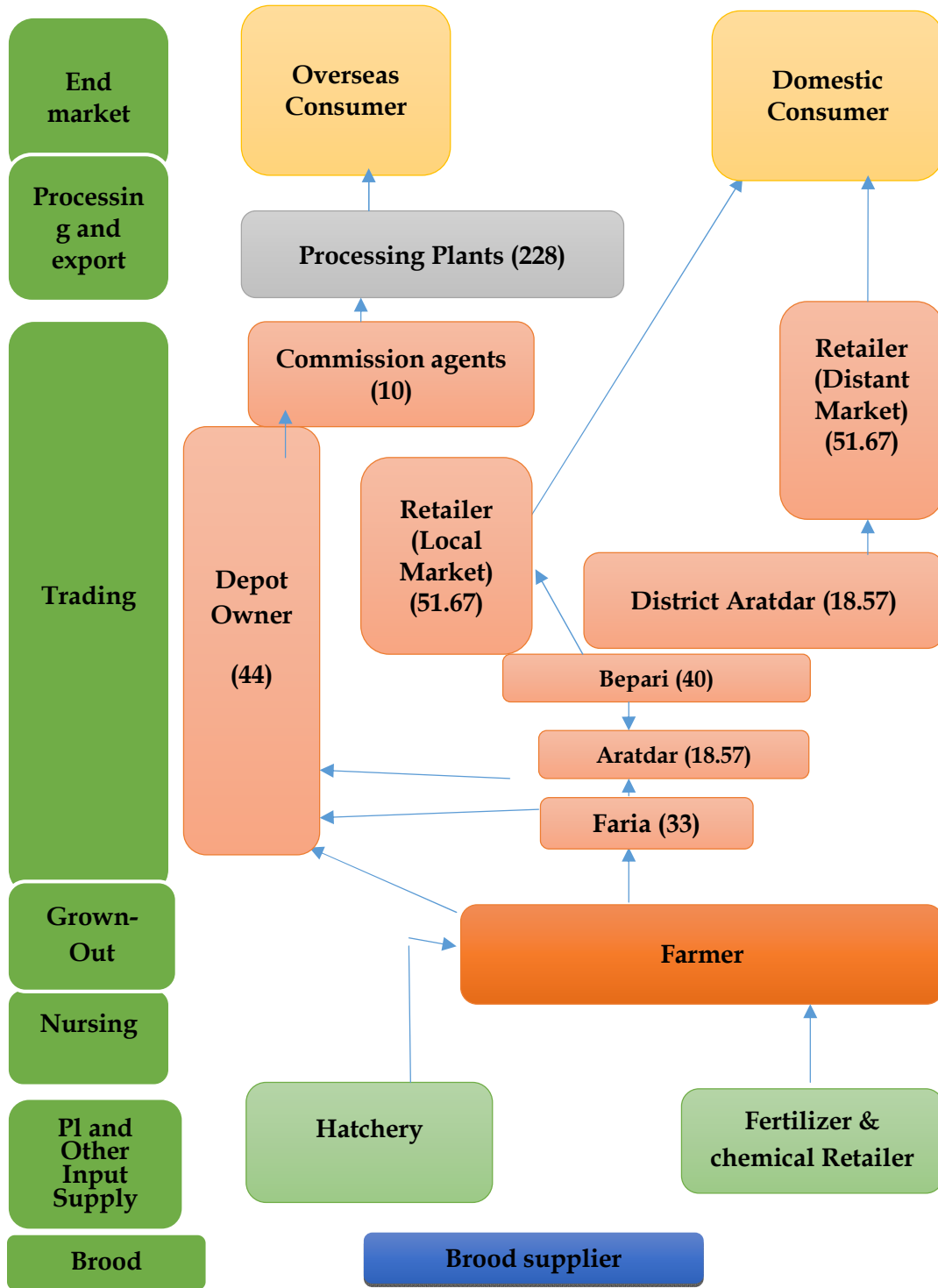


Figure 1. Backward and forward value chain mapping of shrimp.

Note: Figures in the parentheses indicates the average gross value addition / added value (Tk/Kg.) by value chain actors.

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**Table 3.** Shrimp value chain (domestic and overseas markets).

<b>Overseas value chain</b>	
Value chain – I	Fish Farmer – Faria – <i>Aratdar</i> – <i>Bepari</i> – Depot Owner – Commission agent – Processing plant– Consumer
Value chain – II	Fish Farmer – Faria– Depot owner– Commission agent – Processing plant– Consumer
Value chain – III	Fish Farmer – Depot owner – Processing plant– Consumer
<b>Domestic value chain</b>	
Value chain – IV	Fish farmer – Faria– <i>Aratdar</i> – <i>Bepari</i> – Retailer – Consumer (Local market)
Value chain – V	Fish farmer – Faria– <i>Aratdar</i> – <i>Bepari</i> – Retailer – Consumer (Distant market)

Source: Field survey (2016).

**Table 4.** The three realms of rulemaking and monitoring.

<b>Three realms of rulemaking and monitoring</b>	<b>Exercised by parties internal to chain</b>	<b>Exercised by parties external to chain</b>
<b>Legislative governance</b> “Making the rules”- e.g. setting standards for suppliers in meeting product and quality specifications.	Processing plants needs registration from the Department of Fisheries (DoF) before going for production. National Shrimp Policy 2014 implemented by Government ensure strategies and policies to meet the necessary standards. Department of Fisheries (DoF) is also expected to be an important legislative governor in the industry.	Authorities from the main exporting destination (EU, USA) required that the shrimp have been processed under HACCP and ISO standards. It is an important criterion for processing plants for exporting products. Now this day’s demand for traceability for shrimp from USA and EC health organization is required. A number of international bodies from the buyers group have environmental standards that must be followed in order to BAP certified.
<b>Judicial governance</b> “Enforcing the rules” - i.e. Monitoring the performance of suppliers in meeting these standards.	DoF (Department of Fisheries) currently operating three BAB (Bangladesh Accreditation Board) accredited Fish Inspection and Quality control (FIQC) laboratory which closely monitor processing plants to meet the HACCP and ISO standards. Processors / exporters regularly monitor their processing plants for inspection of standards required by the foreign buyers.	A number of international bodies and their local representative like <i>intertek</i> , <i>SGS</i> , United Kingdom based Lloyd’s and Denmark based Baltic Control regularly monitor the processing plants and certified them. Processing plants and other higher participants of the shrimp value chain always ask for organic and healthy shrimp from their suppliers.
<b>Executive governance</b> “Implementing the rules” – i.e. assisting the suppliers in meeting these standards	Bangladesh Frozen Food Exporter Association (BFEEA) provides market information on important issues to their members through publications, seminars etc. According to 7 <sup>th</sup> Five Year plan FY2016-FY2020 Extension support and research linkage will be strengthened.	International bodies don’t assist any processor or exporter for improving their standards for meeting their demand. Shrimp industry has not gained any attention or focus of NGO’s or global development bodies as “bottom” participants in the chain.

Source: Modified and adapted from Kaplinsky and Morris (2001).

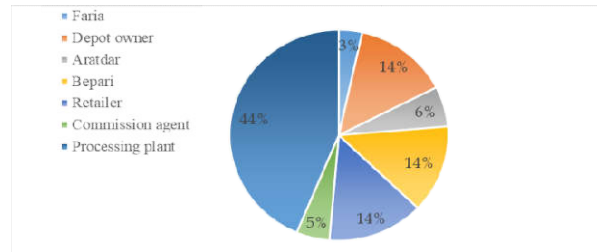
At the same time actors are added value to the raw shrimp in the form of different marketing activities like transportation, icing and grading.

Figure 1 further showed the value chain of shrimp on the basis of value addition in the form of gross value addition by different value chain actors at different stages. It showed that added value by *faria* was Tk 33 per kg. *Aratdar* added Tk 18.57 per kg, *bepari* added Tk 40 per kg and retailers added Tk 51.60 per kg. Depot owner added Tk 44 per kg and send it to the commission agent who added Tk 10 per kg before sell it to the processing plant. Processing plants processes the raw shrimp and added Tk 228 per kg, which was the highest amount before send it off to the importing countries.

**Value chain governance:** By observing the information more deeply in Table 4, it was clear that external parties to the chain plays the rule making part dominantly (legislative governance) with national bodies being focused on monitoring that these rules set by the external parties were being meet (judicial governance). As an export commodity shrimp needs to pay a close attention on meeting the standard issues solved before export. Now, different players from the chain need to meet these demands. The government had not played an active role in assisting the processing plants for meeting these standards. In the case of private sector, the trade associations had provide some benefits for its' members which is not enough. In elaboration on rule making and monitoring in the shrimp sector, it was found that external parties dominate the rule making and national bodies plays vital role in monitoring.

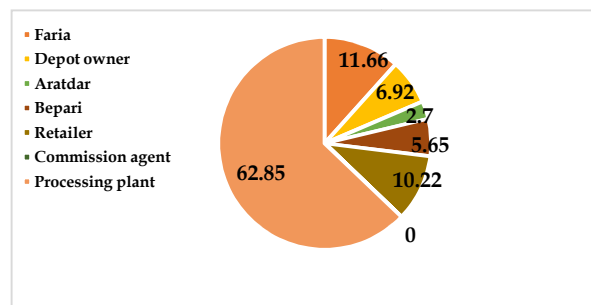
**The extent of chain power:** It is found that share of chain profit and share of chain value added by different actors in terms of marketing cost done by different market actors give a clear scenario of value chain governance situation of shrimp. It explained the power relation in the chain. Figure 2 showed the dominant share holder in the chain power relation in terms of share of its profit in the value chain. From the Figure 2 it is clear that processing plants hold the top position in

the value chain governance as they incurred the highest share of profit (44%) earned by different market actors.



**Figure 2.** Share of profit by different actors in the shrimp value chain

Figure 3 showed the power in the chain in relation to share of value added in the value chain is dominate by processing plants. As processing plants added 62.85% of the total value as marketing cost they are in the leading position.



**Figure 3.** Share of chain value added by different actors in the shrimp value chain

**Estimation of value addition in terms of cost and margin:** From Table 5, it can be seen different marketing activities like (*aratdari*, commission, transportation, grading, icing, packaging for export and storage which added value to the product at different stages were performed by market actors .

Percentage of share of transport cost in total marketing cost was the highest (21.62%) of total cost and consist Tk. 4299.13 per quintal. Salary cost was second highest (12.60%) of total cost. Percentage of share in total marketing cost of house rent was third largest (12.14%) of total cost. The lowest was other cost which was around 0.03% of the total marketing cost and in monetary value it was Tk. 5.05 per quintal.

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Evidence suggested that percentage of marketing cost is highest for commission fee which is Tk. 17776.20 per maund and 35.27% of the total marketing cost for shrimp value chain in Bangladesh. Researcher also found that transportation cost is the second highest marketing cost for shrimp value chain which is Tk. 921.53 per maund and 18.30% percent of total marketing cost (Alam *et al.*, 2011). Marketing cost for

each quintal of shrimp were estimated to be Tk 619, 507, 119, 1017, 819, 543 and 5419 for shrimp farmer, *faria*, *aratdar*, *bepari*, inter-district *aratdar*, retailers and processing plant respectively (Islam *et al.* 2014). Due to specific research area and time frame, this study has some differences from the results found in the literature which is not significant.

**Table 5.** Total marketing cost of different actors (Tk./quintal).

Cost items	<i>Faria</i>	Depot owner	<i>Aratdar</i>	<i>Bepari</i>	Retailer	Processing plant	Total	Percentage
Aratdar commission	748	-	-	-	-	-	7.48	0.04
Transportation	158	280	-	374	501	3100	4299.13	21.62
Grading (Baskets etc.)	713	300	-	182	91	900	1494.86	7.52
Icing	471	256	-	277	178	1500	2237.82	11.26
Wage	-	-	84	68	230	1800	2203.82	11.08
Salaries	-	133	83	63	37	2165	2505.81	12.60
House rent	-	89	126	-	324	1850	2412.89	12.14
Electricity	-	22	13	13	154	1915	2138.17	10.75
Telephone bill	175	140	54	107	163	150	621.89	3.13
Personal expenses	330	320	157	173	580	200	1447.6	7.28
Packaging for export	-	-	-	-	-	218	220.18	1.11
Storage	-	-	-	-	-	160	161.6	0.81
Tips and donation	-	-	83	-	12	-	95.95	0.48
Wastage	-	-	-	-	-	30	30.3	0.15
Others	-	-	1	-	4	-	5.05	0.03
Total	2595	1540	601	1257	2274	13988	19882.55	100.00

Source: Field survey (2016); Note: “-” Indicates zero or nil.

From Table 6, it can be seen that both purchase and selling price was highest for processing plant respectively at Tk. 79000 per quintal and Tk. 101800 per quintal. Second highest purchasing price was Tk. 64222 per quintal paid by the retailer. While the second highest price was also received by the retailers at Tk. 69389 per quintal but their purchase price is Tk. 64222

per quintal. The lowest price was received by the *faria* (Tk. 57833 per quintal). Lowest purchasing price for an actor was Tk. 54533 per quintal paid by the *faria*.

Processing plants generate the highest gross value addition which was Tk. 22800 per quintal. Retailers generate second largest gross value addition in the



value chain. In consideration of marketing costs borne by the actors it was the processing plant who incurred the highest net value addition of Tk. 8901 per quintal.

Lowest net value addition was incurred by the *faria* at Tk. 705 per quintal.

**Table 6.** Average value addition of different market actors (Tk./quintal).

Traders	Purchase price	Sales price	Gross value addition	Marketing cost	Net value addition
<i>Faria</i>	54533	57833	3300	2595	705
Depot owner	63400	67800	4400	1540	2860
<i>Aratdar</i>	-	-	1857	601	1254
<i>Bepari</i>	58250	62250	4000	1257	2745
Retailer	64222	69389	5167	2274	2901
Commission agent	-	-	1000	-	1000
Processing plant	79000	101800	22800	13988	8901
Average per quintal	43417.75	51667	8606.37	2781.87	5836.62
Average per kg	434.17	516.67	86.06	27.81	58.36

**Note:** *Aratdar* Gross Value addition = Average received *Aratdar's* commission. Gross value addition = Sale price – purchase price. Net value addition = gross value addition – marketing costs, **Source:** Field survey (2016).

### Conclusion

Shrimp farming and business can provide income stability, opportunities to generate income more than before and improve food security situation to the farmers in the coastal areas in Bangladesh. Shrimp is a priority export product of Bangladesh with a high international demand. As supply of raw materials for the shrimp processing plants are very low; shrimp farming and business of shrimp can be very profitable for the people of coastal area. This paper is concerned with the analysis of shrimp value chain focusing on actors and their function, value chain mapping and governance and estimation of the cost and margin in relation to the value addition of the shrimp value chain actors in the specific study area of Bangladesh.

It was observed that shrimp was moved to consumer (domestic or overseas market) from farmer through different intermediaries or value chain actors like farmers, *faria*, *bepari*, *aratdar*, depot owner, commission agents, processing plants and retailers. From different functions transportation system is below

the standard in the study area. In developing a value chain map it has been identified that retailers added Tk. 51.67 per kg in the value chain which was the second highest and Tk. 228 per kg was added by processing plants as it is the highest added value in the market chain.

In understanding the governance of shrimp value chain the study revealed that external party plays dominant in legislative governance part while national bodies playing the judicial governance dominantly. Highest gross value addition was incurred by the processing plant (Tk. 22800 per quintal) while they also received the highest selling price (Tk. 101800 per quintal) and paid the highest purchase price (Tk. 79000 per quintal).

It may take in consideration that shrimp farming is seasonal in nature. In Bangladesh shrimp farmers are often forced to sell their shrimp during the catching season. If retail and other wholesale price fall due to some unexpected or natural phenomenon, farmers will

have to sell their shrimp at the low price. This signifies the importance of better storage facilities and improve infrastructure in rural markets. Policies that encourage farmers to form collective arrangement for marketing will be helpful. Therefore, monitoring market actors for secure shrimp quality according to the needs of the foreign buyers need to be stronger.

### **Acknowledgement**

The authors express their gratitude to the SIAGI for giving financial support to conduct this research. This research has been done in line with the objectives of the “Promoting Socially Inclusive & Sustainable Agricultural Intensification in West Bengal & Bangladesh” project sponsored by the Australian Centre for International Agricultural Research (ACIAR).

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