

The Impact of Cluster Farming Approach in Simplification of Shrimp (*Penaeus monodon*) Marketing Channel of Paikgachha Upazila

Mizanur Rahman Washim¹ M. Kamal² Md. Ashraful Hoque³ Rumana Yasmin¹

1. Scientific Officer, Bangladesh Fisheries Research Institute, Brackish Water Station, Paikgachha, Khulna-9280, Bangladesh

2. Professor, Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh-2202

3. Technical Specialist, AIN Project, WorldFish Center, Paikgachha, Khulna, Bangladesh

Abstract

A research study has been undertaken on shrimp marketing channel of Paikgachha upazila and its simplification process by cluster farming approach of WorldFish Center. The objectives of the study were to investigate the stakeholders involved in both existing shrimp marketing and simplified marketing channel and also determine the efficacy of cluster farming on good price and better raw materials quality. Study area possessed a complex marketing channel having at least eight stakeholders from production to processor namely, shrimp farmer; *foria*; local depots; large depots; *aratdar*, *paikar*; sub-agent; commission agents and exporter/processor thus flow of shrimps from gher to processors take about 20-30 hours that ultimately deteriorates the shrimp quality. This beset has been solved rather simplified through managing local depot works as partner NGO (PNGO) of WorldFish Center. The findings of the study revealed that the cluster farming approach simplified the marketing channel considerably than before. The farmers in the clusters received better price from their harvested shrimp without involvement of middlemen which resulted high quality of raw-materials with better price.

Keywords: WorldFish Center, PNGO, cluster farming, *foria*, *aratdar*, *paikar*

INTRODUCTION

The shrimp (*Penaeus monodon*; Fabricius, 1798) farming sector of Bangladesh has become very important to the national economy, contributing significantly to foreign exchange earnings and employment generation in the vast coastal rural areas. During 70's, Bangladesh started export of shrimp in the world market and simultaneously shrimp production got momentum through aquaculture (Rahman and Hossain, 2009).

Bangladesh produces 2.5 percent of the global production of shrimp during the year 2011 and the industry has the participation of 2.73% to total export income of the country. The share of fisheries in the national total export earning is about 6.0% out of which a lion share approximately 85% are contributed by shrimp alone (Azad, 2008). Besides, participation to GDP was 4.43% and on agriculture sector was 22.21% in the year 2011 (BSFF, 2012). It is the second largest export industries after readymade garments from which Bangladesh earned as US\$ 543.84 million in the year 2012-13 (BFFEA, 2014). So, there is no doubt that shrimp has become one of the prominent exportable goods of Bangladesh. The raw materials of shrimp have to cross a longer path through a complex marketing channel from the production hubs to reach to the export market. A larger numbers of stakeholders likewise shrimp farmer; *foria*; local depots; large depots; *aratdar*, *paikar*; sub-agent; commission agents and exporter/processor are directly and indirectly involved in shrimp trading of major production areas. Paikgachha upazila where the study has been undertaken also possesses a complex shrimp marketing channel where major interrupter is *foria* by whom raw materials quality is highly deteriorates.

So an easy supply chain model should be developed to incorporate them as well as reduce the hands and ensuring shrimp quality. Only one way to simplify the shrimp value chain is that the removal of some middleman from the chain but it is not easy to completely remove them as their livelihood status is directly involved with it. Despite having these obstacle farmers group of the shrimp cluster are being able to sell their product directly to the local depots escaping from *foria*. In this case the local depots act as a PNGO of WorldFish Center because they get facilities from WorldFish Center at the same time provide technical assistance about improved shrimp farming technology to the farmers group. WorldFish Center has been recruited their extension facilitators (EFs) in each local depots to manage and monitoring the farmers groups. Considering the PNGO as a fundamental basis the shrimp marketing channels of Paikgachha upazila has been made more simplify than the past and two simplified model named fixed price system and market auction system have been established. The complexity reduction model breaks down the supply chain complexity into its component parts that can be modified to increase supply chain performance. In this supply chain we have to ensure the standard criteria and a full certification system for the shrimp production line from farm to processing plant.

MATERIALS AND METHODS

The study site was Paikgachha upazila, located at the south part of Khuna district. The data was gathered over a

period from August 2013 to September 2014. Field surveys were used for the collection of primary data. The study area was visited officially to check on standards in term of shrimp distribution and marketing information. By using questionnaire interviews and direct observations, primary data were gathered for this survey. From appropriate government and non-government organizations such as WorldFish Center, Department of Fisheries (DOF), Paikgachha Chingri and Matshya Baboshayee Somity etc, secondary data about shrimp distribution and marketing information were gathered. Selected sample actors consisted of 20 shrimp farmers and 45 other stakeholders of whom there were 10 *Forias*, 10 Local depots, 5 Large depots, 5 *Aratdar*, 5 *Paikar*, 5 Sub-agents and 5 Commission agents. The data and information collected were systematically reduced by accumulation, grouping and interpretation to represent as figures and tables so that the findings of the study could be presented in a meaningful way.

RESULTS AND DISCUSSION

EXISTING SHRIMP MARKETING CHANNEL OF PAIKGACHHA UPAZILA

Till now WorldFish Center has been working for the implementation of cluster farming approach on broader scale in Paikgachha upazila. The shrimp marketing channel of Paikgachha upazila was discovered from field survey with the help of WorldFish Center. The study reveals that the marketing channel of shrimp is crucial and comprises a very complex chain of agents outside the shrimp cluster who are involved in the process from the farm gate to the processing plants. Shrimp in Paikgachha usually flows to a number of channels (*foria*, local depots, large depots, *aratdar*, *paikar*, sub-agents, and commission agents) from the producing centers called *gher* (Farm). In Bangladesh, shrimp marketing channel is complex and buyer-driven where at least six stakeholders was explored (Tasnoova *et al.*, 2010). When shrimp moves through market chains, every intermediary adds some extra costs with the purchase price as part of their involvement or profit. But farmers receive relatively higher share (approximately 73%) of the trade value (Figure 4). According to industry experts, in countries like Vietnam and Thailand the processors usually inject the working capital for trade in the marketing chain. In contrast, in Bangladesh particularly at Paikgachha, a different intermediary takes the responsibility for injecting cash in the shrimp marketing chains (INNOVASION, 2012). As a result the commission agents have become the key financier in the marketing channel. Various intermediaries are involved in the shrimp marketing chain from production to final consumption stage as well as the exporting of international markets. The functions performed by different stakeholders and their significance in the shrimp marketing channel are summarized as follows.

CHARACTERISTICS AND SIGNIFICANCE OF STAKEHOLDERS INVOLVED IN SHRIMP MARKETING CHANNEL OF PAIKGACHHA UPAZILA

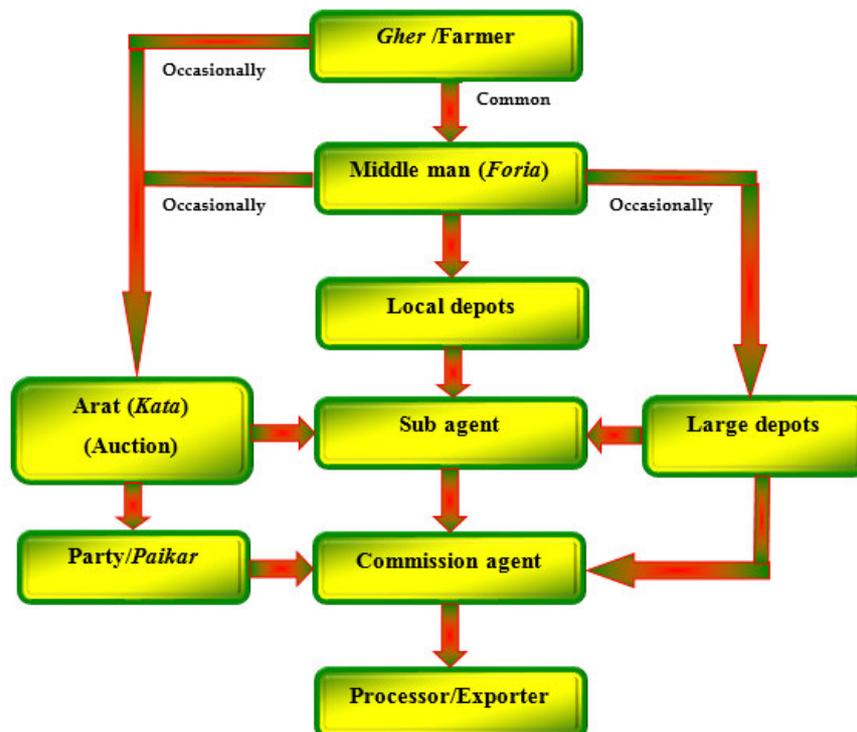


Figure 1. Existing shrimp marketing channel of Paikgachha upazila

(Source: Own field survey, 2013)

Shrimp farmers

Shrimp farmers are the integral and radical part in the shrimp marketing channels who involve themselves directly in shrimp culture practice either in own or leased land or both. The farmer starts to release PL into the gher plots, nursing of PL, and stocking PLs up to marketable size shrimp. Farmers usually harvest their shrimp from the trap twice in a day during full moon, once in the evening and second during early morning. Farmer directly sells shrimp either to *foria* or depot or *aratdar*. Shrimp farmers rely on brokers and trade systems to market and distribute their shrimp to processors and exporters. However, in Paikgachha most farmers (producers) usually sell their shrimp to the *foria*. Usually *foria* themselves directly go to the gher farming area for buying shrimp. On the other hand, farmer directly goes to the depot or *aratdar* for selling their product. In this situation, farmer bears the transportation cost.

Middle man (Shrimp-Foria)

Shrimp-*Foria* is a critical actor in the marketing channel for shrimp who works as buying agents of the depots owners. *Foria* is the most crucial part in shrimp marketing channel of Paikgachha shrimp cluster that makes the marketing channel more complex. They are more in numbers than numbers of farm available in Paikgachha. In this case farmers get more price than they expect due to competition among the *foria* that who can collect more shrimp as their main target is profit for fulfillment of their livelihood. *Foria* is a kind of middleman that waits in the local market or somewhere on the street in the local village close to the ponds for the shrimp or collects it directly from the farm. Most often *foria* try to buy a mixed size of shrimp from smaller farms but some larger farms practice sorting and inspection on the floor before the farmer and *foria* bargain about the price because they know about grading and price. Thus, *foria* achieve profit by purchasing shrimp from farmers without grading, by underestimating the weight of shrimp or by only measuring the “dry weight” of shrimp. The shrimp collected in the evening are landed and laid on the ground until the second harvest is collected in the morning which takes a longer time of about 14 hours before selling. When reselling the shrimp to depots, *aratdar* or *foria* apply deceptive methods to increase the resale price of shrimp. These methods include grading and pricing of shrimp according to official systems and submerging shrimp overnight in water for hours to increase their weight. To achieve higher grade the *forias* practice an adulteration method called ‘*push*’ which involves injecting barley, injecting water as well soaking for increasing weight. The depots, to whom the *forias* directly sell to are thus found less interested to buy from the *forias*. Ice is seldom used by *foria* and the shrimp are taken to the depots in bamboo baskets, plastic drum or by plastic bag. Not only *foria* even most of the farmers in Paikgachha upazila did not found to be used good post harvesting practices. Only 7% farmer practiced initial washing after harvesting but 32% found to keep the raw shrimp in clean and germ free places (Figure-2). Shrimp *forias* do not have notable costs for storage, as they typically resell shrimp on the same day they purchase it.

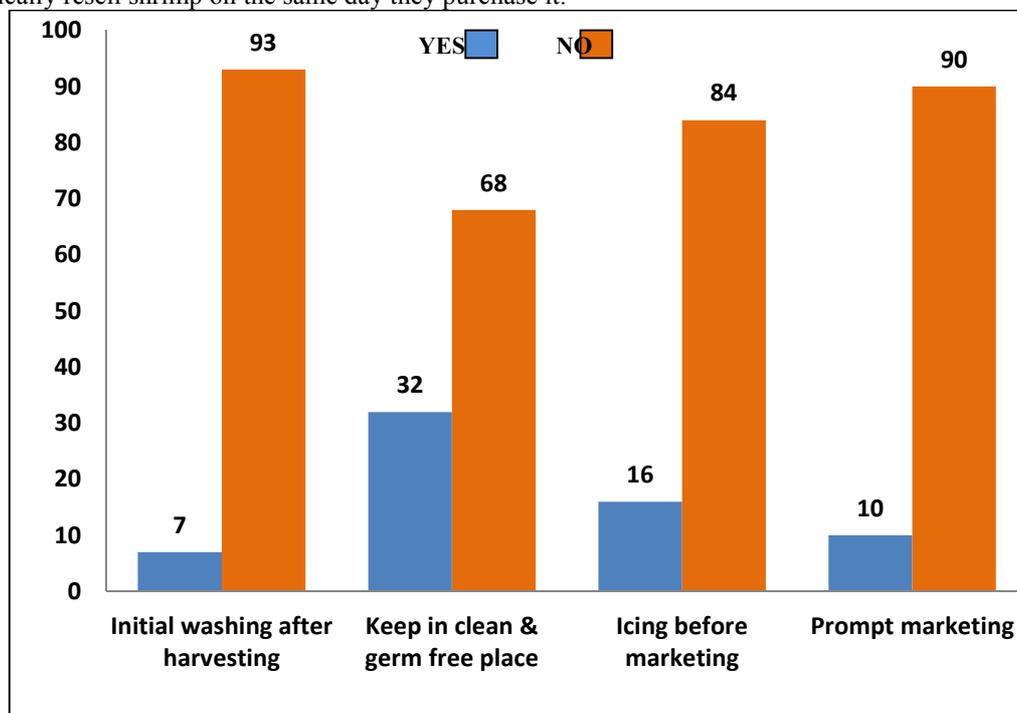


Figure 2. Percentage of good post-harvest practices of shrimp farmer before selling their raw material Local depots (Small depots)

A local depot is a small depot consists of a single room with some boxes and ice, where the shrimps are weighed again and stored in ice till transportation to the processors. Depots are responsible for cleaning, icing & preserving

shrimp in plastic container then transport them to company via commission agents. In Paikgachha area the local depots are situated at close proximity to shrimp farms. The depots pay around 50-70% in cash and the rest are paid after 3-5 days once the payment from the account holders is received by the depots. The postharvest trade flow goes from farmer to sub-depot to depot to agent to factory (allowing for specific variations). Local depot owner get year ending bonus in cash from commission agents depending on the trading volume. All trade ultimately feeds through the agents who buy the entire product pre-sale to the factory.

Large depots

Large depots (locally known as “chalani depot”) which usually maintain direct contact with shrimp commission agent and buy shrimp from small depots also (Ahsan, 2012). These are situated in Paikgachha sadar town near *Kata*. Large depots employ up to 25 *forias* (intermediaries) each purchasing directly from the farm gate. Its percentage is very lower in Paikgachha shrimp marketing channel. Depots, in collaboration with account holders sell their products to processing plants. Sometimes party/*paikar* buy fish in larger volume and sell them to *arats* or large depots.

Arat (Kata)

The “*Arat*” locally called “*Kata*” in Paikgachha is a market place for fish and shrimp where auction is taking place. The owner of the *arat* is called “*aratdar*” who demonstrate the auction system. It is also a commission agent who has a fixed establishment and helps the farmers and *foria* to sell their products and usually charges a fixed commission of Tk 3-5% on the market price. Shrimp are sold either through auction or buyer-seller negotiations. *Aratdar* have financially more purchasing power than *foria*. In general, farmers and *foria* sell their products at a current local market price to any *aratdar*. The most important aspect of *aratdar*'s business is that they do not purchase shrimp but facilitate to sell the shrimp to commission agents with the provision of taking commission.

Sub agents

According to Alamger Hosssain recruited as EF (Extension Facilitator) of WorldFish Center in Laxmikhola village of Paikgachha upazila, sub agents are small size entrepreneurs who also have access to financial resources and works on behalf of depots or commission agents. Sometimes, shrimp *foria* acts as a sub agent in the shrimp marketing channel of Paikgachha upazila.

Party/Paikar

There are small numbers of *paikar* Paikgachha shrimp marketing channel who are mostly seasonal floating traders collecting shrimp from different *arats* across the region. Their trading is mostly based on local fish market called *kata*. Large depots are the primary buyers from the *paikars*. The party/*paikars* are the primary supplier to the local market.

Commission agent

The commission agents are the financier in the shrimp marketing chain. They are typically medium- to large-sized entrepreneurs who have access to large financial resources and provide conditional loans to *aratdars*. Depots receive conditional loans from commission agents and agree to contractual exclusivity. They are the link between a *aratdars*, depots and the manufacturers or exporters. The commission agents contact the exporters on behalf of local depots, *aratdars*, sub agent and *paikar*. They receive a commission fee for shrimp sales from the exporters.

Processor/Exporter

Processor/Exporter export shrimp to foreign buyers are represented by the Bangladesh Frozen Foods Exporters Association (BFFEA). Processor acquire raw shrimp through a small number of commission agents, who are the final aggregators in the domestic supply chain and who source from smaller dealers and depots further upstream. There are no direct links between farmers and the processing factories (less than 1%). Processors provide a commission to agents who compete for supplies at the depots. For shrimp, major portion (65%) is sold to *bepari* and *paikar* through *aratdar* and the depot owner is also an important party for the farmers to sell shrimp (Alam *et al.*, 2012). Again in terms of share of production volume for the Black Tiger shrimp value chain in Vietnam: about 77.5% of Black Tiger production volume is traded by middlemen while only 22.5% is sold directly to processors (CBI, 2012). While, primary survey of this study found that farmers sell about 70% of their shrimp directly to the *foria*. Moreover farmers group of the shrimp cluster formed by WorldFish Center try to sell lion portion (>75%) of their raw products through depots working as PNGO. Omar *et al.*, 2014 stated that farmers sell 5% of their shrimps to *forias*; 50% to *beparis*, 15% to *paikars* and 5% to retailers via *aratdar* and 25% to depot owners. One of the important aspects that, farmers get a greater farmgate price due to negotiation between middlemen as their proportion is larger in respect of very lower production/ha and lower volume. The farmers in Bangladesh get higher prices for their products compared to farmers in countries like Thailand primarily due to higher production cost resulting from low management capability, inefficient quantity management and high mortality (Ahmed, 2010). For this reason middleman have to go a large numbers of gher to achieve his target collection because his livelihood is substantially dependent on shrimp trade. Beside this, there are lots of other intermediaries in shrimp value chain of Paikgachha within which the flow of shrimps from gher to processors takes place 20-30 hours. Quassem, 2003 reviewed that, once harvested, the flow of shrimps from gher to factory takes place within 24-36 hours. The long and uncontrolled system of selling the harvested shrimp, where the middlemen (farmer, *foria* and sometimes depot)

rarely store the shrimp with ice, but rather in unhygienic conditions, sometimes for extended periods of time in warm temperatures. This results huge quality loss of raw shrimp occurs in every stage of marketing chain. In addition presence of large number of intermediaries between the farmers and the processors makes it difficult to ensure a transparent traceable distribution system. So, there is urgent need for simplification of shrimp marketing channel of Paikgachha upazila.

MODEL FOR SIMPLIFICATION OF MARKETING CHANNEL IN SHRIMP CLUSTERS OF PAIKGACHHA UPAZILA

In Paikgachha upazila, shrimp marketing channels are much more complex and longer in comparison of Thailand shrimp supply chain. In Bangladesh, shrimp reaches buyers through trader networks that often include a number of middlemen (Barmon *et al.*, 2011). Each trader along these chains adds substantial margin to the shrimp, despite not adding any value to the product. There are too many non-value-adding middlemen along this shrimp marketing chain, where a financial bonding system extorts high profit margins from hatcheries and producers. The most crucial problem of this long chain is the deterioration of shrimp quality because it takes a longer time (24-36 hours) to reach to the buyer (PDO-ICZMP, 2003) as no ice is used by the most of intermediaries. Again, adulteration practices like pushing is a major threat for the shrimp exported from Bangladesh usually believed to be done by *forias*. Again *foria* involve themselves in adulteration for higher profit earnings. The Black Tiger Shrimp Cluster of Thailand shows that there is no involvement of many intermediaries like Bangladesh (IMETF, 2002). In Thailand, local trade supply chains are much shorter than those in Bangladesh-shrimp may be directly sold to seafood processors and exporting companies by farmers or regional suppliers. However, the majority of shrimp is directly sold to processors by farmers through central shrimp markets. These markets serve as an outlet for farmers and regional suppliers coming from other provinces, attaining competitive auction prices for produce. (Accenture and Humanity United, 2011). In addition, Umesh *et al.*, (2012) stated the Indian shrimp marketing channel where there are no single intermediaries except agents between farmers and processors. The main constraints against simplification of shrimp marketing channel of Paikgachha are intermediaries particularly middleman (*foria*). So we can simplify the shrimp marketing channels of Paikgachha upazila which exists in both India and Thailand. Followings two are the developed simple shrimp marketing channel for Paikgachha upazila.

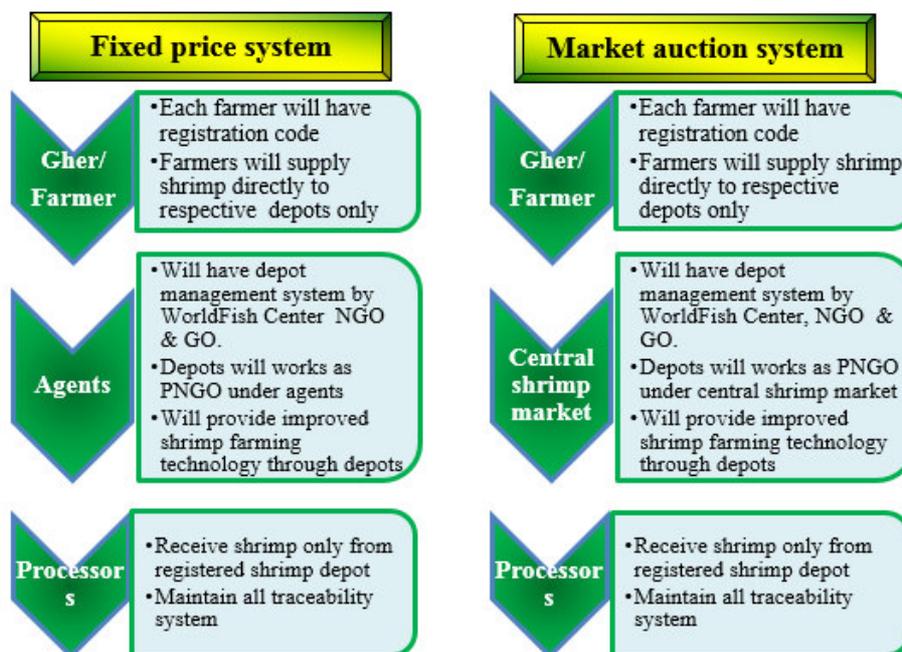


Figure 3. Simplified shrimp marketing channels for Paikgachha upazila

Fixed price system

In fixed price system farmers, agents and processors will be the main stakeholders. All the registered farmers will have to maintain good storage facilities after harvest. Furthermore a numbers of local depots will be connected with the agents. There should have some numbers of collectors having good communication and storage facilities under each depot who will collect the shrimp directly from gher places and promptly carry to the depots for further processing. In this fixed price system all farmers will be ensured actual and current market price according to grading respectively by the depot owner. However, it will be easier than easier under the shrimp cluster system of WorldFish Center since they have been supported the depots with technology and technical staff to transfer knowledge of improved shrimp farming technology and skills to the shrimp farmers. As farmers getting technical

support and other facilities from the depots they will be compelled to sell shrimp to the depots. In the shrimp cluster of Paikgachha some farmer found to sell their harvest voluntarily to their helping depots. In this case depot owner will have to be worked as a PNGO (Partner NGO) of WorldFish Center. However it may massively be possible only when government agency (DoF, BFFEA) will work in field level beside the NGOs and also may comprise the stakeholders under effective coordination.

Market auction system

Stakeholders likewise shrimp farmers, central shrimp market and processors will be incorporated in fixed price system market. This market plan may also simplify the shrimp marketing channel of Paikgachha upazila. This alternative model is to create defined shrimp markets where regular trade can take place between farmers, traders, and processors. These simplified models allow farmers to receive the fair market price of shrimp; likewise, industrialized buyers benefit from the consistent supply of shrimp available at markets. At the same time the buyers will have to buy raw shrimp from the registered farmers only. This will also lessen the possibility of adulteration by the middleman (*foria*) and at the same time reduce prolonged transportation. It may also be possible only in collaboration with other development programs (Katalyst, PRICE, and BFRI) in partnership with BFFEA and the National Shrimp Farmers Association (NSFA) to develop a central shrimp market with close observation of government organization. It will be easier when Bangladeshi shrimp farmers will get a larger harvest at time regularly like the farmers of Vietnam, India, China, Malaysia and Australia.

GRADING AND PRICE TRENDS OF SHRIMP IN PAIKGACHHA UPAZILA

Grading is the basic function of sales transactions and is defined as the classification of products according to some standards or measures (Kohls and Uhl, 2005). Regarding the field survey with EFF of WorldFish Center in different local depots of Paikgachha upazila, most of the depot owner in that time gave the following shrimp grading system. There were five grading system depending on numbers of shrimp/Kg and each having individual price. The highest price (TK 1100) was found for grade 5 consisting of 20 pieces of shrimp/Kg and the lowest price (450-500) was found for grade 1 consisting of about 60 pieces of shrimp/kg (Table 1).

Table 1. Shows the current shrimp grading and farm harvest price in the local depots of Paikgachha upazila

Shrimp grade system	Counts/Kg	Price (Tk/Kg)
Grade-1	66/Kg	450 – 500
Grade-2	50/Kg	600
Grade-3	40/Kg	850
Grade-4	30/Kg	950 – 1000
Grade-5	20/Kg	1100

(Source: Own field survey, 2013)

Table 2. Profit margin according to stakeholders involve in the shrimp marketing channel in Paikgachha upazila

Characteristics	Farmer	Middleman / <i>Foria</i>	Local depots	Sub agent	Commission agent	Processor or exporter
Market Price (Tk/ kg)	600	630	674	684	695	778
Profit margin (Tk/ Kg)	-	30	44.1	10.11	10.26	83.4
Profit margin (% of total)	73%	5%	7%	1.5%	1.5%	12%

(Source: Own field survey, 2013)

The analysis shows that the highest level of price (73% of the total) taken by farmers as farmgate price (Figure 4). Of the trading intermediaries, profit margin is highest for the local depot owners (7%) and second highest is for *foria* or middleman. This is because unlike other trading intermediaries, the depots conduct an intermediate processing before they supply to the agents. Value addition by the factory and exporters is about 12% of the total. It should be noted that the export market price is not based on primary data since the exporters and processors did not reveal the price. Therefore, the price is derived from extrapolation of total export volume and total export revenue reported by DoF.

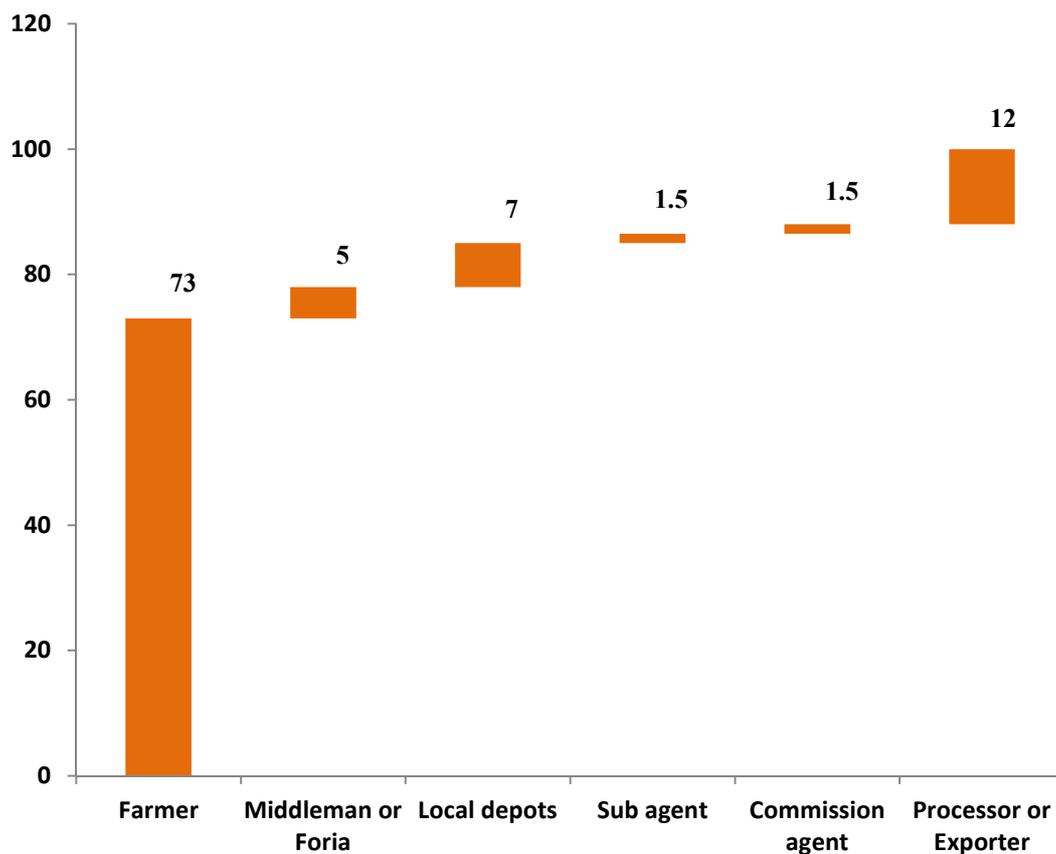


Figure 4. Waterfall diagram of profit margin in the shrimp marketing chain of Paikgachha upazila. Source: Primary Study (Field survey, 2013) and computation by own

CONCLUSION

Shrimp sector of Bangladesh has emerged as an indispensable source of cash crop which creates employment opportunities and improves the livelihood of shrimp farmers as well as related intermediaries. Therefore, shrimp industry is an important and potential sector for economic development of Bangladesh. This sector is helping improve the livelihood of the poor people such as fry catcher, fry *farias*, depot, small farmers, different type of intermediaries (shrimp *farias*, *paikars*, suppliers, agents) and exporters. Although primary survey found that the highest level of price (73% of the total) taken by farmers as farmgate price but this study also investigated that the most vulnerable actor in the shrimp marketing channel of Paikgachha upazila are *forias* who themselves only responsible for prolonged transportation. Once harvested, the flow of shrimps from gher to processors takes place about 24-36 hours. This prolonged marketing chain almost deteriorates the shrimp quality. In addition middlemen (*foria*) often try the adulteration method targeting more profit from his business. On the other hand in Bangladesh, shrimp marketing channel is buyer-oriented. Farmers have less power to control the price and auction market is very few. Due to implementation of cluster farming approach by WorldFish Center collaborating with local depots as a PNGO, farmers group of shrimp clusters are now compelled to trade more than 75% of their raw goods through local depots. The farmers in the clusters received better price from their harvested shrimp without involvement of middlemen which resulted high quality of raw-materials with better price. The simplified supply chain also considered the reduction of post-harvest losses. So it can be acknowledged that only a simple shrimp marketing frame with transparent traceability system can widespread our international market with long term sustainability. Considering these positive outcomes, the simplified marketing channel named fixed price system and market auction system has been developed.

REFERENCES

1. Accenture and Humanity United, 2011. United Exploitative Labor Practices in the Global Shrimp Industry, pp. 20-28.
2. Ahmed A. 2010. Prospects, Importance, Problems and Impacts of Shrimp Cultivation in Bangladesh: A Literature Review. p. 6.
3. Ahsan DMN 2012. Development of a Framework for Simplification of Shrimp Supply Chain in Bangladesh.

- Fisheries & Marine Resource Technology Discipline Khulna University, Khulna 9208, Bangladesh. pp. 9-39.
4. Alam, M.F., Palash, M.S., Miah, M.I.A. and Dey, M.M. 2012. Marketing of major fish species in Bangladesh- A value chain analysis, Food and Agricultural Organization. pp. 10-23.
 5. Azad A.K. 2008. Coastal Aquaculture Development in Bangladesh: Un-sustainable and Sustainable Experiences. IIFET 2008 Vietnam Proceedings.p.2.
 6. Barmon, B.K., Chaudhury, M., Munim, S.S. 2011. Value Chain and Marketing Channels of Shrimp/Prawn Sector of Gher Farming System in Bangladesh. *World Review of Business Research* 1(1) 15-21.
 7. BFFEA, 2014. Shrimp and Fish News: News Letter of Bangladesh Frozen Foods Exporters.
 8. BSFF, 2012. Bangladesh Shrimp and Fish Foundation, Dhaka, Bangladesh.
 9. CBI, 2012. The Bangladeshi seafood sector: A value chain analysis. CBI Report by LEI-Wageningen UR. Centre for the Promotion of Imports from Developing Countries. pp. 27-34.
 10. IMETF (Institute for Management Education for Thailand Foundation) 2002. Competitive Study-Cluster Approach, Study Highlights: Competitiveness of Thailand's Black Tiger Shrimp Industry. pp. 6-30.
 11. INNOVISION, 2012. INNOVISION Consulting Private Limited: Value Chain Analysis of Shrimp, Prawn and Tilapia from the Southern Region of Bangladesh. pp. 22-48.
 12. Kohls, R.L and Uhl, J.N 2005. Marketing of agricultural products. *9th edition*. Macmillan publishing co, Inc., New York.p.314.
 13. Omar, M.I., Islam, M.A., Haque, S.A., Alam, M.A. and Janifa, U.A. 2014. Marketing System of Shrimp in Some Selected Areas of Bangladesh. *European Journal of Business and Management* 6(4) 133-135.
 14. PDO-ICZMP, 2003. A Systems Analysis of Shrimp Production, Working Paper WP014 Program, Development Office-Integrated Coastal Zone Management, Water Resources Planning Organization, Ministry of Water Resources, Dhaka, Bangladesh. pp. 12-48.
 15. Quassem K. 2003. Market structure in shrimp and prawn sector in Bangladesh. *World Review of Business Research*. Vol 3. pp. 13-24.
 16. Tasnoova, S., Yukata, T. and Iwamoto, I. 2010. Market structure and procurement system of shrimp export industry in Bangladesh. 4th Asian Rural Sociology Association (ARSA), International Conference, Legazpi City, Philippines. p. 239.
 17. Umesh, R.N., Chandra Mohan, A.B., Ravibabu, G., Padiyar, P.A., Phillips, M.J., Mohan, C., Bhat, V. 2010. Implementation of better management practices by empowering small-scale farmers through a cluster-based approach: the case of shrimp farmers in India. pp. 43-68.
 18. Rahman, M. M.and Hossain, M. M. 2009. Production and export of shrimp of Bangladesh, problems and prospects, Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh, Dhaka, p.163.