Status of Stakeholders of Shrimp Marketing Channel in Bagerhat District with View to Food Safety

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Abstract
The marketing channel included the stakeholders like gher owner, faria, depot holder, agent and processing plant. In the present situation shrimp is considered the exporting item assuring good quality product, satisfy the foreign buyers and thus promoting export growth. In this circumstance seven salient features were fixed up for increasing export and production. Some concerning factors like source of pure water, irregular icing, improper handling and transportation were identified which affected the food safety and quality of the seafood product. Lower stakeholders like gher owners, farias and depots were less aware about HACCP where as agent and plant complied HACCP system cautiously. In processing plants there was no child labour, less wage was paid to workers and other facilities were partially provided. In ghers wage was paid in terms of cash, food and cloth where as in depots and agents only low rate of cash were paid. Overtime wage were fully absent in whole marketing channel. In farias and deposit some unethical fair trade practices having pushing foreign materials (shabu, juice of ladies finger, water etc.) were observed. In case depots, agents and processing plants lower grade was counted during the procuring where as higher grade was considered during selling period. Without faria all stakeholders had provision to get license. It was found that gher owners were less interested to get license but higher percentage of agents and factories were found having license from the competent authority. Less number of lower stakeholders was aware about traceability and only factory owners were found conscious about it and tried to maintain.

Key words: Shrimp, marketing, food, safety

Introduction
Bangladesh is primarily agricultural country. It is a small country but with vast water resources scattered all over the country in the form of small ponds, beels, lakes, canals, rivers and estuaries covering an area of about 4.34 million ha. The total fish production in Bangladesh was estimated at 1.78 million tones in 2005-06; of which 1.4 million tones (97%) were obtained from the inland waters, and the remaining 0.38 million tones (21%) came from marine water (Rahman, 1994). Presently 1.4 million people are engaged full time and 12 millions as part time in fisheries sector in the country for livelihood and trade. Another 3.08 million fish and shrimp farmers are cultivating fish both at subsistence and commercial level. Bangladesh was a fish surplus country about a century back when the population was less than 20 million. However with the rapid growth of population, fishing efforts increased greatly while fish culture and conservation were insufficient to keep pace with population explosion. In Bangladesh, fish farming is currently one of the most important sectors of the national economy. Within the overall agro-based economy of the country, the contribution of fish production have been considered to hold good promise for creating jobs, earning foreign currency and supplying protein (Sikorski, and Sun, 1994). About 97% of the inland fish production is marketed internally for domestic consumption while the remaining 3% is exported (Ias, 2001 and Love, 1988). A large number of people, many of whom living below the poverty line, find employment in the domestic fish marketing channel in the form of farmers, processors, traders, intermediaries, day labourers and transporters (Matsya, 2003; Pansuwanna, 2001; Ruckes, 1980 and Sait, 2001). The fisheries sector, especially the shrimp sector has been playing an important role in the economy of Bangladesh. From time immemorial, freshwater prawns and shrimps have been caught as wild product of rivers, canals and floodplains. In the past people living in coastal areas used to make dikes or embankments along the banks of estuarine rivers and allowed sea water carrying shrimp fry or juveniles to enter the enclosures. As a result, production output had always been very poor. The government of Bangladesh has taken up many schemes for the modernize the shrimp culture in the country from mid 1980s, as a result of which there have been considerable improvements during last twenty years. The sector plays a dominant role in nutrition, employment and foreign exchange earnings. About 1.2 million people directly and 10 million people indirectly depend on fisheries for their livelihood. This figure is about 12% of the total population of the country. Fisheries have contributed to 5.24% to GDP, 5.03% to national income, and 4.76% foreign exchange earning (Matsya, 2003 and Sait, E., 2001). Bangladesh shrimp and prawn exports comprise 2 species from freshwater and 9 species from marine water. Of these, Macrobrachium rosenbergii, (The giant freshwater prawn, locally known as golda), Metapenaeus monoceros (Brown shrimp, locally known as harina), Penaeus indicus (White shrimp, locally known as chaka), and P. monodon (Black tiger, locally known as bagda) are worth mentioning. Tremendous prospectus exists for the development of the sector. The country has great potential for freshwater prawn

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culture, and marine and brackish water shrimp culture. Bangladesh shrimp is widely accepted for its freshness and pollution free production. It is also free from any chemical environmental hazards. This advantage is fully exploited by the way of image promotion in the world market both with the consumers as well as marketing channels.

Objectives
The broad objective of the present investigation mainly focused on identification of the steps taken of each stakeholder to know how food safety activities improved by the stakeholders.

Materials and Method
Nine upazillas of Bagerhat district were selected under the investigation. Bagerhat district is famous for shrimp culture and a strong marketing channel existing in this district. All marketing channel is interlinked with other district marketing channel. The study area were Sadar, Mongla, Rampal, Fakirhat, Kachua, Mollahat, Morelgong, Chitalmari and Sarankhola (Fig. 1). Different questionnaires were prepared each for each stakeholders, and survey based work had been done. A total 81 gher, 81 farias, 54 depots, 8 agents and 2 factories were investigated. The participants were selected as random basis. The PRA tools including FGD (Focus Group Discussion), daily activities, cross check, seasonal calendar, etc., photographs were taken before interpretation. There were 9 FGD were conducted at the gher level in 9 surveyed upazillas. Different organizations such as Bangladesh Frozen Food Exports Association (BFFEA), Bangladesh Export Promotion Bureau (BEFR), Department of Fisheries (DoF), Shrimp Seal of Quality (SSoQ), Bangladesh Fisheries Development Corporation (BFDC), NGO's and other international organizations etc., had formed alliance to work in a body to improve the present shrimp marketing system and to do so they were trying to bring change top to bottom of the shrimp marketing channel with a target of Tk 10,000 crore (US$1.53 billion) export earning from frozen food sector of the country. To achieve the new desired target scheme they had established Food safety in all stages. In the present study to identify the problems existing in the marketing system to bring revolution, data were collected from each and every stakeholder in the aspect of the relevant features (Table 1).

Table 1. Major considering factors taken under the study.

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<th>Salient features</th>
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Primary data were gathered by field survey through structured questionnaires. This study involved the inspection of the socio-economy and livelihoods of the stakeholders.

Results
Existing shrimp marketing channel in Bagerhat district: Marketing channel is the sequence of intermediaries through which harvested shrimp go by from producers to consumers. It may be noted that some shrimp were harvested and marketed to the local consumer. Those marketing channel was different from the marketing channel where harvested shrimp were exported through a channel to the abroad. In the present study all types of shrimp like Peneaus monodon (bagda), Macrobrachium rosenbergii (golda), Metapenaeus monoceros (horina), P. indicus etc. were taken under consideration. Those are used to export abroad. This marketing channel is simple comparative to the fish marketing channel. Marketing channel participants included farmers, farias, depot holders, commission agents and processing plants. Including freshwater and marine water shrimp a general marketing channel was sketched. The first stakeholder was identified as farmer that was indicated as gher owners/gher, second stakeholder was appeared that was farias. In the present marketing system two types of farias were found. Some were called small farias and other was called as large farias. Though in the analysis both farias were combined and used in the result in a body.
Gher owners sold their shrimp to the farias sometimes in the gher areas or sometimes they carried their harvested shrimp directly to the depot. The third stakeholder was depot holder. In that section also two types of depots were found, one was primary and another was secondary. Shrimp can be marketed from farias to the both places and even primary depot owners sold shrimp to the secondary depot owners. Also in that section two depots were analyzed jointly. The fourth stakeholder was found agents or commission agents. Either farias or depots all shrimp was firstly entered into any commission agents then those were passed to the processing plants. The last one was processing plants. There was a very interesting matter that processing plants didn’t accept any shrimp without via commission agents.

Source of fund of the gher: Gher owners normally run with self financial support. About 66.67% gher of Morelgong upazilla, 33.33% gher from Mongla and Mollahat upazillas and also 16.67% gher from Kachua and Sarankhola upazillas were established taking loan from somewhere.

Education and religion of the gher: It has been found that 46.43% gher owners were found whose education level was primary and a large percentage (89.29%) gher owner was found Muslim.

Salary of the workers of the gher: In gher male and children workers were found with great percentage and sometimes manager or accountant was found in some ghers but no grader was found. Male, female and children workers salary were ranged between 60-120, 50-55 and 30-40 Tk/day\(^1\), respectively. Where as manager was paid ranged between 3000-5000 Tk/month\(^1\).

Source of water: After harvesting shrimp should be washed out with clean water which is not contaminated with microbes. Normally deep tubewell water is fresh. From the survey it was found that only 20 and 16.67% gher of Mongla and Fakirhat upazilla, respectively were found mitigated their water source from deep tubewell and Chitalmari upazilla was found where 100% gher used pond water to solve water source.

Ice used: Ice should be used immediately after harvesting to the consumer level. In the present study, only Chitalmari upazilla was found where 60% gher of Sadar upazilla used ice after harvesting, while 100% gher of Chitalmari and Rampal upazilla declared that they didn’t use ice after harvesting.

Ice ratio (Ice: shrimp): Ice ratio (ice:shrimp) used in gher of nine different upazillas. From the survey it was clear that not all gher used ice, if they used, 0.5:1 ratio maintained. Some upazillas like Mongla, Morelgong, Sarankhola, Rampal and Fakirhat were found where 100% gher used ice as a ratio of 0.5: 1 while 50% gher used 1:1 ratio ice.

Grading spot: Grading spot should be a fresh place. It is evident from the grading spot used in gher of nine different upazillas. In mongla, Rampal and Sarankhola Upazillas 66.67% gher were found where grading was carried out only over the floor and in Sadar upazilla 75% gher were found where wooden platform was used to grade the shrimp. Actually in every gher landing center and a steal or polythene grading spot should be remained, but very limited portion was observed in the study area.

Shrimp handling hour: Shrimp handling time should be minimum which can increase the shelf life of shrimp. About 33.33% gher of Bagerhat District found that took 1-2hrs handling period where as more than half gher took time 2-3hrs to send the harvested shrimp to the next stakeholders. Even 11.11% gher also spent more than four hours to send their harvested product to the next step. If the gher take a significant time in their stock without or with lower ratio ice noticeably it can be said that the quality of those product would be deteriorated when it will reach to the factory and thus unfair trade takes place to sell those product. The farmers must be trained or informed to market the product as early as possible. Before harvest they should take necessary step that are required to keep the product comparatively free and contamination free.

Transporting material: Upazilla wise transporting material variation, where bamboo baskets were present in Kachua, Mollahat, Morelgong and Sarankhola Upazilla where as 100% plastic materials were used in Mongla and Rampal Upazilla. Only cork (Styrofoam) sheet (25%) was found in the Sadar Upazilla. It is suggested by quality control authorities that carrying material should be food grade plastic materials because it can be easily clean and minimum chance to be contaminated.

Transporting carrier: Upazilla wise transporting carrier scenario. Maximum gher were situated remote areas from where van was the only way to carry to the next stakeholder area. Sadar, Fakirhat, Kachua, Mollahat and Chitalmari upazillas were found where van was the only carrier way to carry shrimp to the next step. Some gher of Morelgong and Sarakhola upazillas were placed comparatively in the remote area and from both area 66.67% shrimp were transported by mechanized boat.

HACCP concept: Every person related with the shrimp post harvest activities up to consumer level must have to knowledge about HACCP and they must have to obey the norms of the HACCP at every sector of the shrimp marketing chain. In the present study 35.71% gher owners found who have no any idea about HACCP. A minimum portion 17.86% respondent were found who maintained HACCP.

Age of Faria: Age structure of all farias in Bagerhat district where maximum farias (40.74%) was found whose age was between 30-39 years and none was found bellow 20 years.
Religion of Faria: Upazilla wise religious were identified and data revealed that 33.33% Hindu were found in Mongla, Mollahat and Rampal Upazillas and 66.67% Hindu was found as fari in Chitalmari and rest of them were in Muslim.

Education of Faria: The data focused that 33.33% fari was found from Mongla, Chitalmari and Rampal upazillas who were illiterate and highest percentage (66.67%) of primary level and SSC level were found in Sadar and Morelgong Upazilla respectively and also 33.33% fari was identified in Kachua upazilla who were up to university level.

Amount of shrimp buy everyday of Faria: About 66.67% of farias from Sadar, Fakirhat, Kachua, Morelgong, and Mollahat upazillas purchased 40-60 Kg day⁻¹, where 33.33% of farias of Mongla, Kachua, Chitalmari, Morelgong, Mollahat and Rampal upazillas purchased shrimp more than 60 Kg day⁻¹.

Sell to the next stakeholder of Faria: It is evident that 100% farias of Sadar, Mongla, Kachua, Chitalmari, Sarankhola and Rampal upazillas sold their shrimp to Depot and 33.33% of farias of Morelgong and Mollahat sold shrimp to the big faria and also an exceptional was found that 33.33% farias of fakirhat upazilla sold shrimp directly to the agent, none was found who sold directly to the factory.

Source of water of Faria: A substantial amount of farias like 66.67% and 33.33% from Mongla, Kachua, Morelgong, mollahat and Sadar, Fakirhat, Chitalmari, Rampal Upazillas respectively were found who used water from gher/pond and also 33.33% of farias from Fakirhat and Rampal were used river/canal water. But that water might be contaminated. Further 66.67% of farias from Chitalmari and Sarankhola Upazilla were found who used shallow tubewell water and one third (33.33%) of farias from Sadar and Kachua used deep tubewell water.

Icing spot of Faria: Icing spot should be contamination free and the place which is easy to clean. The data depicted that 66.67% of farias from Sadar and Morelgong upazillas used icing spot at their home. Further 66.67% farias from Kachua, Chitalmari, Sarankhola and Rampal upazilla was found who used ice at the depot area. This indicated that in the mean time from gher to the depot they didn’t use ice. On the other hand 33.33% farias from Mongla and Morelgong and 66.67% farias from Mollahat stated that they didn’t use ice ever to carry the shrimp from gher to the depot or next step of the marketing channel.

Grading spot of Faria: It is strictly prescribed by quality control authority that grading spot must be the place where there is no chance to contaminate the shrimp with any sorts of foreign particles like microbes or other toxic material. From the present study it was found that 66.67% farias of Sadar, Mongla, Chitalmari, Mollahat and Rampal upazillas did their shrimp grading on the floor where 33.33% farias of Fakirhat and Morelgong Upazillas used tin/steal material and also found 66.67% farias of Kachua upazilla used wooden platform for grading shrimp, but no polythene user was found in any upazilla.

Shrimp handling hours of Faria: Only Fakirhat upazilla’s faria (33.33%) took 1-2 hours handling period to send the shrimp to the next step. One the other hand 66.67% farias from Sadar, Chitalmari, Sarankhola and Mollahat upazillas, and 33.33% farias from Fakirhat, Kachua and Morelgong upazillas took maximum time (5-6 hours) to pass the shrimp to the next step of the marketing channel.

Transorting materials of Faria: All the (100%) farias of Kachua upazilla used plastic material and 66.67% of farias of Mongla, Chitalmari, Morelgong, Sarankhola and Rampal upazillas were used aluminum material to carry shrimp.

Transorting carrier of Faria: Upazilla wise transorting carrier were investigated and found 33.33% of farias from Sadar, Mongla, Chitalmari, Sarankhola, Mollahat and Rampal upazillas carried shrimp to the next step either by hand or on head. To early reaching carrier like truck/pickup was found in Fakirhat, Kachua and Rampal Upazillas at a percentage of 66.67 and 66.67% mechanized boat also found in riverine area of Morelgong upazilla.

Transorting route of Faria: Half (50%) of the farias of Chitalmari upazilla used muddy road to carry their shrimp and but 100% farias of Kachua upazilla carried their shrimp to the next step through road (brick/pitch).

HACCP concept of Faria: A big percentage farias of Bagerhat district stated that they had no idea about HACCP while a few percentages (3.7%) farias declared that they maintained HACCP and rest of the farias of Bagerhat district said that they knew but didn’t maintained.

Ownership of depot: In the present investigation 66.67% depot of Bagerhat district was found whose ownership was rented while 14.81 and 18.52% were found Govt. and self respectively. About 37.04% depot was identified whose source of fund was loan from somewhere.

Area of depot: Area wise depots were divided into four different groups, where below <100 sq.ft depot was not found and 62.96% depots were found having area of 200-300 sq.ft. Too large depot is difficult to keep clean and free from contamination of maintain HACCP. In Bagerhat district only 14.81% depots were found having area more than 300 sq.ft.

Structure of depot: In the study area (Bagerhat district) 62.96% depots were found where floor had been made of mosaic and rest of the depots floor was plastered. It was very positive result in the context of HACCP that there was no muddy and wooden floor found in any of the nine surveyed upazillas. Further
same figure shows that 88.89% depots made their wall with bricks. Though a few (14.81%) depots were appeared whose roof was made of golpata, but a significant portion (37.04 and 29.63%) depots were visible whose roof was made of concrete and tin respectively.

**Salary of depot**: Females and children were employed giving lowest salary into the depots. The male workers were getting higher salary (60-120 Tk day) rather than others. Workers were employed as daily basis and salary increases depending upon season and production of the depot. The salary of staff and also workers varied with the size of the depot, situation, availability of labour, production and other factors. In the depots of Bagerhat district there was no permanent children staff and manager/accountants salary ranged between 2500 to 6000 Tk month.

**Source of water of depot**: Upazilla wise source of water in the depots was checked and there was no depot was found where river/canal and deep tubewell water used. In sadar, Mongla and Morelgong Upazilla were found where depots used shallow tubewell to solve their water activities. Rest of the upazzillas a few percentage depots were found where gher/pond water used.

**Ice ratio of depot**: Properly icing can increase the freshness of the shrimp. Depot is the second step after harvesting. In this step shrimp should be iced and as early as possible. About 66.67% depot of maximum upazillas (Sadar, Mongla, Rampal, Fakirhat, Mollahat, Morelgong and Chitalmari) and depot of Kachua upazilla kept shrimp with ice at a ratio of 1:1 and none was found who kept shrimp with ice at a ratio 2:1.

**Grading spot of depot**: Grading place is the point from where shrimp can be contaminated. To maintain HACCP it is suggested that shrimp should not grade in a place which is contaminated. In the present survey a noticeable portion (66.67%) depots of some upazzillas (Mongla, Fakirhat, Kachua, Morelgong and Chitalmari) were found where shrimp grading was taking place on the floor. But 100% depots were found that where grading was taking place over the steal table.

**Transporting materials of depot**: The bamboo baskets were disappeared from depot area only in Fakirhat upazilla 16.67% depot bamboo baskets used to transport shrimp. Four upazzillas like Rampal, Morelgong, Chitalmari and Sarankhola where 100% depots were found who used plastic drum to transport shrimp.

**Transport route of depot**: It has been found that shrimp of 100% depot of eight upazzillas without Sarankhola were transported through road (brick/pitch) and only 33.33% muddy road was used in Sarakholha Upazilla.

**Transporting carrier of depot**: Depots were comparatively situated in the urban area rather than gher in the Bagerhat district. From the investigation it was found that pickup van was used almost all upazzillas. In Sarankhola upazilla van were the only means to transport shrimp from depot to the next step and without Sarankhola and Morelgong rest of the upazzillas depots used pickup van and sometimes bus/truck to carry their shrimp towards the processing plants. To use pickup van has a great advantage that with less mechanical injury shrimp can be reached to the next step within shortest time. There was a less chance to reject the shrimp causing spoilage.

**Shrimp handling hours of depot**: Less than three hours handling period was found in Sarankhola upazilla (33.33%) in all depots average handling hours were 4 hours or more than 5 hours. The 100% depots of Mollahat upazilla were found whose shrimp handling period was 4 hours.

**HACCP concept of depot**: From the survey it was found that 51.85% depots of Bagerhat district maintained HACCP norms while 29.63% depots reported that they heard but not maintained and rest of the depots (18.52%) reported that they didn’t know what HACCP is.

**Ownership of agents**: From the investigation 62.50% agents were identified as rented and, 25 and 12.50% were identified as self and Govt. respectively. 62.50% agents were running by getting loan from others where remaining was self funded.

**Area of agents**: Area wise agents were divided into five different categories such as 200-300, 300-400, 400-500, 500-600 and >600 sq. ft groups. About 25% agents were identified for each of 300-400, 400-500 and >600 sq.ft groups and 12.5% for each of 200-300 and 500-600 sq.ft groups.

**Structure of agent**: Floor of almost all agents was constructed by mosaic and it is prerequisite to construct the floor and wall with such a material that can be easily cleaned to maintain HACCP. In the present survey a large percentage (62.5%) of agents were identified which floor was constructed with mosaic or tiles. Where 31.25% floor was found plastered and very little (6.25%) was found wooden floor which could be vulnerable to contamination. No one was found which floor was muddy. Like floor 75% agents were found which wall was made of brick and remaining was found whose wall was made of tin (12.5%) and wood (12.5%) while bamboo wall was absent and also shows the roof structure of surveyed agents where 25, 50, 12 and 12% for concrete, tin, gopolata and other respectively.

**Source of water of agents**: Use of water is an important key factor to maintain HACCP. Water is used to wash shrimp as well as agent floor, wall and keep hygienic the environment. In the survey source of water was checked out. Greater portion (62.50%) agents used water from shallow tubewell and 25% agents used deep tubewell water while 6.25% and 6.25% agents were identified who mitigate their water problem from gher/pond and river/canal respectively.
Icing ratio of agents: After entering shrimp to the agents and up to reaching to the factories it is needed to keep the product dipping into ice. Some factories were identified which didn’t use ice while some used. The shrimp were preserved with dry ice the ratio was varied from agent to agent. In the present study 62.50% agents were found where ice was used with a ratio of 1.5: 1 (Ice: shrimp) while 25 and 12.5% were found for 1:1 and 2:1 ratio groups respectively.

Grading spot of agents: Grading spot should be contaminated free. To ensure good quality of shrimp contaminating less quantity of microbes it is suggested to use such a material which could be cleaned easily after every use. It was suggested from the shrimp consumer country shrimp should be graded over the steal table. Moreover in the present study 37.5% agents were found where grading was taking place on the floor and remaining (62.5%) was done over the steal.

Transportation of agents: The shrimp, transported from different agents to the processing plants was found with the help of plastic drum and plastic materials. A significant percentage (68.75%) was found in case of plastic drum where as 31.25% found for plastic materials. No bamboo baskets were identified. The result showed that the agents were followed HACCP norms in this respect though it is either practiced consciously or not. Plastic drum or plastic materials were easy to clean. A significant portion (50.26%) shrimp were identified transferring from agents to the factories by pickup van and next big amount (25%) was bus/truck. Some portion (12.5%) was transported by van when the quantity of selling product was lower and if the agents were situated nearby to the factories. Very lower amount (6.25%) was appeared transferring from agents to the factories by mechanized boats.

HACCP concept of agents: It is necessary to know HACCP concept who are engaged with the shrimp post harvest activities. In the present study HACCP concept was investigated and 62.5% agent owners were declared that they maintain HACCP, while 12.5% agent owners stated that they didn’t know what is HACCP and 25% agent owners said they knew but couldn’t maintained properly.

Ownership and source of fund factory/ processing plant: About 100% factories were running taking loan from others and also 100% factories were constructed making partnership with other.

Education and religion of factory owner of plants: About 100% factory owner’s educational background was SSC pass and religious status was Muslim.

Source of water of plants: Water use is the vital concerning matter to maintain HACCP. It is recommended by shrimp importing countries to use water from deep tube well that is safe and free from microbes. Moreover in factories quality of water is checked. In the present study it was found that 100% factories were found where deep tubewell water used. Moreover the using water was found treated with chlorine to disinfect hand, leg or other processing related materials.

Icing of plants: After receiving in the factories shrimp must be cleaned and washed and as well as removed old ice, water because old ice could carry microbes or contaminated. From the investigation it was found that 75% factories cleaned both ice and pots and 25% factories stated that they washed and then iced.

Icing ratio of plants: Before processing the received shrimp was stocked or plied in chilled room and then different factories use ice at different ratio. It was found that 50% of factories use ice ratio 0.5:1 (Ice: shrimp) and 50% factories ice at a ratio of 1:1.

Shrimp handling hour of plants: Before processed the shrimp handling period should as less as possible is best for keeping good quality. Figure 81 shows that 75% factories took 2-3 hours to handle the shrimp and 25% factories stated that was 1-2 hours.

HACCP concept of plants: About 100% factories maintain HACCP norms. HACCP concept and consequently maintaining is the very important key factor to continue the processing plant.

Discussion
Food safety is the burning issue in world consumer market. Shrimp buyers are more sensitive about food safety and quality assurance. In this case they gave attention on sanitation and hygienic facility prevailing on each tire of the channel. Food safety were hampering using unhygienic water (gher, pond, river and canal water) during the shrimp washing period in lower stake holders. Also use of unhygienic ice, improper ratio of ice, bamboo baskets, grading on the floor, long term handling were found in the study are. A considerable amount of gher were found where bamboo baskets were replace to plastic material which improving the food safety. Degree of HACCP acquaintance and their implementation were found higher in agents and processing plants. Long time shrimp handling period was observed in farias and depot which deteriorated the quality of the shrimp. Once harvested flow of shrimp from gher to processing plants takes place within 8-10 hours. The post harvest flow goes from farmers to processing plants through passing a series of intermediaries such as faria, depot, and agents. There is no direct links between farmers to processing plants, thus quality of the shrimp deteriorated continuously.

References