

**Socio-economy and livelihoods of stakeholders at
different levels of production, processing and
marketing and value chain of freshwater prawn
(*Macrobrachium rosenbergii*) in greater Khulna and
Noakhali areas of Bangladesh**

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Executive Summary

Galda *Macrobrachium rosenbergii* culture is an important activity in Khulna areas. The production, processing and marketing chain consists of about 7 different stakeholder groups. The present study was aimed at evaluating the socio-economy of the stakeholders groups associated in the chain and to analyze the value chain of the process. A total of 325 sample questionnaires were collected from 6 stakeholder groups viz., farmers, forias & local depot owners, secondary depot owners, chatal auctioneers, commission agents and factory workers. Interview of factory owners were taken through a formal discussion without any structured questioner. It was obtained that galda is being farmed mainly by the poor farmers. Their farm sizes average at 2.5 acres. The farmers have the inherent fund crisis. They take loan from the Mohazons and Dadonders at extra high interest rate. The average production cost / acre stands at Tk. 55,000. The principal costs involve in feed, seed and labor. They largely use the home-made feed prepared with local ingredients. The food being of low nutritive quality, production / acre thus remains low, being averaged at 162 Kg. The price of galda remains variable through out the season; the farmers do not have any say on the rates and grades, the same is fixed by the commission agents. The net annual profit / acre of galda farming averaged at Tk. 10,000 and considering other incomes and costs, the annual balance of a galda farmer average at Tk. 10,000. The marketing chain of galda is plagued by various problems. The local depots are very poor in handling and sanitation; the conditions are marginally upgraded at the secondary depots. At chatal prawn is found to be sold through auction by the auctioneers and get 2 to 3 percent commission of total value of the product. Agents are the rich and powerful intermediaries in the prawn marketing channel and most of the exploitation of farmers and small traders occur probably due to the presence of this stake in the chain. The factory workers are not trained in sanitation and food safety code. They are low paid and subjugated.

The prawn is a highly valued product in the international markets and the market chain from producers to consumers passes through a numbers of intermediaries. Most of the product are exported to the USA, European countries and Middle-East countries. Prawn constitutes 15 to 18 percent of the total export of Fish and Fisheries products.

In spite of poor socio-economic conditions, livelihood outcomes are positive and most of the household farmers (77 %) and depot owners (92 %) have improved their social and economic conditions through prawn farming activities. The export quantity of prawn is increasing from year to year which revealed that the prawn farming area as well as the production also have increased from year to year. However, concerns arise about the long term sustainability of the production due to lack of technical knowledge of the farmers, higher production costs, insufficient supply of fry, poor road and transport facilities, lack of fund, large number of intermediaries, poor institutional support and extension services etc. A concerted effort is needed to upgrade the production and marketing chain of galda in Bangladesh.

Background

Bangladesh is fortunate enough having an extensive 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. Promise for improvement of human livelihood through land based production system seems quite feeble hence fisheries have a greater promise and maintaining a steady rise in contribution to GDP. The total fish production in Bangladesh was estimated at 1.78 million tones in 2000-01; 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 (DOF,2002). 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. 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. About 97% of the inland fish production is marketed internally for domestic consumption while the remaining 3% is exported (Hasan, 2001). A large number of people, many of whom living below the poverty line, find employment in the domestic fish marketing chain in the form of farmers, processors, traders, intermediaries, day laborers and transporters (Ahmed *et al.*, Islam, 1996; DFID, 1997; Kleih, 2001).

In Bangladesh aquaculture of fresh water prawn (*Macrobrachium rosenbergii*) has experienced a boom in the recent times. Although the species can be cultured in the freshwater habitats of ponds throughout Bangladesh but for various reasons, it is being cultured at large scale in fresh waters in the coastal districts especially in greater Khulna and Noakhali, either singly or in polyculture with Indian major carps species, being integrated with paddy in the pond bottom itself and vegetables in the pond dikes. Technology of culture of the species could not keep pace with the demand in the international market and as such as it led to the expansion of the acreage of the culture especially in Khulna areas.

The culture is now being practiced at traditional level or at best at improved traditional level where some amounts of feeding, fertilization and water management are done; the farmers are mainly small holders unlike the *Penaenus monodon* farmers who are mainly rich and powerful ones. The demand of seed was primarily used to be met from the natural collection, however in recent times hatchery-produced seed is meeting a significant part of the demand though farmers have a numbers of claims against the quality of hatchery produced seeds. The nursery technology of the seed is not optimum, so with the poor nursed or without nursed post larvae/juveniles going into the traditional or semi-improved culture farms, the per unit production has remained ever low in Bangladesh.

Freshwater prawn farming is mostly concentrated in southwestern Bangladesh. However now it has also been practiced in the northern part of the country. At present the total estimated area of prawn culture is more than 30,000 hectare. This compares with a total of 3,500 hectare in the mid 1980s. The total production area is believed to have expanded by approximately 20 per annum in the last 15 years. Though the livelihoods of a considerable number of people are associated with

prawn farming, many farmers are socially, economically and educationally disadvantaged and with the lacking of their own financial resources, they are heavily indebted to traders and middlemen (Ahmed, 2002). Prawn farmers are struggling to survive, with health, nutrition, sanitation, water supply, cooking fuel, animal feed and house building materials as a day-to-day problem. Constraints also arise from over population, low incomes, low economic status, and lack of alternative employment opportunities (Ahmed, 2003). Furthermore, concerns arise about the long-term sustainability of prawn farming due to poor institutional support and inadequate extension services.

In prawn marketing, the most serious marketing difficulties seem to occur in remote communities, which lack transport, ice, poor road facilities and where the farmers are in a particularly weak position in relation to intermediaries. The middlemen have established a new marketing chain based on the extreme exploitation of the prawn farming communities by setting up an artificial pricing policy through intermediaries at different levels (Ahmed, 2001; Ahmed, 2003). As a result farmers could not get real price due to poor knowledge on pricing policy. Therefore it is important to know the existing prawn production systems with its marketing activities. Aside from a better understanding of prawn production and marketing systems, it seems important to identify farming constraints and marketing inefficiencies that is having negative impacts on poor farmers, traders and associated groups, and that also affects their livelihoods.

There are now about 129 processing plants located mainly in Khulna and Chittagong areas and almost all of the plants, together with their principal commodity of brackish water shrimp, process and export the giant freshwater prawn also. The country has exported frozen shrimp (Prawn and shrimp) and fish of about Tk.20 million in the ear 2003-2004. From January to June of the year 2005 the country has exported 1889 tones prawn and expected that at the end of the year this quantity will reach up to 4500 tones. This export trade functions with a big chain of stakeholders from production to processing. The frozen food export trade though, over the years, has come up as a prune sector of foreign exchange earner, the big majority of people who are there behind it particularly the producers and local traders, remained poor and marginal; their lots are hardly touched by the valuable foreign currency.

Objectives of the Research

The present study focused on the value chain analysis in production, processing and marketing of prawn and the marketing system (supply and demand situation, pricing mechanism, marketing costs and margins, market inefficiencies etc.) in DANIDA assisted projects in greater Noakhali areas and greater Khulna areas.

The project was based on the following specific objectives:

- Review the current socio-economic and livelihood situation of coastal communities involved in the production, processing and marketing of fresh water prawn;
- Know the marketing system (supply and demand situation, pricing mechanisms, marketing costs and margins, post-harvest issues, food safety, infrastructure, etc) and to identify market inefficiencies; and
- Value chain analysis in production, processing and marketing of prawn (golda).

Materials and Methods

Study areas (Khulna region)

The study area included three districts of Khulna region, a well-known shrimp and prawn production zone in the southwestern part of Bangladesh. Three districts were Khulna, Satkhira and Bagerhat. The main prawn production areas under the three districts were Dumuria, Fultala and Batiaghata upazila of Khulna district; Patkelghata, Tala and Kolaroa upazila of Satkhira district and Fakirhat, Mollarhat and Chitalmari upzila of Bagerhat district.

Data collection

Data were collected from May 2005 to January 2006, during the season of prawn farming and marketing. A combination of the following survey techniques was used for data collection:

Secondary data collection

Data about the information of prawn production and marketing were collected from relevant Government and non-government organizations such as Department of Fisheries (DOF), District and Upazila Fisheries Offices and relevant NGOs.

Primary data collection

Primary data were gathered by field survey through structured questioners. This study involved the inspection of the socio-economy and livelihoods of the stakeholders as well as the value chain of the prawn production and marketing systems. Primary data were collected by using following methods:

Questionnaire interviews

Prawn farmers

For questionnaire interviews, simple random sampling method was followed for 75 farmers in the study areas. Farmers were interviewed at their houses and/or farm sites. The interviews focused on history of prawn farming, culture systems, production technology, finance of farming, production costs, profit, constraints of prawn farming, socio economic conditions of farmers etc.

Depot owners

Interviews of 75 local depot owners and 75 secondary depot owners were randomly taken from the study areas. The interviews focused on purchase and selling system, sanitation of depots, pricing systems, finance of business, depot maintenance costs, profit, constraints of business, socio economic conditions etc.

Chatal auctioneers and commission agents

Interviews of 5 chatals from Satkhira district and 20 chatals from Khulna district were taken. From chatal auctioneers, information was collected on auction system, rate of commission, sanitation and seasonal turn over etc. Interviews of 25 commission agents were randomly taken

from Khulna districts, as all most all commission agents were located there. For the commission agents, information were focused on business systems, finance, quantity of turn over and problems associated etc.

Factory workers

Interviews of 25 female workers and 25 male workers were taken. The interviews focused on their socio-economic conditions, salary status, nutrition, problems associated in the working places, health, sanitation etc.

Factory owners

No structured questionnaire was used for data collection from factory owners. Various information related to their business such as buying and selling system, pricing system, export markets, facilities of factory workers, HACCP knowledge etc were tried to gathered through a formal conversation.

Participatory Rural Appraisal (PRA)

PRA is a group of methods to collect information in a participatory fashion from rural communities (Chambers, 1992).. Focus Group Discussions (FGD) were conducted with prawn farmers and depot owners. FGD was used to get an overview of particular issues such as existing value chain of prawn production and marketing systems, constraints of prawn farming as well as marketing, socio-economy of the stakeholders etc. A total of 6 FGD sessions were conducted for farmers, 6 for depot owners and 2 for sessions were conducted for factory workers.

Data processing and analysis

Data collected from various sources were coded and entered into a database system using Microsoft Excel software. Preliminary data sheets were compared with the original coding sheets to ensure the accuracy of the data entered. SPSS (Statistical Package for Social Science) was used to analyze the data. Data were summarized using descriptive statistics.

Experimental results

Farmers

The successful development of prawn farming and marketing activities requires receptive and supportive socio-economic conditions (Tisdell, 1994). The socio-economic condition of the households farmers are of much significance in planning development activities whose nature and extent influenced targets by such issue.

Age structure and sex distribution

Knowledge of the age structure of farms is important in estimating potential productive human resources. Planning of education, health and employment generation requires sufficient data on

relevant age structures. The age distribution of farmers has an important influence on labour (Mandima, 1995), and also on their perceptions of the nature (Khan and Hashemzadeh, 1985).

In the study area, most of the prawn farmers were found to be quite young with a range from 25 to 45. It was found that 70.66 % farmers covered the mentioned age group and rest 29.33% farmers were above 45 years old. From the study area, it was found that 100% of the interviewee galda farmers were male.

Education of farmer

Six categories were used to define education level of farmers. These were -

1. Primary level-1 to 5 class education
2. Secondary school certificate level –6 to 8 class
3. Secondary school certificate (SSC)
4. Higher secondary certificate (HSC)
5. No education

Among the 75 interviewee, 33.33% had education up to primary level, 10% secondary, 17.33% SSC, 33% HSC, 5.33% Bachelor education and 45% farmers had no education.

Education of children

From the study it was found that the percentages of school going children in Khulna, Satkhira and Bagerhat were 65, 75 and 67 respectively whereas those of non-school going were 25, 18 and 19 in these regions respectively. Percentages of below school going age were 10, 7, and 14 in Khulna, Satkhira and Bagerhat respectively.

Family status, family type and family size

The average number of members per family of prawn farmer was estimated 6 in Khulna and 7 in both Satkhira and Bagerhat which was higher than national house hold size 5.6 (BBS, 2002). The average percentage of male and female were 51 and 49, 55 and 45, 54 and 46 in Khulna, Satkhira and Bagerhat respectively. Based on farmers' description, almost all members over 12 years are directly engaged in agriculture as well as prawn farming activities, homestead gardening, poultry and livestock rearing to be supplement to the household income.

Household assets

House

From the study it was found that 48, 68 and 52 percent of farmers were tin shed dweller in Khulna, Satkhira and Bagerhat respectively whereas 32, 8 and 24 percent were pucca house dweller and 20, 24 and 24 percent were kancha house dweller in these regions respectively.

Livestock

In the study area, average number of cow was found 2.82 per family, goat 2.28 and poultry 15. The rich were found to have more than 5 cows but the poor were found to have less than 3 cows on an average, and a few had no cow.

Land

Majority of the golda farmer are poor and have small land property as gher for the integrated culture of galda-fish-crop. In the study area it was found that, in Khulna, Satkhira and Bagerhat, 72%, 76% and 100% farmer had own cultivable land averaging 2.11, 2.44 and 2.42 acres respectively. Again 28% farmer of Khulna 40% of Satkhira and 60% farmer of Bagerhat had both the own and leased cultivable land.

House holds facilities

Electricity

In the study area it was found that 56% farmers in Khulna, 64% in Satkhira and 68% in Bagerhat had electricity in their houses since 25 years. But majority of the farmers were provided with electric facilities since 5 to 6 years.

Water supply

In the greater Khulna there was a crisis of availability of fresh water to be used for drinking and domestic use. In the near past majority of the rural people of this region used to drink rain or filtered water. However shallow tube wells and deep tube wells have recently been introduced all over the country as a source of drinking water. From the study it was found that in Khulna and Bagerhat 100% farmers' households used tube wells for drinking water and Satkhira it was 84 %.

Though almost all farmers' households used tube well water, only 30 percent was found to have their own tube wells, others using neighbors or government tube wells belonging to the locality.

Sanitation and disease

In Khulna 72 percent farmers and in Satkhira and Bagerhat 56% farmers' households used sanitary latrine. In Khulna and Bagerhat 4% farmers were found who were still using kancha toilet. However rest of the farmers used close pit toilet.

Only a few of them were seen to be suffered often from diarrhea, dysentery and gastroenterological diseases due to lack of proper sanitation facilities.

Some concern aspects culture of Galda in the study area

Gher size, ownership, involvement in farming and lease value

The average sizes of gher were found 2.25, 2.32 and 2.50 acres in Khulna, Satkhira and Bagerhat respectively. The maximum and minimum gher sizes were 8 and 0.26 acres found in

Khulna and Bagerhat respectively. Majority of the farmers had their own gher, however on an average 38.67% farmers had both loans and leased gher (Table 1).

The average time duration involvement in galda farming was found about 8 year and the maximum and the minimum values were 18 year and 2 year. According to the 75 interviewee 6 farmers started farming in or before 18 years, 15 in or before 10 years, 18 in or before 8 years, 24 in or before 5 years, 7 in or before 3 years and 5 from 2 years.

The average lease values (Tk/acre) in the study area were found 7880, 8520 and 9208 in Khulna, Satkhira and Bagerhat respectively. Due to expansion of galda culture, lease value was also increased over the years. Highest lease value was found Tk 1200 per acre in Bagerhat (Table 1).

Table 1 Some aspects concerned with culture of Galda in the study regions

| Considerations | | Regions | | |
|---|--------------|---------|----------|----------|
| | | Khulna | Satkhira | Bagerhat |
| Area of gher (in acre) | Average | 2.25 | 2.32 | 2.50 |
| | Highest size | 8 | 4.50 | 7.00 |
| | Lowest size | .75 | 0.37 | 0.26 |
| Gher ownership (% of farmers) | Own % | 48 | 80 | 72 |
| | Leased % | 52 | 20.00 | 60.00 |
| | Both% | 8 | 44 | 32 |
| Lease value per acre in Tk. | Average | 7880.00 | 8520.00 | 9208.65 |
| | Highest | 10000 | 10000 | 12000 |
| | Lowest | 6000 | 7000 | 6400 |
| Involvement in Galda Farming (in years) | Average | 6.84 | 7.56 | 9.73 |
| | First before | 15 | 15 | 18 |
| | Last before | 2 | 3 | 3 |

Stocking density and Survivability

Production of galda depends on stocking of larvae or fry at the optimum density and rate of feeding. The average density of the stocking fry was found 6500 PL / acre. The maximum and the minimum stocking densities were found 11300 and 4000 PL/ acres. Average survivability was found 61.19 percent and the highest and the lowest were found to be 90% and 40% in Satkhira and Khulna respectively (Table 2).

Table 2 Some aspects concerned with culture of Galda in the study regions

| Considerations | | Regions | | |
|--|-------------------|---------|----------|----------|
| | | Khulna | Satkhira | Bagerhat |
| Stocking density (*PL/ acre) | Average | 6708 | 5800 | 7058 |
| | Highest | 10000 | 10000 | 11500 |
| | Lowest | 4000 | 4000 | 4000 |
| Survivability percentage | Average | 59.60 | 63.40 | 60.58 |
| | Highest | 75.00 | 90.00 | 85.00 |
| | Lowest | 40.00 | 50.00 | 50.00 |
| Culture period | | 6 to 10 | 6 to 10 | 7 to 10 |
| Over-wintering | % of farmer doing | 100.00 | 80.00 | 100.00 |
| | % of galda left | 24.00 | 18.00 | 22.69 |
| Periphery canal (% of farmer) | | 100.00 | 100.00 | 96.00 |
| Repairing of periphery canal (% of farmer) | | 100.00 | 100.00 | 96.00 |
| Training program (% of farmer taken) | | 24.00 | 32.00 | 44.00 |
| Monitoring of water and soil quality on visual basis (% of farmer) | | 100.00 | 100.00 | 100.00 |
| Use of lime (% of farmer) | | 92.00 | 100.00 | 100.00 |

Feed

Both prepared and commercial feeds were found to be used by the farmers for better production. Among commercial feeds different brand named Progati fish feed, Niribili fish feed, Saudi Bangla fish feed and CP fish feed were used. The major ingredients of prepared feed were crashed snail, boiled rice, wheat flour, rice and wheat bran, mustard oil cake and Soyabin oil cake. Feeds were applied twice, in the morning and in the evening, in a day generally.

Seed source and cost

Farmers believed that seeds collected from nature have much better performance in terms of growth and survivability than the hatchery produced seeds. Therefore they like to stock seed from riverine source though its price is much higher than the hatchery seed. However, as the farmers purchased seed from local fry traders and not directly from the source they had to believe that seeds are collected from nature but the case may be not like that. The study revealed that 72% farmers of Khulna and 80 % of Satkhira and Bagerhat were found to use natural seed in their farms. Others used both the natural and hatchery produced seed. The average prices of naturally collected seeds were found Tk 2178, 2209 and 2353 per thousand PL. In the pick season the price rises up to up to Tk 3000 per thousand PL whereas in off season it stays at Tk 800 per thousand.

Production system and productivity

The peak season of PL stocking was March to May and culture duration extends up to December- January. Major portion of the production was quarterly harvested from November to January. The main water sources for prawn farms were found to be rainfall and sometimes, ground water (i.e. shallow or deep tube well).

Almost all farmers in the study area were found to follow the integrated culture system. Out of 75 farmers doing integrated farming only 1 farmer in Bagerhat followed monoculture system and 3 farmers in Bagerhat and 1 farmer in Khulna followed polyculture system. In integrated culture system farmers cultured prawn with other white fish species like Common carp (*Cyprinus carpio*), Silver carp, (*Hypophthalmichthys molitrix*), Indian major carps (*Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*) and Grass carp (*Ctenopharyngodon idellus*). After gradual harvesting of fish and prawn in the late winter they cultured paddy in the same gher and vegetable on the dikes throughout the year. It should be mentioned that in Satkhira prawn and white fish as well as Bagda (*Penaeus monodon*) are cultured at a time in the same gher.

The average production of galda in integrated culture system was 162 kg/acre. The highest production was found in Khulna 280 kg/ acre and lowest was in Khulna and Satkhira 100 kg/ acre. Marvelous production in monoculture system was found in Bagerhat district where a farmer got 438 kg galda / acre and this was probably due to the financial ability, educational background and awareness of the farmer (Table 3).

Table 3 Culture system and Production in the study areas

| Culture system and production | | Regions | | |
|-------------------------------|---|---------|----------|----------|
| | | Khulna | Satkhira | Bagerhat |
| Monoculture | Production of Galda (Kg./ acre) | 0 | 0 | 438 |
| | % of farmer involved in monoculture system | 0 | 0 | 4 |
| Polyculture | Average production of Galda (Kg./ acre) | 300 | 0 | 156.6667 |
| | Highest Production (Kg./ acre) | 300 | 0 | 210 |
| | Lowest Production (Kg./ acre) | 300 | 0 | 60 |
| | White fish production (Kg./ acre) | 80 | 0 | 287 |
| | % of farmer involved in poly culture system | 4 | 0 | 12 |
| Integrated Culture | Average production of Galda (Kg./ acre) | 165.217 | 152.4 | 168 |
| | Highest Production (Kg./ acre) | 280 | 240 | 240 |
| | Lowest Production (Kg./ acre) | 100 | 110 | 100 |
| | White fish production (Kg./ acre) | 107.391 | 74 | 104.8 |
| | Production of Bagda (Kg./ acre) | | 33.5714 | |
| | Production of paddy* (Kg./ acre) | 1652.17 | 1577.6 | 1972.381 |
| | Vegetables/ acre in Tk. | 3090.91 | 4200 | 4476.316 |
| | % of farmer involved in integrated culture system | 96 | 100 | 88 |

Selling places and rates

Farmers usually were found to sell their products to the farias, local depots and secondary depots in Satkhira, in Khulna they used to sell to chatal, local depots and secondary depots and in Bagerhat to local depots and secondary depots.

In Bagerhat the rates of both headon and headless galda were higher than that in Khulna and Satkhira, only in cases of grade 5 and 10. For grade 5 the average rates were (Tk/Kg) 550.5, 550 and 580 in Khulna, Satkhira and Bagerhat respectively. For grades 5 and 8 the rates (Tk/Kg) were 1180 and 1080 respectively in Bagerhat. Rates found in the study areas have been shown in detail in Table no. 15.

Average cost involved of per acre gher for galda farming

Average total costs for per acre galda farming were found Tk 50523, 50527 and 56092 in Khulna, Satkhira and Bagerhat respectively. Major costs are associated with feed, fertilizer, lease and labour (Table 4). In the item of labour cost both self and hired labour costs were included. Comparatively labour cost was higher in Bagerhat region than Khulna and Satkhira region.

Table 4 Area wise item costs for per acre production of galda.

| Item | Regions | | |
|---|---------|----------|----------|
| | Khulna | Satkhira | Bagerhat |
| Pond lease(avg. Tk/a) | 8009 | 8568 | 9462 |
| Feed cost/ ac | 11819 | 12758 | 16440 |
| Fertilizer | 613 | 229 | 511 |
| Seed | 13419 | 13088 | 15051 |
| Labor | 13476 | 13076 | 12135 |
| Harvesting | 1374 | 1101 | 1159 |
| Others (lime, bleaching, rotenone, seed of white fish etc.) | 1813 | 1707 | 1334 |

Source of fund and rate of interest

Most of the galda farmers were poor and suffering from their inherent crisis of fund. They often failed to stock in time and could not supply adequate feed in their farms. In the study area it was found that only 16% farmers in Khulna, 12% in Satkhira and 28% in Bagerhat used their own fund for galda farming. Majority of them took advance, locally called 'Dadon' from the depot owners and remained bound to sell their products to them even at the low price than the prevailing market price. Some also took loan from NGOs and local Mohajons at the rate 10% or higher per month. Though the rate of interest commercial banks is much lower, they hardly go there due the complexities in processes. Generally there is no loan facility for galda farming.

Annual cost benefit distribution

Net profit from galda culture was found Tk 10572 in Khulna, 8834 in Satkhira and 9859 in Bagerhat. Farmers were not satisfied with such small amount of profit against high amount of investment. Incomes from other sources were found Tk 35583 in Khulna, 39667 in Satkhira and 47760 in Bagerhat (Table 5). Though 73% farmers were found having annual savings but most of them are unable to improve their living status at the standard level due to the very small amount of savings.

Table 5 Annual cost benefit distribution

| Parameters | Regions | | |
|--|---------|----------|----------|
| | Khulna | Satkhira | Bagerhat |
| 1.Total cost involved /acre | 53370 | 51468 | 58725 |
| 2.Net profit /acre | 10572 | 8834 | 9859 |
| 3. % of farmer facing loss | 16 | 4 | 12 |
| 4.Income from other sources (excluding cost) | 35583 | 39667 | 47760 |
| 5. %of farmer having Annul balance | 88 | 68 | 64 |
| 6.Annual balance | 8880 | 9080 | 11667 |

Local depot

Age structure

Distribution of age, sex, educational status, household members, facilities, assets and liabilities of the depot owners were analyzed and seen to be of the similar type as of the farmers, in general.

Depot size

Average sizes of the local depots were found to be 150.56, 153.80 and 107.89 sq feet in Khulna, Satkhira and Bagerhat region respectively. Maximum and minimum sizes of the depot were 240 and 80 sq feet respectively.

Depot facilities

Electricity and Drainage system

All of the local depots owners were found to have electricity facilities. In Khulna region only 20% local depots were found to have good drainage system but 44% depot had drainage system that could be defined as up to mark and rest of them (36%) were bad. In Satkhira region the percentage of depots that were with good, up to the mark and bad drainage system were 20, 40 and 40 respectively. In Bagerhat region the condition of the drainage system is somewhat different from the other two districts where only 55% were with good, 55% up to the mark and the rest 40% were bad.

Communication

More than 50% local depots were found near the markets and roadsides and had a good communication system. But the depots situated at the remote villages found to have a very bad communication system and this was severely found in Satkhira district.

Use of grading table

On an average the percentage of stainless steel grading table user was found to be 38.67 and it was maximum (50%) in Satkhira and minimum (30%) in Bagerhat district.

Status of the floor

On an average the percentages of pucca floor user were 68, 50 and 70 in Khulna, Satkhira and Bagerhat region respectively.

Some other information about local depot activities

Beheading

In Khulna, Satkhira and Bagerhat, about 28%, 40% and 100% local depot owners respectively, were found to do beheading. In Bagerhat the local depot owners got their product beheaded by the farmers, whereas in Khulna and Satkhira, it was seen to be done by the local depot owners themselves.

Seasonal turn over and Duration of business season

Average seasonal turns over of the local depot were found to be 5272.8 kg, 4826 kg and 5480 kg in Khulna, Satkhira and Bagerhat regions respectively (Table 22). On an average the duration of business season in Khulna, Satkhira and Bagerhat were found to be 8.44, 6.45 and 6.85 months respectively.

Purchasing and selling rate

. The purchasing rates of galda were usually not found to get varied between Khulna and Satkhira but it got higher in Bagerhat than the other two regions, only in case of grade 5. The local depot owners in Khulna and Satkhira region were found to sell their product both head less and head on whereas in Bagerhat region only headless products were sold. The selling rates in Khulna and Bagerhat regions are almost same, but in case grade 5 it is found higher in Bagerhat region.

Mode of payment given and taken

In case of purchasing, the payment given to the farmers by the local depot owner was found to be 50 % immediate and/ or advance (dadon) and 50% late and the duration of making late payment ranges from 1 to 10 days. The same thing was found to happen in case of payment taken by the local depot owners from their Dadondars or central depot owners from commission agents. Understanding is the major factor upon which the time of late payment depends upon.

Means of transport

In the study area it was found that on an average about 40% local depot owners used truck and pickup van and the rest 60% used other means of transport such as baby taxi, tempo, cycle van etc to sell their products.

Costs for galda marketing

Two types of costs were encountered to analyze average annual cost for galda marketing of the local depots. The table below shows the different items of costs:

Table 6 Average maintenance cost and overhead cost of local depots

| Criteria | Item of costs | Region | | |
|--------------------------------------|---------------------------------------|----------|----------|----------|
| | | Khulna | Satkhira | Bagerhat |
| Over head costs | Grading table | 6520.00 | 7421.05 | 5236.84 |
| | Drum and baskets | 3060.00 | 2935.29 | 2095.00 |
| | Furniture | 2240.00 | 2415.00 | 1925.00 |
| | Depot construction /repair/ Mozaic | 7880.00 | 10175.00 | 9157.89 |
| Maintenance costs per year/season | Depot rent | 6440.00 | 5890.00 | 5750.00 |
| | Electric bill) | 2356.00 | 2570.00 | 2250.00 |
| | Ice cost | 6932.00 | 6085.00 | 8085.00 |
| | Carrying cost | 3456.00 | 3260.00 | 6790.00 |
| | Wages of labor | 32160.00 | 29825.00 | 34315.79 |
| | Miscellaneous | 4520.00 | 5500.00 | 6175.00 |

Annual income and savings

Average annual income from galda marketing were found to be Tk. 21760, 18290 and 18250 in Khulna, Satkhira and Bagerhat district respectively, whereas average income from other sources were found to be in these three regions respectively, tk.33600, 48250 and 28200. Average annual balances of the local depot owners were found to be tk.8529, 13000 and 8846 in Khulna, Satkhira and Bagerhat district respectively.

Secondary depot

Distribution of age, sex, educational status, household members, facilities, assets and liabilities of the secondary depot owners were analyzed and seen to be of the similar condition as of the local depot owners, in general.

Depot size

Average sizes of the depots were found to be 280, 322 and 339 sq feet in Khulna, Satkhira and Bagerhat regions respectively. Maximum and minimum sizes of the depots were 600 and 80 sq feet respectively.

Drainage system

Three categories were made to define the drainage system of the secondary depots as Good, Up to the mark and bad. The study showed that majority of the depots was either in good or up to the mark category. In Khulna region only 12% depots were found to have bad drainage system but 52% depots had drainage system that could be defined as up to mark and rest (36%) were good. In Satkhira region the percentage of depots that were with Good, Up to the mark and Bad drainage system were 36, 44 and 20 respectively and the same in Bagerhat region were 36%, 48% and 12% respectively.

Communication

Most of the secondary depots were found to be situated at the more centralized places and high way sides. Therefore were facilitated with good communication system. However, some were found at the remote places and faced a major problem of transportation due to bad communication system. Communication system in Khulna was found better than other two districts.

Use of grading table

On an average the percentage of stainless steel grading table user was found to be 100% in Khulna and Bagerhat and in Satkhira it was found to be 92%.

Status of the floor

On an average the percentages of pucca floor user were 36, 24 and 36 in Khulna, Satkhira and Bagerhat regions respectively. There were 64%, 76% depot had mosaic floor respectively in Khulna, Satkhira and Bagerhat region whereas no brick soling user were found.

Source of water

On an average 94.67% depot were found to use shallow tube well water for their operational purposes and only 5.33% used deep tube well water but none was reported to use river or pond water.

A European team was about to paying a visit to the depots of these regions while the survey was being conducted and for these maximum depots were found under construction or repairing to improve their sanitation.

Product kept before onward sell and storage condition

The time duration of keeping the product in the secondary depot ranges from 6 to 14 hours. In Khulna, Satkhira and Bagerhat it was about 8.28, 9.32 and 8.08 hours respectively. Generally in most of the depots, Galda was found to be kept with 1:1 ratio of Galda to ice and the percentages of 1:1 ratio user were 88, 100 and 84 whereas 1:1.5 ratio of galda to ice user percentages were 12, 0, and 16 in Khulna, Satkhira and Bagerhat region respectively.

Beheading

In 100% depots of Khulna and Satkhira was found to do beheading whereas only in 30% depots were found to do it in Bagerhat.

Seasonal turn over

Average seasonal turns over of the secondary depots were found to be 18016 kg, 12392 kg and 17728 kg in Khulna, Satkhira and Bagerhat regions respectively.

Duration of business season

On an average the duration of business season in Khulna, Satkhira and Bagerhat were found to be 10.12, 7.92 and 8.28 months respectively. The business duration of galda generally ranges from 5 to 12 months.

Purchasing rate

Secondary depot owners were found to purchase prawn mainly from local depots and farmers and sometimes from chatal (auction market). Purchase rates were found nearly similar in Khulna and Satkhira but in Bagerhat the rate of grade '5' was found somewhat higher. The following table shows the grade wise purchase rates in the three districts:

Table 7 Grade wise average purchase rates of depot owners

| | Grade | Region wise average rate, Tk./ Kg. | | |
|-----------|-------|------------------------------------|----------|----------|
| | | Khulna | Satkhira | Bagerhat |
| Head on | 5 | 564.4 | 564.4 | 585.4 |
| | 10 | 515.4.4 | 512.4 | 509.4 |
| | 20 | 392.4 | 391.2 | 402.2 |
| | 30 | 298.4 | 290.8 | 301. |
| | 50 | 185.6 | 170 | 183.3 |
| Head less | 5 | 1140.5 | 1150.2 | 1192.25 |
| | 8 | 1050.8 | 1045.6 | 1086.4 |
| | 12 | 700.5 | 690.8 | 707.08 |
| | 20 | 490.5 | 490.5 | 506.25 |
| | 30 | 370 | 370.8 | 379.583 |
| | 50 | 200 | 205.6 | 205.417 |

Mode of payment given and taken

During the time of purchasing galda from the farmers or local depot owners or chatal owners, the secondary depot owners paid 50 % immediate and/ or advance (dadon) and 50% late payment and the duration of late payment ranges from 1 to 10 days. The same thing was found to happen in case of payment taken by the secondary depot owners from commission agents. The length of the time and amount of late payment were found to be dependent upon understanding between the two parties.

Means of transport

In the study area it was found that on an average 92%, 84% and 80% secondary depot owners in Khulna, Khulna and Satkhira respectively used both truck and pickup van and the rest 8%, 16% and 20% respectively used other means of transport such as baby-taxi, tampoo.

Selling rate

The following table shows the selling rates found in the three districts:

Table 8 Grade wise average selling rates

| | Grade | Regions wise average rate, Tk. / Kg. | | |
|-----------|-------|--------------------------------------|----------|----------|
| | | Khulna | Satkhira | Bagerhat |
| Head less | 5 | 1148.8 | 1156 | 1196.8 |
| | 8 | 1046.8 | 1050 | 1090 |
| | 12 | 700.8 | 696.8 | 718 |
| | 20 | 498.4 | 492.4 | 517.4 |
| | 30 | 380.8 | 379.2 | 394 |
| | 50 | 207.2 | 212.8 | 211.6 |

Costs for galda marketing

The tables below shows the distribution of average overhead and maintenance costs of marketing of galda:

Table 9 Item wise average overhead costs distribution of the secondary depots in Tk.

| Items | Regions | | |
|---------------------------------------|---------|----------|----------|
| | Khulna | Satkhira | Bagerhat |
| Grading table | 11600 | 14480 | 14160 |
| Drum and baskets | 5360 | 6080 | 6160 |
| Furniture | 3840 | 4100 | 4500 |
| Depot construction/ repair/ Mozaic | 18600 | 26440 | 25666.7 |

Table 10 Item wise average maintenance costs per year of the secondary depots in Tk

| Items | Regions | | |
|----------------|---------|----------|----------|
| | Khulna | Satkhira | Bagerhat |
| Depot rent | 9200 | 11152 | 11176 |
| Electric bill | 3380 | 3876 | 3756 |
| Ice cost | 24800 | 15316 | 25970.8 |
| Carrying cost | 16480 | 14008 | 23420 |
| Wages of labor | 48875 | 53440 | 54625 |
| Miscellaneous | 10240 | 12920 | 12000 |

However, depots that were found not rented and constructed by the depot owners themselves needed Tk. 80000 to 150000 for the construction. These above mention cost were required once at a time during the onset of the depot.

Annual income and savings

Average annual income from galda marketing were found to be Tk.45440, 40000 and 50521.7 in Khulna, Satkhira and Bagerhat district respectively, whereas average income from other sources were found to be in these three regions respectively, Tk.41600, 57840 and 52480. Average annual balances of the secondary depot owners were found to be tk.20520, 22560 and 20600 in Khulna, Satkhira and Bagerhat district respectively.

Chatal auctioneer

Chatal is a newly introduced system in the marketing chain of galda and now is common in Khulna district for galda marketing but in Bagerhat it is hardly found. Although chatal is available in Satkhira district, galda is auctioned in a very few number of chatals.

White fish was the major component in chatals for auction, however in peak harvesting season mainly from September to December galda became one of the major business component in chatals.

Sanitation at most of the chatals were unsatisfactory that could be considered as very bad.

Only 10% chatals were found to have mosaic floors and 90% pucca or brick soling floor.

30% chatals had no grading tables, 60% had tables made of tin sheet and only 10% had stainless steel grading table.

Average size of the floor was found to be 180 sq. ft. Average seasonal turnover was 23000 kg. There is no use of ice at the chatals. The chatal auctioneers were found to sell the product of the farmers through auction at the rate of 2-3 percent commission of the total price.

The farmers were found to prefer selling at the chatals because they got immediate cash payment and comparatively higher price.

Each chatal was found to be run by 5 or more partners and each partners got commission of around Tk. 20000 per season.

Commission Agents

Commission agents are actually the agents of account holders of the factories. They are the intermediaries in the Galda marketing channel who sell the product of other intermediaries to the factory owners through account holders of the factories and get a certain percentage of commission for certain quantity of product.

All most all commission agents were situated near the factory sides. However some were found at the remote areas where there were a cluster of depots due to ample prawn production farms

situated at the nearby locality. There were about 200 hundreds commission agents at the Rupsha of Khulna district where most of the processing plants of greater Khulna were situated.

The commission agents can be divided into the following different categories:

Tabl 11 Different types of commission agents

| Agent types | Frequency | Percentage |
|--|-----------|------------|
| Agents have no account | 14 | 56 |
| Agents have account in 1 factory | 5 | 20 |
| Agents have account in 2 factories | 4 | 16 |
| Agents have account in more than 2 factories | 2 | 8 |

Out of 25 agents 6 agents were found to have no landing centre or receiving room. They directly sell their product to the factory gate. Both the headless and head on were purchased but the quantity of headless was more than head-on ones. All of them used stainless steel grading table for grading and plastic drum and basket for handling of prawn. The sanitation of the receiving rooms was found good. Beheading was done at the clean mosaic floor.

Commission agents purchased Galda according to the rate fixed by the account holders and got commission of Tk.100 to 300 per mound (1 mound = 40 Kg.) depending on the rate that the account holders got from the factory owners which in turn depended on the price of Galda in the international market. Agents often paid 5- 20 Tk. less to the parties (Depot owners) than the price fixed by the account holders claiming that the account holders did the same with them. Purchase rate of commission agents (Head less) shown below:

Table12 Purchase rate of commission agents in the year 2004 and 2005

| Grade | Year 2004 (in Tk. / Kg.) | Year 2005 (in Tk. / Kg.) |
|-------|--------------------------|--------------------------|
| 5 | 1150 - 1160 | 1190-1220 |
| 8 | 1050- 1060 | 1090- 1120 |
| 12 | 680- 700 | 650- 700 |
| 20 | 480- 700 | 460- 500 |
| 30 | 300- 350 | 280-300 |
| 50 | 180- 200 | 175- 200 |

Commission agent took dadon (advance) from the account holders and remained bound to sell his product to the right one from whom he took dadon. Sometimes they also sold their product to

the account holders other than they took dadon and it depended on the situation of market. In general commission agents were not found to take loan from banks but who had accounts in the factories had to take loan both from government and private commercial Banks.

The seasonal turn over of prawn of the interviewee was found 15 to up to 50 metric tons.

Factory worker

Female workers

Age group

From the study it was found that on an average the female ferry workers were within the age group from 16-25 years and about 32% of them were within the age group 26-35 years, within the age above 35 years there were 16% women and only 4% were within below 15 years.

Educational level

In order to describe the education level of the female factory worker, 5 categories were defined. According to the study results, majority of them were found to be illiterate (no education 40%) and next to it, 36% of them had only nominal literacy, which was considered as up to primary level. Only 4% of them were found to have completed up to SSC level and the rest 20% were found up to class VIII level. Generally as they came from very poor family with lower social status, they did not run after education bad ran often means of living.

Marital status, Relationship with the head of the household and torture

Marital status of the female worker was defined as following 5 categories. According to the results, majority of them were found to be abandoned and their percentage was 40 where as divorced percentage was 4. As they were found to be in economically and socially poor condition, they were found to be plagued with a lot of social problems. Such as early marriage and multiple marriages that resulted being abandoned by their husbands. About 24% female workers were found to be unmarried. Both married and unmarried young women had to earn for their poor family. It's useless to say that married women were found to be belonged to their husbands' family but the unmarried and abandoned were found to be with their father (52%) or brother (8%) or other relatives (8%). Only 28% of them were reported to be tortured physically, mentally or both by the head of the household.

Household members, children and their education

On an average each female works had 2.4 male and 3.2 female members in her family. An average child per family was 1.68 and percentage of school going children was 62 whereas dropout percentage was 38%. Among the dropout children 100% of them lost their way to school only due to economic cause.

Household assets and facilities

It was found that 88% of the female worker had no house of their own, as they were not the permanent inhabitants of their present residential locality. They used to come from another region / district in search of work and had to dwell in rent house. The average rental value of their house was found to be 200-300 Tk/ month. Condition of house was kancha 96% and tin shed 4% and they were found to live in the slums near the city.

On an average 52% of them were found to have electricity, facilities and 44% of them had recreational instrument (radio/ cassette player/TV). None of them had tube well of their own but all (100%) of them used to drink tube well water from neighbors' or government tube well.

On an average 56% of them female worker were found to use sanitary latrine, 32% close pit and the rest 12% kancha latrine.

Occupation

Their main occupation was found to be only working in the factory. There were no chances left for them to have another secondary occupation because their working home in the factory was at least 12 hours without any fixed timetable. It was mandatory in the factories that if a husband had been working in a factory, his wife would not be allowed to work there and the vice-versa. On an average they were involved in this occupation since 7 years.

Distance and means of travel to the factory

The female workers were found to live. Generally in slums within 1-2 km around the factory, 84% of who used to go to their working place on feet in order to save money and the rest 16% sometimes used cycle van.

Type of work, working hour, duty, mode of salary and income

On an average 28% women were engaged in washing and beheading, 44% in packaging 12% in panning and 16% were in IQF (Individual Quick Freezing). The women engaged in washing and beheading was appointed on temporary basis and their mode of salary was based on quantity of work. The temporary worker could earn 100 – 150 Tk / day during the full moon, 60 – 70 Tk / day during the new moon and 40 – 50 Tk during the off seasons (Fig. 51). The women engaged in beheading (supervisor), packaging, panning and IQF were engaged on permanent basis and their mode of salary was monthly basis. According to the women worker their working hour was officially 12 hour but they were compelled to work much more than that and there were no fixed working hour for them, which was quite inhuman. The salary of the permanent worker depends upon their experiences in concerned job. However, their salary was found to be as in the following table.

Table 13 Types of works Salary of the women workers

| Type of works | Salary range |
|---------------------------------|------------------------------|
| Washing | Tk. 5 / Bowl (1 bowl =10 kg) |
| Beheading | Tk. 3 / kg |
| Beheading (supervisor) | Tk. 2000 –2500 / month |
| Packaging | Tk. 1500 – 2000 / month |
| Panning | Tk. 1500 – 2000 / month |
| IQF (Individual Quick Freezing) | Tk. 1500 – 2200 / month |

Membership association, savings and disparity of salary

From the study it was found that only 12% of the women workers were member of any association and the rest 88% were not at all. Only 8% of them could save a little from their income but this amount of saving was too little to improve their social status. Only those who had other sources of income through their husband or other family members were seen to have savings. The rest 92% had no savings rather they had to pass their days in miserable condition. Like other fields of work, disparity of salary between man and women worker was observed as well and 60% disparity was found.

Male worker

Interview of 25 male factory workers were taken from the study area mainly from Khulna regions as most of the factories are located in this region. Male workers were found to be involved mainly in receiving, grading, store keeper, cold storage, and supervisors in area of panning, packaging, beheading and IQF. Out of the above mentioned workers graders were appointed temporarily and there salaries were paid on the basis of quantity of work whereas the other were appointed permanently and their mode of salaries monthly basis. Like the female worker male workers also found to be low paid against their labor. Average salary status of the worker is shown in the following table:

Table 14 Types of works Salary of the male workers

| Type of works | Salary range |
|------------------------|-------------------------------------|
| Receiver | Tk.1800- 2500 |
| Supervisor | Tk. 2000- 2500 /month |
| Store keeper | Tk. 1500- 2000 / month |
| Cold storage in charge | Tk. 1500 – 2200 / month |
| Grader | Tk. 20 per mound (1 mound = 40 Kg.) |

Prominent age group was found 31 to 40 covering 36% of the total interviewee. 21 to 30 age group covered 32%, 16 to 20 age group covered 16% and >40 age group covered 12 percent of the male workers of the factory.

Most of the workers were found to have primary education covering a total of 32% and 16% were found having no educational background. 24% were class VII, 20% SSC and 8% were found to have above SSC education. Male workers had to work 12 hours in the factories as like the female workers. But the grader and receiver had no fixed working hour and sometimes had to work continuously a few days

Factory owners

Two types of processed Galda are exported. These are IQF (Individual Quick Freezing) product and Block freezing product

In block freezing only head less Galda is processed. The different products of IQF are:

- Easy peeled
- Peeled and deveined (PND)
- Peeled, deveined and tail on (PDTO)
- Cocked PDTO

10 different grades of Galda are exported. These are; U 5, U 6/8, U 8/12, U13/15, U 16/20, U 21/25, U 26/30, U 31/40, U 41/50 and U 51/60.

Europe and U.S.A. are the main consumer countries and a good quantity exported in Middle East Galda constitute 15- 18 percent of the total export of Fish and Fisheries products.

Table 15 Quantity of Galda Exported in the last three years:

| Year | Quantity in |
|-----------------|-------------|
| 2003, Jan –Dec. | 1917.15 |
| 2004, Jan- Dec. | 3936.97 |
| 2005, Jan- Jun. | 1889.58 |

Year to year the quantity of Galda is increasing as an exporting item. According Frozen Food Export Association in 2005 the amount may exceed 4500

Discussion

This research intended to know and bring into light the socio-economic status of the different stake holders involved in galda production, processing and marketing and value chain of galda in greater Khulna areas. As a result, the investigation identified the principal stakeholders involved in the chain that covered from producer to various groups in the channels. The background of

this study reflected the importance of galda in the economy of our country and therefore the importance of identifying the socio-economy of the related stakeholders and problems and prospects in the total chain from production to export. The stakeholders in the galda production, processing and distribution channel in the present investigation were the farmers, depot owners, chatal auctioneer, commission agents, factory workers and factory owners.

The investigation covered three districts in greater Khulna region i.e. Bagerhat, Khulna and Satkhira.. The study focused on key indicators such as physical structure, ownership, production, processing system, sanitation, source of finds, transportation, manpower, salary, education, problems associated etc.

Galda culture in greater Khulna mostly depends on naturally collected PL. The average stocking densities found in the present study were 6708, 5800 and 7058 PL per acre in Khulna, Satkhira and Bagerhat respectively. These figures can be compared with the stocking rates of 20000 PL per hector, suggested by Huq *et al.*, (1996) and 30000 PL per hector noted by Khatun (2000). It was found from the statement of the farmers of the study area that the stocking density used by them was fully dependent upon their ability of financial support. Farmers of Khulna and Satkhira stated that they prefer to use natural PL than the hatchery produced PL because of their better performance in terms of growth and survivability. Due to lack of development of hatchery and nursery in these regions, they didn't get good quality seed and had to depend on natural sources.

Both commercial and prepared feeds were found to use by the farmers. Saudibangla, Niribili, CP etc, were the widely used brands of commercially feeds. Rice bran, cooked rice, dal, wheat bran, oil cake, wheat flour, blood meal and crushed snail were used frequently for galda farming. Prepared feeds were home made and using them instead of commercials ones lowered the production cost of galda. According to the interviewed farmer, using both commercial and prepared feeds specially snail yields higher production.

Among the three types of culture system found in the study area, integrated culture system was widely done by the farmers because of its higher profitability than the other two (monoculture and poly culture).

Production rate was not only associated with feed but also with stocking density, water quality management. Farmers were found to maintain the water quality of their gher on visual basis as they didn't have any scientific kits. They didn't possess any scientific knowledge about the culture and management of galda farming. They simply followed the farmers around them and tended to implement their previous experiences.

Galda production costs were mainly associated with seed, feed and labor. Almost all interviewed farmers reported that production cost had increased notably over the recent years due to dramatic rise of price of necessary things and profitability from galda farming was decreasing than the past years. nd management profitability can be increased.

Operational cost of galda farming needs quite a big amount. Only 16, 12 and 28 percent farmer were found in Khulna, Satkhira and Bagerhat respectively invested their own fund for galda farming, whereas the rest majority portion had to receive loans or dadons from depot owners, local Mohazons, NGOs and relatives due to less complexity and ease in process.

Production and profitability of galda farming is related to sound management and culture practice, which are in turn related to education level and capability of high investment. Maximum farmers were poor with lower educational background. Farmers having comparatively higher education were capable of yielding higher production than those of with lower education.

Farmers didn't have any association, for absence of which they were not a stronger body to have their say to the powerful exploiters. Awareness among them should be elevated to make realize them the necessity of coming in a body to protect themselves from being exploited.

The figures of annual net profit were found smaller in comparison to the high investment. Though this figures seemed to be smaller, the actual net profit/ acre was much higher than that, because in the production cost, cost of self labor and lease value were incorporated. So the farmers having own gher and/ or self labor got more profit than the calculated values.

Farias, the intermediaries who collect galda from farm to farm and used by-cycle or cycle van to carry the products were found only at the remote areas of Satkhira in small quantities. At the very recent past they were one of the vital middle men presently many depots are being run near the village markets and farmers like to sell their products in the market by cross-checking the market price. Therefore, farias had already been abolished from Khulna and Bagerhat and also decreasing in number from Satkhira.

In the study area almost 100 percent depot were with electricity facility. Primary depot were found located at the road sides, local markets cross roads where as the secondary depots were found located at some more centralized areas which were comparatively better communicated.

Sanitation at the depots is a major concern for hygienic handling and preserving the product. Though sanitation system was found better at the secondary depots comparing the local depots but not at the satisfactory level in the context of HACCP except a few.

Mosaic floor and use of stainless steel grading table were at the maximum in the secondary depots which was not so prominent in the local depots..

In the production and marketing chain of galda it was found that besides taking loan from different organizations, farmers mainly took dadon from the depot owners, depot owners from commission agents and agents from account holders. In every step one remained bound to sell their product from whom they took dadon.

In the marketing channel of galda the pricing system of the product appeared to be quite vague. The actual price of products did not appear to be understood by the farmers and depot owners because there were no ways of knowing the price determined by the factory owners.

Cross-check interview it was found that agents often paid 5 to 20 Tk. less than that of the price fixed by the account holders. Though the depot owners got subsidies 100 Tk. per mound at the end of the season farmers do not get such benefit and therefore, are likely to be disadvantaged in the marketing of prawn.

Shrimp were transported in plastic drums from depots to agents' receiving rooms or to the processing plants. Pickup vans and trucks were generally used for long distance transportation. However, cycle van and tempoo were often used for small short distance transportation. Icing ratio used by farias, in depots, agents and in processing plants varied widely.

Most of the female factory workers were of the age group 16-25 year (48%) and 26-35 year (36%) and most of them were literate up to a nominal level.

Maximum of the worker both the male and female were found to come to site of work from other distant places in search of work. Among the women worker 40% of them were abandoned by their husband that drove them to take this occupation as a means of living. Early marriage, tendency of the husband of multiple marriage, poverty, illiteracy and social unconsciousness are the probable reasons of their being abandoned.

The male worker had boarding facilities which was found quite unhygienic where as the female had no such facilities and they had to live in rented house at cheap cost near the factories. They were found to be too low paid compared to their work to cope with their livelihoods. Though it is internationally recommended that the working hours should not be more than 8 hour, workers of the fish processing industries had to work more than 12 hours in a day at a stretch.

Women workers were found with fungal attack on their skin and nails of hand and feet because of working with naked hands and feet. On the contrary when any team of foreign buyers paid visit to the factory, they were being sobbed up of hiding the actual miserable and inhuman stories of working in factories. They were threatened by the authority to say that they were well paid; working hour was 8 and got various facilities which are not actually provided to them.

This study definitely identified 'Agents' as a major factor in preventing the enhancement of livelihood of the stakeholders. Depot owners were reported to be exploited by the agents and farmers were clearly identified to be exploited by the depot owners in the chain. Thus farmers were the extreme loser though they remained at the root of the chain. The level of exploitation by traders stood at upper chain to the lower chain traders and finally the producers is highly discrete, controversial and undesirable.

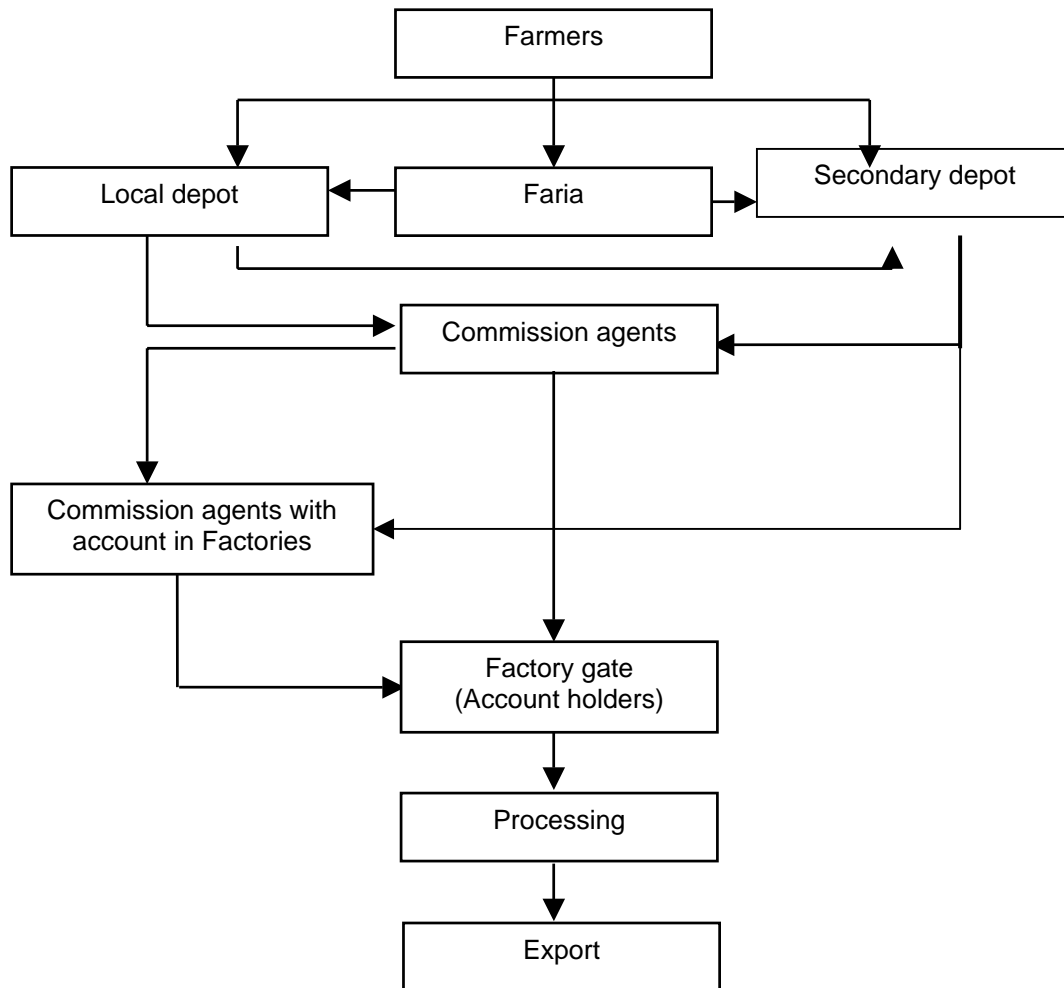


Fig 1: A general pathway of galda marketing in Bangladesh.

The major constraints found in the marketing system of galda were lack of loan facilities for farmers and depot owners from govt. organizations, poor road and transport facilities, insufficient supplies of ice, poor infrastructure of markets, poor electricity supply, lack of water supply, inadequate drainage system, poor sanitation and unhygienic condition.. As a result the perishable product gets damaged and the traders sell this at cheap rate, sometimes they even fail to get any revenue.

Study area (Greater Noakhali Aquaculture Extension Projects – GNAEP/DANIDA)

Executive Summary

The value chain analysis in production, processing and marketing of prawn and the marketing system (supply and demand situation, pricing mechanism, marketing costs and margins, market inefficiencies etc.) in DANIDA assisted projects in greater Noakhali areas were focused.

Presently prawn culture is being practiced at traditional level with very low input. Consequently, per unit production has remained ever low. At present prawn and shrimp is the second export-earning commodity for the country. Greater Noakhali areas still acting as prawn grow out habitants. Near about 40 mt was produced in the year 2002-2003 from *ghers*, rice fields and ponds, but each year a considerable quantity of prawn (approx. 80 mt) being harvested along with other brackish water fishes. Based on this wild catch a prawn marketing system has developed, mainly facilitating by Chittagong based prawn and shrimp exporters. If prawn supply is increased by several folds of current supply in the region, demand or marketing opportunities will not decrease due to increasing trend of international market demand. Galda are sold by weight and the bigger size galda are in the upper level of the standard. Thus price of prawn is being fixed based on the size categories i.e. Grading system. Galda is always been exported as head-off condition. In the past galda were purchased in head-off condition by *aratders* and fishermen or prawn growers were usually done the beheading activities. The quality control experts identified that beheading task done by unskilled hands in unhygienic places was partly responsible for bacterial contamination in frozen prawns. In greater Noakhali area, head-on prawns are sold to the hawkers or *aratders* and *aratders* made supply to the respective agent in head-on condition. Beheading is done here by the agent of processing plant as a separate part of processing. It was important that the heads were taken off before it is transported.

Galda trade is still a part of the general fish trade in this region. Therefore, the same persons involved in general fish marketing system are playing the same role for galda marketing system. The galda marketing network is less complicated than fish marketing because they can directly sell their collected galda to the processing plants through agents. In galda marketing, the root level buyers are fishermen who catch prawn from rivers, canals, and prawn growers. In greater Noakhali region there is an organized galda marketing system. GNAEP farmers can easily sale their galda in this existing marketing system. In existing galda marketing chain the root level buyers are fishermen and some where is small traders and they supply to depot holder located in upazilla or district level Bazar. The depot holders send to the local commission agent (Located in Feni, Chowmuhani, Thanarhat and Campanygonj in Noakhali) the local agent send to the agent in Chittagong, then the agents send to the processing center through commission agent. The price is not satisfactory for the farmers, because the depot holders give less price to the farmers where as they sale at high price to the local agent, agent or commission agent at Chittagong. In this marketing chain the local commission agents give much more price than depot holder or *arotdar*. But at the moment the farmers face problem to find out the local commission agents during their galda harvesting period to sale their product as they are only a few stay at a long distance. It is clear that the local commission agent is one of the important media in galda

marketing chain to establish a sustainable galda marketing system in GNAEP working area.

Small Traders/Hawker are the purchasing agents located at the village level and they sale their collected galda to the *bazar* based *arotdar*. They pay a low price to the fishermen and some times the galda farmers. This put the fishermen or farmers to bargain to increase price of their harvested galda. The galda is transported to the *bazar*-based *arotdar* 1-2 times in a week depend on collected amount.

The *arotdars* have more than ten hawkers/fishermen located in village level and they collect galda from the pond owner or fish farmer. In maximum cases the *arotdar* give *dadon* to those hawkers or fishermen to ensure the galda supply to his *arot*. Generally the *arotdars* have one or more big galda holding wooden ice box, which they store a full load of collected prawns before delivery to the agent or commission agent to processing plants. The *arotdars*/depot holder supply their galda to the processing plant through respective agent or commission agent. Some farmers also sell their galda directly to the *arotdars*/depot holders for higher price.

Agent is the second top place in marketing chain, and they play a big role in galda marketing network. Actually they play as a middlemen between *Arotdar*/depot holder and commission agent. Commission agents have sub-agent in the galda growing area and they also invest/*dadon* a large amount for collecting more product. Commission agents are the enlisted supplier of galda to the processing plant. They are appointed by the respective processing plant to ensure regular supply of required quantity of galda. Processing plants have only provision to purchase prawn from their enlisted commission agents. They supply prawn to the processing plant on commission basis.

Fishermen groups in greater Noakhali region harvest prawns mainly from open waters throughout the year. The quantity of harvest however, varies from month to month in a year. It was found that the major harvest takes place during dry season (January-April) and during the season prawn supply from the region thereby increases to the processing plants. A second big harvest (but smaller in comparison of the first one) again is found after the wet season for three months (September-November). During wet season (May-August) only a few prawn are harvested from open water sources. The prawn growers used to sell their prawns mainly in December and January. The price of prawn is directly related to the demand from international markets. The exporters generally keep prawn-purchasing price constant through out the year unless the usual demand from international markets is decreased. However, the *arotdars* maintain a comparatively lower pricing schedule when supply from wild sources is high. But the price variation always has been within the range of Tk. 50-60 per kg. of prawns.

Before formation of CBO (Community Based Organization), the marketing chain of prawn was traditional and this type of channel is still seen in many areas. Currently CBO (Community Based Organisation) is playing a very important role in marketing of prawn. This type of marketing chain is found in most of the areas of Chatkhil, Begumgonj and Noakhali sadar upazilla of Noakhali district; Daganbhuiyan and Feni sadar upazilla of Feni district and Lakshmipur sadar, Ramganj and Raipur upazila of Lakshmipur district. CBO committee harvest the prawn from farmer's pond when prawn grows up and this committee stores and transports the prawn to the *arot*. CBO gets

5% commission for this role. From arot, these prawn are transported to the processing plants of Savar, Dhaka and Chittagong.

In this type of marketing system, farmer gets more advantages because: 1) arot holder cannot give lower prices to farmer as CBO are aware of latest world market condition through GNAEP workers, 2) CBO can bargain with arot holder, 3) farmer get actual weight and 4) farmer get actual grade.

This Noakhali Gold Processing Centre will be expected to buy prawn from May 2006. Then it is expected to have good marketing system, as intermediaries will be lowered and transport cost as well as preservation cost will be reduced. Therefore, poor farmer will get more prices for their product. On the other hand several intermediaries will loose their job. Question is will CBO survive after phase out of GNAEP?. Although CBO executive committee is elected by the members of CBO there have risk of nepotism, influence of elite and terrorist group of the society. Again CBO may be a new dominant group in prawn marketing.

Market margins of representative intermediaries acting between growers and consumers, the bulk usually earned by the arotder and the wholesale depot. Arot dar usually get 10 Tk/kg and Commission agent get 5~10 Tk/kg. At the moment there are 3~4 intermediaries between grower and processing plant, however, from 2006 there will be no intermediaries. Farmers will get the fare price because Noakhali Gold Prawn Industries Association (NGPIA) and CBO's are responsible for the prawn marketing in Noakhali specially GNAEP area. Grower (most of them are women) will sell the prawn to CBO's and CBO sell the prawn to NGPIA. Women in some programmes are also found to be selling fish on their own. Most of the women sell at the farm-gate, local bazar and to the middlemen. However, when projects are withdrawn how the growers are going to market their prawn still needs to be answered.

Materials and Methods

A detailed survey was made on socio-economy and livelihood aspects of the communities involved in production, processing and marketing of freshwater prawn. Detail information was collected as to the problems and constraints that they face in the chain of activities starting from production and marketing of the products. Data was also collected on the scope of improving product quality and value addition to the chain and the product. For this purpose random sample opinions of prawn farmers, forias, primary depot and main depot owners and carrier agents each from of Satkhira, Khulna and Bagerhat and greater Noakhali were collected. Some 10-15 selected processing factories from greater Khulna and Noakhali areas were sampled for reviewing the socio-economy and livelihoods of the factory workers. Special efforts were made for inclusion of socially under privileged groups of women from the target specific area/chain of activity. For Noakhali area the GNAEP personnel were involved in the project activities.

The study covered 15 upazila of greater Noakhali districts where DANIDA assisted GNAEP is going on. Data were collected by the following methods:

- LGD/Focus Group Discussion (FGD)
- Market survey
- Case Studies
- Semi-structured Interviews

Experimental Results

- Market margins of representative intermediaries acting between growers and consumers, the bulk usually earned by the arotder and the wholesale depot.
- Arotdar usually gets Tk10/kg and Commission agent gets Tk.5~10 /kg.
- At the moment there are 3~4 intermediaries between grower and processing plant, however, from 2006 there will be no intermediaries.
- Farmers will get the fare price because Noakhali Gold Prawn Industries Association (NGPIA) and CBO's are going to be responsible for the prawn marketing in Noakhali specially in GNAEP area.
- Grower (most of them are women) will sell the prawn to CBO's and CBO will inturn sell the prawn to NGPIA.
- Women in some programmes are also found to be selling fish on their own.
- Most of the women sell at the farm-gate, local bazar and to the middlemen.
- However, when projects support will be withdrawn how the growers are going to market their prawn still needs to be answered.

Discussion

Galda marketing system in greater Noakhali area

In greater Noakhali region there is an organized galda marketing system. GNAEP farmers can easily sale their galda in this existing marketing system with complicated price. In existing galda marketing chain the root level buyers are fishermen and some where is small traders and they supply to depot holder which are located at upazilla or district level Bazar then the depot holder send golda to the local commission agent (located in Feni, Chowmuhani, Thanarhat and Campanygonj in Noakhali) the local agent send to the agent in Chittagong, then the agent send to the processing center through commission agent. At this moment the price is not satisfactory for the farmers, because the depot holders give less price to the farmers where as they sale at a high price to the local agent, agent or commission agent at Chittagong. In this marketing chain the local commission agents give much more price than depot holder or *arotdar*. But at this moment the farmers face problem to find out the local commission agent during their galda harvesting for sale their product as they are only a few and stay at a long distance from the local agent. It is clear that the local commission agent is one of the main important media in galda marketing chain to establish a sustainable galda marketing system in GNAEP working area.

Market demand

At present prawn and shrimp is the second export-earning commodity for the country. Among prawn and shrimp, prawn's contribution is around 60% in the total export. The major production of this commodity is mainly coming from southwestern part of Bangladesh. The major prawn growing zone. However, the contribution from wild sources also considered as important over the last five years for meeting up the international market demand. Greater Noakhali areas are coming as prawn grows out habitants. Near about 40 mt was produced in the year 2002-2003 from *ghers*, rice fields and ponds, but each year a considerable quantity of prawn (approx. 80 mt) being harvested along with other brackish water fishes in this regions. Based on this wild catch a prawn marketing system has developed, mainly facilitated by Chittagong based prawn and shrimp exporters. If prawn supply is increased several folds of the current supply in the region, demand or marketing opportunities will not decrease due to increasing trend of international market demand. Galda are sold by weight and the bigger size galda are in the upper level of the standard. In the international markets bigger size prawn always been considered as "first moving goods". Thus price of prawn being field based on the size categories i.e. Grading system. Galda always been exported in head-off condition. In the past galda were purchased in head-off condition by *aratders* and fishermen or prawn growers who usually did the beheading activities. The quality control experts identified that beheading task done by unskilled hands in unhygienic places were partly responsible for bacterial contamination in frozen prawns. Thus the authority declared that skill hands trained by respective processing plants should do beheading task only as per recommendation of the quality improvement review team. In greater Noakhali area, head-on prawns are sold to the hawkers or *aratders* and *aratders* made supply to the respective agent in head-on condition. Beheading is done here by the agent of processing plant as a separate part of processing. It was important that the heads were taken off before it is transported. So they asked the fishermen or prawn growers for bringing prawns to them after beheading.

Galda grading system

Galda is sold sale through grading system both in local and international market. Generally there are six galda grading system in our country. The grades are :

Table 1 Galda grading system

| | GRADES | DESCRIPTION |
|----|------------|-------------------|
| 01 | Grade - U5 | 1 - 5 pieces/kg |
| 02 | Grade - 10 | 6- 10 pieces/kg |
| 03 | Grade - 20 | 11 - 20 pieces/kg |
| 04 | Grade - 30 | 21 - 30 pieces/kg |
| 05 | Grade - 50 | 31 - 50 pieces/kg |
| 06 | Grade - 70 | 51 - 70 pieces/kg |

Existing marketing channel in Noakhali

Galda trade is still a part of the general fish trade in this region. Therefore, the same persons involved in general fish marketing system are playing the same role for galda marketing system. The galda marketing network is less complicated than fish marketing because they can directly sell their collected galda to the processing plants through agents. In galda marketing, the root level buyers are fishermen who catch prawn from rivers, canals, and prawn growers.

Small traders/hawkers

They are the purchasing agents located at the village level and they sale their collected galda to the *bazar* based *arotdar*. They pay the fishermen and some times the galda farmers low price. This competition put the fishermen or farmers to burgeoning to increase price of their harvested galda. The galda is transported to the *bazar*-based *arotdar* 1-2 times in a week dependind on collected amount. Generally they supply around 5 kg. is wooden iceboxes provided to the hawkers for preserving the collected prawns for 2-3 days at the village level.

Arotgars /depot holder

The *arotgars* have more than ten hawkers/fishermen located in village level and they collect galda from the pond owners or fish farmers then they supplied to the *arotdar*. In maximum cases the *arotdar* give *dadun* to those hawker or fishermen to ensure the galda supply to his *arot*.

Generally the *arotgars* have one or more big galda holding wooden made ice box, which they use to store a full load of collected prawns before delivery to the agents or commission agent to processing plants. The *arotgars* /depot holder supply their galda to the processing plant through respective agent or commission agent. Some farmers also sell their galda directly to the *arotgars* / depot holders for higher price.

Agent

Agent is the second top place in marketing chain, and they play a big role in galda marketing network. Actually they play as a middlemen between *Arotgar*/depot holder and commission agent. Commission agents have more agent in the galda growing area and they also invest/*dadun* large amount for collecting more product.

Commission agents

Commission agents are the enlisted suppliers of galda to the processing plant. They are appointed by the respective processing plant to ensure regular supply of the required quality of galda. Processing plants have only provision to purchase prawn from their enlisted commission agents. They supply prawn to the processing plant on commission basis.

Seasonal availability and price of prawn

Fishermen groups in greater Noakhali region prawns mainly from open water throughout the year. The quantity of harvest however, varies from month to month in a year. During discussion with fishermen it was found that major harvest takes place during dry season (January-April) and during the season prawn supply from the region thereby increases to the processing plants. A

second big harvest (but smaller in comparison with the first one) again is found after the wet season for three months (September- November). During wet season (May-August) very few prawn are harvested from open water sources. The prawn growers used to sell their prawns mainly in December and January.

The price of prawn is directly related with the demand in the international markets. The exporters generally keep prawn-purchasing price constant through out the year unless normal demand from international markets is decreased. However, the *arotdars* maintain a comparatively lower pricing schedule when supply from wild sources is high. But the price variation always has been within the range of Tk. 50-60 per kg. of prawns.

Galda market price

Arotdar/ depot holders price

Table 2 Price of various grades of galda in greater Noakhali regions in 2003

| Grades | Description | Price Tk/kg |
|-------------|--------------------|-------------|
| Head-on | | |
| Grade - U5 | 5 pieces/kilogram | 450 |
| Grade - U10 | 10 pieces/kilogram | 300 |
| Grade -U20 | 20 pieces/kilogram | 220 |
| Grade - U30 | 30 pieces/kilogram | 180 |
| Grade - U50 | 50 pieces/kilogram | 150 |
| Grade - U70 | 70 pieces/kilogram | 100 |

Source Mr. Tazul Islam, Arotdar, Sonapur fisheries arot, Sonapur, Noakhali.

Local Agent Price

Table 3 Price of various grades of galda in greater Noakhali regions in 2003

| Grades | Description | Price Tk/kg |
|-------------|--------------------|-------------|
| Head-on | | |
| Grade - U5 | 5 pieces/kilogram | Tk.550/= |
| Grade -U8 | 8 pieces/kilogram | Tk. 500/= |
| Grade - U10 | 10 pieces/kilogram | Tk. 490/= |
| Grade - U20 | 20 pieces/kilogram | Tk. 320/= |
| Grade - U30 | 30 pieces/kilogram | Tk 230/= |
| Grade - U50 | 50 pieces/kilogram | Tk. 200/= |
| Grade - U70 | 70 pieces/kilogram | Tk. 120/= |

It is clear that the local agents offer high price than *arotdar* and depot holder in Noakhali region. The local agents price and processing plants price are more or less similar but there is a big difference between *arotdar* / depot holder and hawker/ farmers.

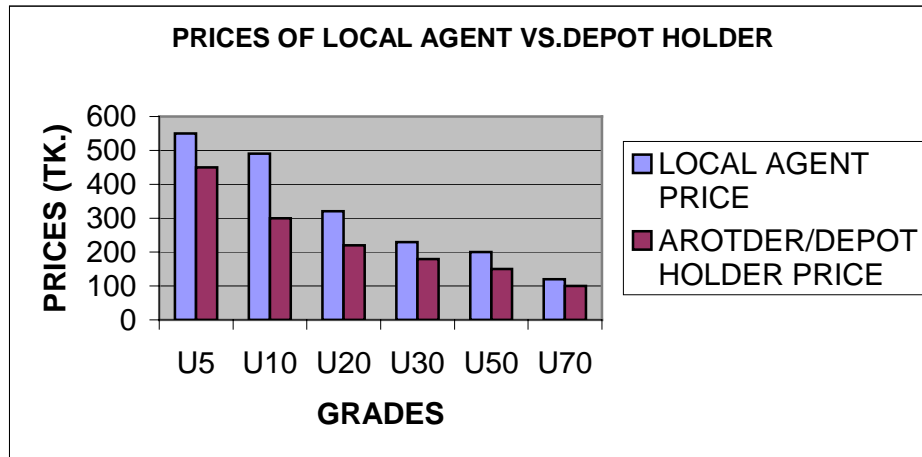


Fig. 1 Prices of local agent vs. depot holder price

Galda market price growing up

It is really a positive sign and encouragement for the galda growers the galda market price and demand have rapidly increased with in a year through galda *gher* culture in this region in 2003.

Ice factory

Prawn is a highly perishable commodity that requires keeping out of contamination all the time from harvest to processing for maintaining superior quality needed for export benchmark. Prawn preservation and transportation are closely related with Ice. In order to prevent spoilage and ensure required quality proper icing is strongly recommended during the period needed for transferring prawns from harvesting sites to processing plants. Therefore, ice factories in the region are playing an important role in this regard. There is sufficient number of ice factories under operation in Noakhali region. But most of them are located at close distance from trading centers. In case of ice needed by hawkers for preservation and transportation after collecting prawns from -village ponds, they used to collect ice from nearby ice factories although some times ice factory is located far away from the harvesting sites. There is a healthy competition among the ice factories for maintaining a quality product to attract the potential buyers. Thus all of them are using underground water for producing ice-blocks, looks snow white, an indicator of a quality product. More over the factories try to handle ice-blocks in a hygiene manner to avoid any type of contamination that may cause earlier spoilage for fishes when it is to be used in preservation purpose. The price of each block of ice mainly varies with the demand. If demand is high then price increases. This was came to learn from the ice users that the availability of ice as per requirements still not a problem in Noakhali regions for locally preserving and transporting of fish and prawn. The price for each block (weighting about 40 kg.) of ice ranging from Tk. 40 - 100/=. In greater Noakhali area in total 42 ice factories are under operation in different Upazilas.

Prawn financing

The main scope for increasing prawn production is by upgrading thousands of unused or underused (culturable and derelict) ponds and improving the management of those already under cultivation, where two or three-fold increase in prawn production can be expected. Substantial finance shall be needed to do this, and therefore, credit facilities to pond farmers may be arranged. NGO like CODEC already achieved an extremely successful record of small loan disbursement to such pond culturist in adjacent areas.

Formation of prawn marketing groups

Analyzing the existing prawn marketing situation study it is found that there is distinct possibility of farming, purchasing or selling groups with in the existing beneficiary groups. At present, the beneficiaries are only involved in learning activities as group with active facilitation by the project. In that case during group formation the following issues need to be focused:

- Incorporation of group dynamic activities within the groups
- Initiation of group leadership development initiatives
- Incorporation of Income Generating Activities (IGAs) within the groups
- Wider inclusion of prawn farming in other closed water bodies.

Prospects of galda farming in Noakhali

Large area of agriculture land in Noakhali are located in medium low lying area due to the topographical condition and emerging of thousand hectares of char along the riversides. There is seasonal water logging condition prevailing for more than 6 months in many years. An estimation of Agriculture department stated that more than 40 thousand hectares of rice fields are under such water logging condition located in five upazilla (Begumgonj, Chatkhil, Noakhali sadar and Part of Senbag and Companigonj) of Noakhali district. The owners of these waterlogged lands only could cultivate single crop in a year due to the problems related to the water issue. Farmers in these areas used to cultivate local varieties *Amon* rice in August and harvest rice on the average of one ton per hectare, is significantly below the production levels obtained in other part of the country. In *Boro* season although the fields remain dry but *boro* rice cultivation is not possible due to the lack of irrigation facilities. Moreover, the agriculture activities in such waterlogged areas seem to be much costly or economically non-viable. All of these issues jointly responsible to made the landowners reluctant for undertaking any agriculture activities in their lands. Therefore, thousand hectares of waterlogged lands remain fallow for many years in the regions.

The unused low laying rice fields of Noakhali could be easily converted into integrated rice-fish and rice-prawn farming plots with little expenditure through proper planning and initiatives. Community based rice-fish-prawn farming also possible to implement in these regions.

Accordingly, the NGO was encouraged to boost its production by launching new projects in the distant char lands of Noakhali and Luxmipur districts. Ten local fishermen were employed as trainers for the purpose. In 2003-2004, about 600 tonnes of shrimps were produced.

Din Mohammad Mohsin, co-ordinator and technical assistant of GNAEP, said, about 91 tonnes of shrimps costing Tk 30 crores were exported in the same year. An ultra modern hatchery was set up at Sonapur in the coastal area of Noakhali district with the financial assistance of the Royal Danish Government. About 100 tonnes of shrimps were produced. Meanwhile, distribution of post larvae for the current financial year began in April 27, three weeks ahead than the previous year, due to their bulk production in different hatcheries. The authorities of GNAEP at Upakul Fresh Water Shrimp Hatchery distributed first PL to women dominated households in Char Majid at a simple ceremony. By the end of June, about five million PLs had been distributed.

Of the total distributed prawns 3.3 million PL came from UFWPH and 1.7 million PL came from (SFWPH). Of the total quantity of shrimps distributed, 40 per cent PL has been allocated to FFG, 357 PL to hatcheries, 2,050,000 to women headed household projects. From the first phase of production at SFWPH, 50 per cent PL has been allocated to FFG ponds and 11 per to hatcheries.

Galda farming and production status

Initially the project starts Galda farming through *gher* piloting at Nobogram under Noakhali sadar, Hazigonj under Ramgonj upazilla and charcakra under Companygonj upazilla and around the project area through Rice field, FFG pond and wetland under Sadar, Begumgonj, Chatkhil and Ramgonj. Near about 1200-rice field, *gher* farmer were found to culture galda in the year 2002, the project gave technical and follow-up support and also helped marketing. Total 17 lacks PL stocked in the whole project area in the year 2002. The *gher* farmer's used home made feed which is locally available and low price which encouraged the farmers for wider expansion of galda culture in this region.

The production rate is satisfactory in *gher* farming. The production rate is 3kg/dec in *gher*, 2.5kg/dec in rice fish and 1kg/dec in FFG pond. Up to February 2003 near about 20 mt. galda harvested from *gher*, rice fish and FFG pond, the project target is 40 mt. The present galda production is two times more than the previous years, and additional Tk.70,00,000 was earned by the farmers of Noakhali regions. The trend of galda culture and production in these regions is satisfactory.

Pro-poor: social income- bellow 30,000 Tk./year

Land holding capacity 0- 200 dec.

Marketing chain

Marketing channel without CBO

Before formation of CBO (Community Based Organization), the marketing chain of prawn was traditional and this type of channel is still present in many areas. Galda trade is still a part of the general fish trade in this region. Therefore, the same persons involved in general fish marketing system are playing the same role for galda marketing system. The galda marketing network is less complicated than fish marketing because they can directly sell their collected galda to the processing plants through agents.

This type of marketing chain is found in most of the areas of Subarnachar upazilla of Noakhali district; Chagalnaiya and Parshuram upazilla of Feni district and Ramgoti upazilla of Lakshmipur district.

Local agent/foria

They are the purchasing agents, located at the village level and they sale their collective galda to the *bazar* based *arthatdar*. They pay the fishermen and some time galda farmers a low price. This competition put the fishermen or farmers to burgeoning to increase price of their harvested galda, otherwise they will require the *arotdar* to pay advance contact with *farias* that is called "*Dadun*". Specially the fishermen groups receive these interest-free loans, will the condition to sell all galda to the respective *arotdar*. The galda is transported to the *bazar*-based *arotdar* 1-2 times in a week depending on collected amount. Generally they supply in around 5 kg. The *arothder* provide wooden iceboxes to the *farias* for preserving the collected prawns for 2-3 days at the village level.

Arotgars/depot holder

The *arotgars* have more than ten *farias*/fishermen located at village level and they collect galda from the pond owners or fish farmers then they supplied to the *arotdar*. In maximum cases the *arotdar* give *dadun* to those *farias* or fishermen to ensure the galda supply to his *aroth*.

Generally the *arotgars* have one or more big galda holding wooden made ice box, which they store a full load of collected prawns before delivery to the agent or commission agent to processing plants. The *arotgars* /depot holder supply their galda to the processing plant through respective agent or commission agent. Some farmers also sell their galda directly to the *arotgars*/depot holders for higher price.

Agent

Agent is the second top place in marketing chain, and they play big role in galda marketing network. Actually they play as a middlemen between *Arotgar*/depot holder and commission agent. Commission agents have more agent in the galda growing area and they also invest/*dadun* large amount for collecting more product.

Commission agents

Commission agents are the enlisted supplier of galda to the processing plant. They are appointed by the respective processing plant to ensure regular supply of required quantity of quality galda. Processing plants have only provision to purchase prawn from their enlisted commission agents. They supply prawn to the processing plant on commission basis.

CBO based marketing channel

Currently CBO (Community Based Organisation) is playing a very important role in the marketing of prawn. This type of marketing chain is found in most of the areas of Chatkhil, Begumgonj and Noakhali sadar upazilla of Noakhali district; Daganbhuiyan and Feni sadar upazilla of Feni district and Lakshmipur sadar, Ramganj and Raipur upazila of Lakshmipur district. CBO committee harvest the prawn from farmer's pond when prawn grows up and this committee stores and transports the prawn to the arot. CBO gets 5% commission for this role. From arot, these prawn are transported to the processing plant of Savar, Dhaka and Chittagong.

In this type of marketing system, farmer gets more advantages because 1) arot holder cannot give less prices to farmer as CBO are aware of latest world market condition through GNAEP

workers, 2) CBO can bargain with arot holder 3) farmer get actual weight and 4) farmer get actual grade.

Question is will CBO survive after phase out of GNAEP? Although CBO executive committee are elected by the members of CBO there is risk of nepotism, influence of elite and terrorist group of the society. Again CBO may be a new dominant group in prawn marketing. The Noakhali Gold Processing Centre will be expected to buy prawn by May 2006. Then it is expected to have a good marketing system, as intermediaries will be lowered and transport cost as well as preservation cost will be reduced. Therefore, poor farmer will get more prices for their product. On the other hand several intermediaries will loose their job.

Other marketing channel

In most of the areas of Companygonaj upazila of Noakhali district, the marketing chain is somewhat different.

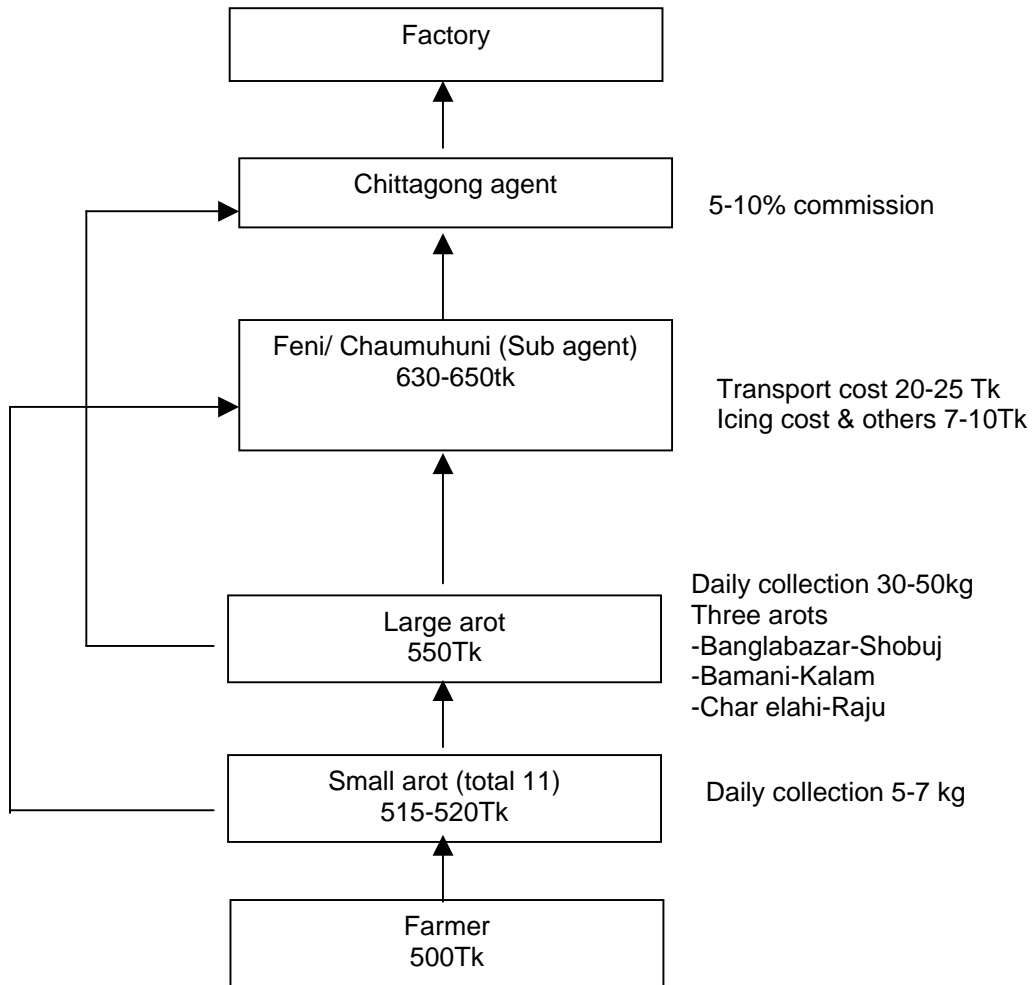


Fig. 2. Different marketing channel

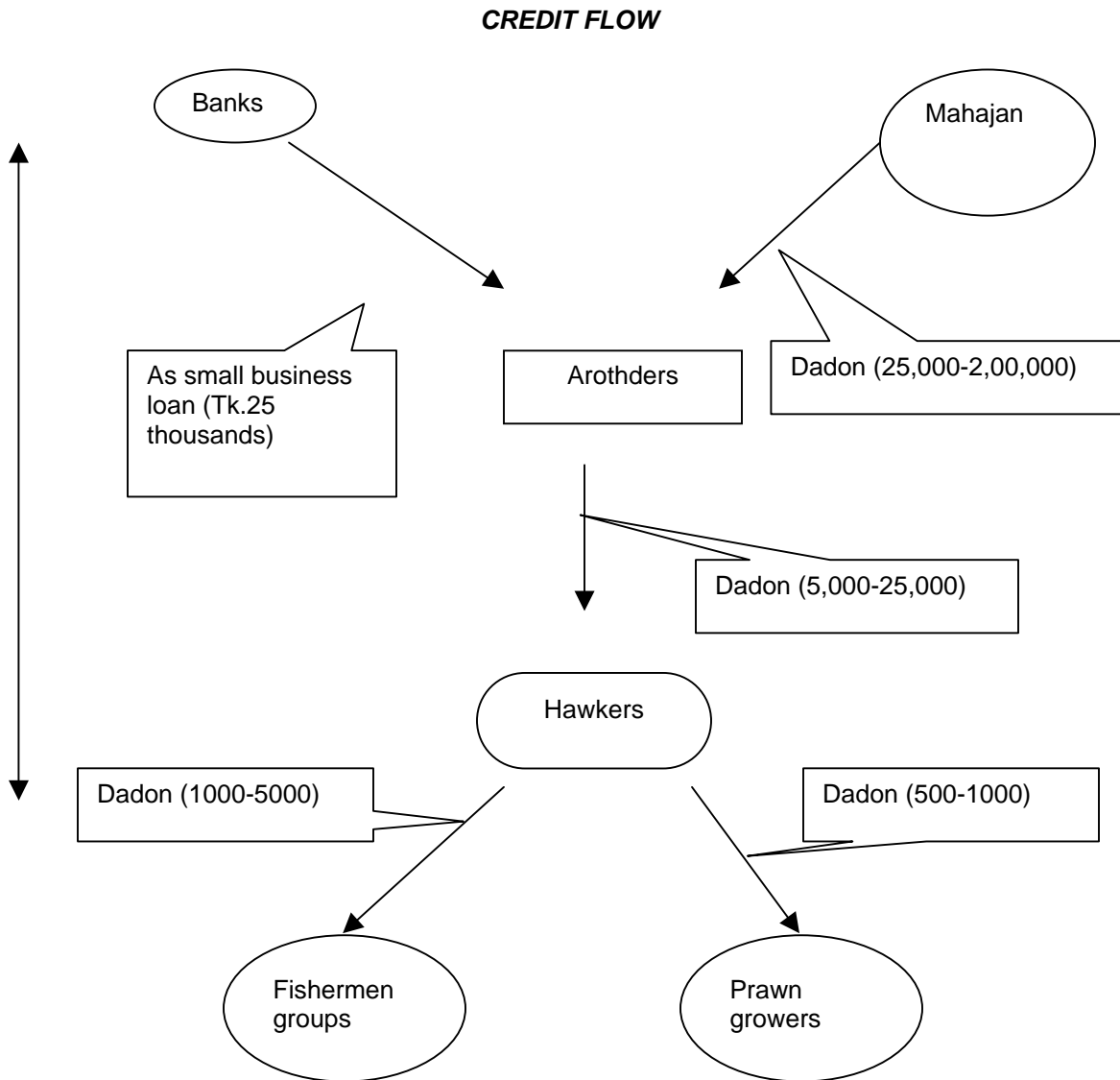


Fig. 3. Prawn financing system (for capture fisheries only).

Prawn financing

The main scope for increasing prawn production is by upgrading thousands of unused or underused (culturable and derelict) ponds and improving the management of those already under cultivation, where two or three-fold increase in prawn production can be expected. Substantial finance shall be needed to do this, and therefore, credit facilities to pond farmers may be arranged. NGO like CODEC already achieved an extremely successful record of small loan disbursement to such pond culturist in adjacent areas.

Marketing constraints

- Insufficient ice or distance from sources of ice.
- Infrastructure (especially communication) facilities is not well developed.
- Lack of knowledge; especially technical knowledge.
- Local arot that existed before the formation of CBO; now has started to buy prawn with high price than CBO (although they are facing loss).

Processing plant

Name: Noakhali Gold Foods Ltd.

Status: Yet has not been started: expected to buy prawn by May 2006.

Storage Capacity: 205 mt

Processing capacity: 10 mt/day

The authority expects that they will be able to export 40 mt/month.

They will buy all the prawn, shrimps and white fish of that area according to capacity but they will prefer galda first.

The executive committee of Noakhali Gold Prawn Industries Association (NGPIA) will include 15 persons, of whom at least 6 is drawn from CBO's and at least 6 from private commercial members. It is intended that two CBO members should be drawn from each of the three districts of greater Noakhali. The Noakhali Gold Food Industries prawn processing plant has now began work of infill on a 5-acre site at west Char Uriya some 3 kilometers down the road to the Hatiya steamer ghat and about 6 kilometers from Sonapur.

Recommendations

The pro-poor prawn farming intervention operated in greater Noakhali area is the challenge to fight against poverty. This initiative is rapidly multiplying and implemented in the area due to its high profitability and quick return. Considered as a delicacy food item the demand of prawn is high in the international market. The initiative not only provides food security but also creates job opportunity among the poor people. Among the poorest community the social violence is high. More than 80% people live in village in our country of which majority are live under poverty level. Food security reduces the violence and keeps the society peace. A nutritional deficiency is another important factor for village people, which reduce physical as well as mental efficiencies. So, supplies of proper nutritional level is urgent need proper utilization of our manpower. To ensure food security of the poor households, GNAEP is promoting integrated farming system (fish-crops-poultry or livestock). The integrated farming system maximizes food production in a homestead.

The giant freshwater prawn *Macrobrachium rosenbergii*, is potentially important to be introduced in the pond and waterlogged (Rice-prawn) culture system of Bangladesh. Large area of agriculture land in Noakhali are located in medium low laying area due to the topographical

condition and emerging of thousand hectares of char along the riversides are potential for galda farming. There is seasonal water logging condition prevailing for more than 6 months since many years. An estimation of Agriculture department stated that more than 40 thousand hectares of rice fields are under such water logging condition located in five upazilla (Begumgonj, Chatkhil, Noakhali sadar and Part of Senbag and Companigonj) of Noakhali district. The owners of these waterlogged lands could cultivate only a single crop in a year due to the problems related to the water issue. The unused low laying rice fields of Noakhali could be easily converted into integrated rice-fish and rice-prawn farming plots with little expenditure through proper planning and initiatives. Community based rice-fish-prawn farming is also possible to implement in these regions.

The production potential of these lands would be higher than south western Bangladesh due to its improved soil quality. Because of water logging here by rainwater and remaining dry for 5-6 months each year helps in improving the soil quality. Whereas the water logging was permanent in southwestern Bangladesh for many years with saline water before converting those into shrimp *ghers* that might considerably damaged soil quality. Moreover, the low laying rice fields in these areas are not located into any water drainage channel of the villages, So that, if these fields are convert into integrated rice-fish or rice-prawn farming *ghers* there is no possibility of deterioration in water drainage system during the wet season. For example, there is potentiality for producing more than 6000 metric ton prawn and 20,000 metric ton fish per year in addition to rice and vegetable production only through converting 50% low laying rice fields into *ghers* in Noakhali district. The PL is available in the area because of the establishment of two private hatcheries. Farmers can easily distinguish the hatchery produced PL and naturally collected PL. Farmers can made feed easily in home by locally available feed ingredients. Resource Learning Centers can play greater role in facilitating farmer's access to information of different livelihood issues.

GNAEP is also creating marketing opportunity for fishermen to sell the prawn to get better returns. The present prawn marketing system in the regions is completely in favor of galda farmers in terms of selling price and market accessing. The demand force for galda is extremely high which would ensure the considerable selling price of the galda. Although the fish *arats* at present are located around different growth centers, but their galda collection process as per advance message from farmers would extend at the pond side. In future there is distinct possibility of establishing more formal galda markets if prawn production in closed water bodies is increased. During the education process about galda, farmers need to be learnt the galda marketing process, its market price and grading system in order to increase their bargaining capacity. The production capacity of ice factories is widely surplus than the requirement and that is why many factories have to keep running on seasonal basis. Therefore, availability of ice would not be a problem for galda marketing in Noakhali regions.

GNAEP considers that poverty alleviation cannot be achieved only through increasing food production but also requires improvement of issues affecting social factors. Through linkage and coordination with concerned agencies, GNAEP is also addressing crosscutting issues such as human rights and good governance.

- The socio-economy and the livelihoods of the groups of people engaged in production and at different levels of marketing chain of the coastal aquaculture products freshwater prawn are clearly understood.
- The problems and constraints that these groups of people face in the chain of activity in production, processing and marketing are evaluated, understood and scopes of improvement of the system through technological/organizational intervention are highlighted.

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