

Present Status of Shrimp at the Stage of Production and Marketing: A Study in Khulna District of Bangladesh

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Abstract *The marine water shrimp and freshwater prawn is commercially cultured in Bangladesh's Khulna. Thousands of farmers in this area have converted their paddy fields to shrimp and prawn farms to adopt a profitable shrimp culture practice. Farmers directly sell their shrimps to the local markets during March-May/June and prawns during October/November-January/ February. However, now the production of shrimp and prawn are take places all around the year. The shrimp/prawns supply chain from farmers to the international markets always pass through a number of middlemen: foria (field workers), prawn traders, agents and companies. The growing production in shrimp and prawn farming in Khulna region and rising export are generating employment in this sector. Suitable trade infrastructure conducive to shrimps export should be established and strict compliance with requirements of importing countries by shrimp processors and exporters should be ensured in order to advance the sector.*

1. Introduction

The culture of shrimp in Bangladesh has been drawing greater attention by fish farmers, particularly in brackish waters. In the coastal area of the greater Khulna region having a tropical climate, productive and unpolluted estuarine areas are

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considered to be a suitable natural habitat for penaeid shrimp culture (Ali et al., 2000). The latest estimate of the area of land under shrimp cultivation in Bangladesh is about 140,000 ha (BBS 1996). Shrimp farming plays a significant role in the economy of Bangladesh. Processed shrimp comprises the second largest export commodity of the country. Shrimp farming also generated diverse employment opportunities; In 1993, about 87000 persons were involved in shrimp farming and another 5000-6000 in shrimp processing industries (Hussain, 1994). This number is now 3.5 lakh in Khulna region. In addition, about 300,000 to 500,000 persons are involved in shrimp larvae collection for shrimp farming (Ali, 1992). Due to its tremendous potential, the area under shrimp farming has been increasing rapidly every year in Bangladesh. About 140,000 ha of land in the coastal region is under shrimp farming, of which about 125,000 ha is used for brackish water shrimp farming and about 15,000 ha for fresh water giant prawn farming (BFRI, 1996). Now in Khulna district about 58,472 ha is under shrimp farming. About 80% of the tiger shrimp comes from the south western region of Bangladesh *i.e.* greater Khulna region. The rapid expansion of shrimp farming over the last decade and its contribution to foreign exchange earnings has been quite remarkable. In 2005-06 the total foreign exchange earnings from shrimp export was Tk. 2100 crore. Shrimp culture covered an area of 1.4 lakh ha in 1995-96 in contrast to 0.87 ha in 1985-86 (DoF 1998). The biology of these two species is mostly associated with the salinity of the environment. Khulna region is geographically situated in the mixed climatic condition between fresh, brackish and marine environment. Marine shrimp and fresh prawn are both suitable culture in this ground. In the last few years horizontal expansion of shrimp cultivation in Bangladesh occurred rapidly, but unfortunately, due to improper management practices appropriate level of production of shrimp was not achieved. Both low production rate such as 197.4 to 225.6 kg/ha/season (Hoq et al., 1997) and poor management practice both appear as the major hindrance to competing in the international market, which deprive the country from earning more foreign exchange. Shrimp farming technology followed by most of the farmers of Bangladesh is rather primitive and inefficient and it is also difficult to effectively apply any improved culture technology in existing farms because most of them are unmanageably large in size, shallow in depth, irregular in shape (Karim, M., and Aftabuzzaman. 1995). Successful shrimp farming depends on its good management and improved system at various culture practices. In summary, the commercial development of shrimp and prawn farming is geographically broad but piecemeal and, with a few exceptions, nationally insignificant in terms of volume production. The goals of the study are to estimate the production, marketing system and channel as well as to evaluate employment generation and manpower involvement in shrimp farming.

2. Materials and Methods

2.1 Study area

Khulna district: 10 Upazila viz., Koyra, Paikgacha, Dumuria, Fultala, Digholia, Terokhada, Rupsha, Batiaghata, Dacope and Metro respectively.

2.2 Species

Fresh Water Giant Prawn (*Macrobrachium rosenbergii*) and Marine Water Giant Tiger Shrimp (*Paeneous monodon*)

2.3 Data collection method

Questionnaire, interviews, Literature review, Field visit, Personal contact.

2.4 Methodology

The survey covered the period of seven months from January to July in 2006. The data was collected by using questionnaire interviews with prawn traders and participatory rapid appraisal (PRA) tools like Focus Group Discussion (FGD) with shrimp/prawn farmers. Shrimp traders for face to face questionnaire interviews were selected by random sampling. Interviews were conducted in the market places. PRA tools were used to get an overview of some particular issues like shrimp/prawn harvesting and marketing. A sample survey on 68 shrimp traders in different markets of Khulna district was conducted for data collection. Cross check interviews were conducted with many respondents of different categories as far as possible.

2.5 Data analysis

2.5.1 Computer software support

- i) MS Word ii) MS Excel iii) SPSS

2.5.2 Production counting

Production of Upazila = Average production from 3 to 15 depots X total depots of each market in the Upazila.

2.5.3 Test

t-test: paired two samples for means

Linear regression analysis

- i) $y = a + bx$ (Hosmand, 1988)
- ii) $y =$ co-ordinate value along the vertical axis (dependant variables)

x = co-ordinate value along the horizontal axis (independent variables)

a = intercept of the curve

b = slope of the curve.

iii) Co-relation co-efficient 'r' Where,

$$r = \frac{\sum xy}{N \sigma_x \sigma_y}$$

$x = x_i - \bar{x}$, $y = y_i - \bar{y}$, σ_x = Standard deviation of series x , σ_y = Standard deviation of series y , N = Number of pair of observation

3. RESULTS AND DISCUSSION

3.1 Production of shrimp and prawns from the Khulna district of Bangladesh

The approximate annual production of shrimp and prawn was estimated from the Khulna district of Bangladesh through regular field survey at monthly interval from Upazila fisheries Office and randomly selected shrimp depots of Paikgacha, Dacope, Koyra, Batiaghata, Dumuria, Rupsha, Terokhada, Digholia, Fultala, and Metro Upazila in Khulna district and gross production from the farms of that Upazilas for a period of six month from January to June, 2006. The production was counted in two ways in all Upazilas. Firstly, the annual harvest of shrimp was counted monthly from Upazila fisheries Office by turn. Secondly, the production was counted from randomly selected depots. The total harvest of shrimp and prawn and observed production in shrimp depots in Khulna district was 21611 and 18620 ton, respectively, and the total area of shrimp farming was 58472 hector. The annual total harvest of shrimp was 5873, 4388, 1636, 2145, 5416, 616, 582, 569, 345 and 41 tons at Paikgacha, Dacope, Koyra, Batiaghata, Dumuria, Rupsha, Terokhada, Digholia, Fultala, and Metro Upazila in Khulna district, respectively. The annual total shrimp production in depots was 4833, 3675, 1408, 1992, 4694, 602, 529, 537, 311 and 39 tons at Paikgacha, Dacope, Koyra, Batiaghata, Dumuria, Rupsha, Terokhada, Digholia, Fultala, and Metro Upazila in Khulna district, respectively. The total shrimp farming area are 17276, 12680, 4530, 6253, 13284, 1178, 1102, 1070, 987 and 112 hector at Paikgacha, Dacope, Koyra, Batiaghata, Dumuria, Rupsha, Terokhada, Digholia, Fultala, and Metro Upazila in Khulna district, respectively. Both the maximum production of farm (5873) and depots (4833) were found in Paikgacha and the minimum was 41 ton and 39 ton in Metro Upazila (Table-1 and Figure-1).

In all level of production there is some loss that may hamper the production frequency. In shrimp production, a major loss occurs from harvesting to depot, which affects the primary stakeholder. The rate of rejection of shrimp over from

Table 1: Upazila wise area of shrimp farm and production from farm and depots

Upazila	Area (ha)	Production (ton)	
		Farm	Depot
Paikgacha	17276	5873	4833
Dacope	12680	4388	3675
Koyra	4530	1636	1408
Batiaghata	6253	2145	1992
Dumuria	13284	5416	4694
Rupsha	1178	616	602
Terokhada	1102	582	529
Digholia	1070	569	537
Fultala	987	345	311
Metro	112	41	39
Total	58472	21611	18620

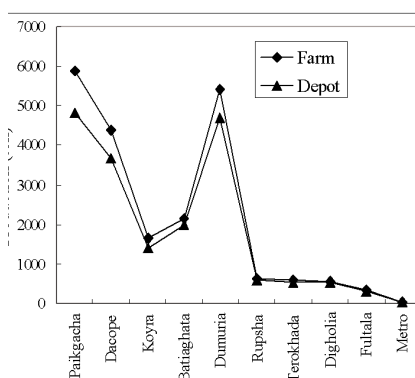


Figure-1: Production variation from Farm to Depots

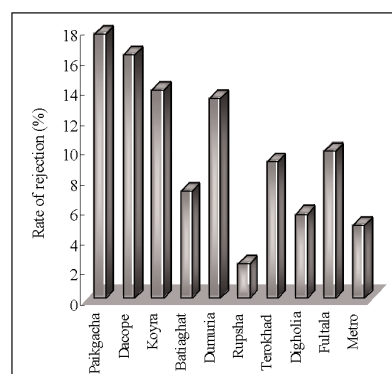


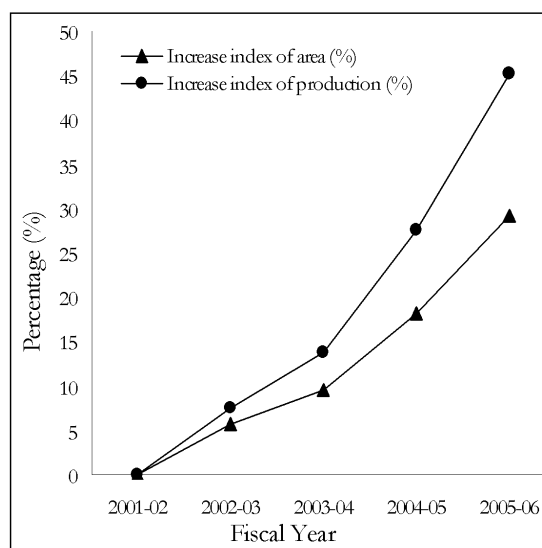
Figure-2: Percentage change of the rejection rate over Production from Farm to Depots

farm to depots are 18%, 16%, 20%, 7%, 12%, 2%, 13%, 9%, 10% and 5%, respectively, at Paikgacha, Dacope, Koyra, Batiaghata, Dumuria, Rupsha, Terokhada, Digholia, Fultala, and Metro Upazila in Khulna district (Figure-2). The highest rate was 20% in Koyra and the lowest was 2% in Rupsha. The total shrimp farming area is 45238, 47820, 49570, 53467 and 58472 in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 fiscal year, respectively. The export volume and foreign currency earnings are encourage the shrimp farming.

Table 2: Increasing trend of shrimp farming area and Production in last five years in Khulna district.

Fiscal year	Production (ton)	Shrimp farming area (ha)	Increase index of area (%)
2005-06	21611	58472	29.25
2004-05	18986	53467	18.19
2003-04	16939	49570	9.58
2002-03	16080	47820	5.71
2001-02	14875	45238	0.00

Figure 3: Increasing Index (%) of shrimp farming area and production in Khulna region



The increase shrimp farming area and production are shown in Table-2. Increasing index of area in 2002-03, 2003-04, 2004-05 and 2005-06 are 5.71%, 9.58%, 18.19% and 29.25%, respectively, with the comparison year 2001-02 (Figure-3 and Table-2).

3.2 Employment generation and manpower distribution

The initiatives of shrimp farming in *gher* system increase manpower involvement. The total manpower involved in shrimp farming was 279875 and 304570 in 2004-05 and 2005-2006 financial years, respectively. The maximum manpower involvements in shrimp farming were 69870 and 75460 at Paikgacha in 2004-05

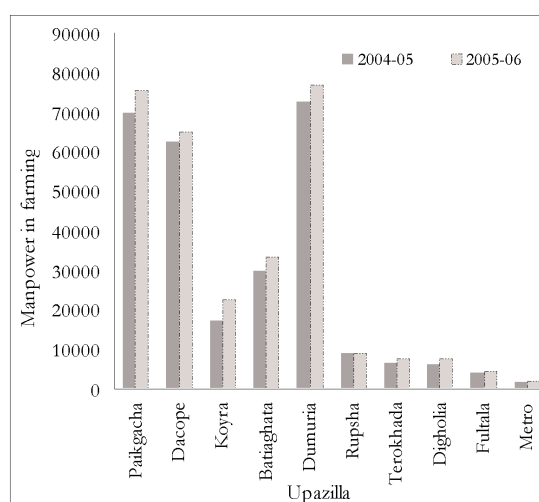
and 2005-06, respectively, and the minimum were 1825 and 2110 at Metro Upazila in 2004-05 and 2005-06, respectively (Table-3 and Figure-4).

The total manpower involved in shrimp farming are 160585, 175850, 221780, 279875 and 304570 in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 fiscal

Table 3: Upazila wise Manpower involvement in shrimp farming

Upazila	Manpower involvement in shrimp farming	
	2004-05	2005-06
Paikgacha	69870	75460
Dacope	62550	64890
Koyra	17250	22750
Batiaghata	29840	33410
Dumuria	72760	76925
Rupsha	8920	9170
Terokhada	6535	7645
Digholia	6195	7530
Fultala	4130	4680
Metro	1825	2110
Total	279875	304570

Figure 4: Upazila wise Manpower involvement in shrimp farming around 2004-05 and 2005-06 in Khulna district.



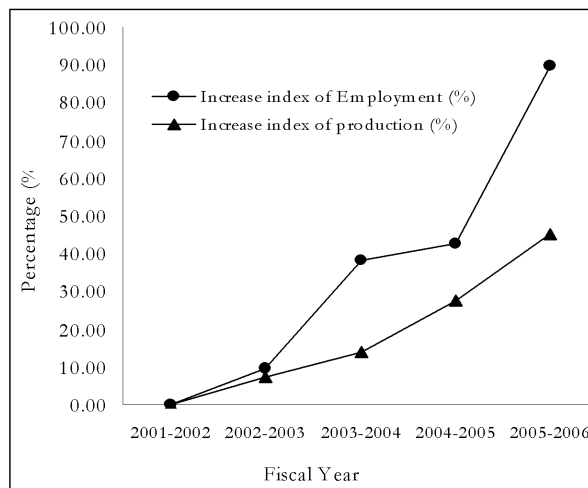
year, respectively (Table-4). Increases in the earning of foreign currency are creating huge employment generation in shrimp farming in the coastal belt of Bangladesh.

The indices of employment in 2002-03, 2003-04, 2004-05 and 2005-06 are 9.51%, 38.11%, 42.62% and 89.66%, respectively, with the comparison year 2001-02 (Figure-5).

Table 4: Employment generation in shrimp farming area in last five years in Khulna district

Fiscal year	Manpower involvement	Increase index of Employment
2001-2002	160585	0.00
2002-2003	175850	9.51
2003-2004	221780	38.11
2004-2005	279875	42.62
2005-2006	304570	89.66

Figure-5: Increasing Index (%) of Employment and shrimp production in Khulna region



3.3 Shrimp production from Khulna region

Total production of shrimp at Upazila level of Khulna district shows a phenomenal increase year by year. The cumulative production was always higher, viz., 14875, 16080, 16939, 18986 and 21611 tons in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06, respectively. In total production Paikgacha was always top

producing 4453, 4790, 4948, 5645 and 5873 tons in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06, respectively, and the lowest production was in Metro Upazila at 30, 31, 36, 39 and 41 tons in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06, respectively (Table-5).

The production trend from 2001-02 to 2005-06 showed the highest deviation in Dumuria Upazila (± 778) and the lowest deviation in Metro Upazila (± 5) (Table-5 and Figure-6). The production deviation for the entire district was ± 1571 , ± 1683 , ± 1765 , ± 2023 and ± 2023 in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 fiscal year, respectively (Table-5 and Figure-7). The maximum deviation

Table 5 : Year wise production of shrimp and prawn in different Upazila in Khulna district of Bangladesh

Upazila	Production (ton)					SD	Total
	2005-06	2004-05	2003-04	2002-03	2001-02		
Paikgacha	5873	5645	4948	4790	4453	± 597	25709
Dacope	4388	3825	3356	3210	2935	± 572	17714
Koyra	1636	1532	1420	1380	1220	± 158	7188
Batiaghata	2145	1810	1642	1480	1302	± 323	8379
Dumuria	5416	4476	3950	3660	3486	± 778	20988
Rupsha	616	420	413	409	392	± 93	2250
Terokhada	582	535	510	503	488	± 37	2618
Digholia	569	418	386	372	344	± 89	2089
Fultala	345	286	278	245	225	± 46	1379
Metro	41	39	36	31	30	± 5	177
SD	± 2232	± 2023	± 1765	± 1683	± 1571		88491
Total	21611	18986	16939	16080	14875		

is noticed in 2005-06 (± 2232) and the lowest in 2001-02 (± 1571) (Figure-7). Where, the production is high the deviation is high and vice versa. Market inconsistency, market demand, market competition and market price are mostly responsible for production variation.

3.5 Marketing Channel in shrimp trading

The trading pattern of shrimps business involves a series of intermediaries between the producers, suppliers, exporters and the consumers (Diagram-1). Generally the supply chain of shrimps is similar at all Upazilas in Khulna district. Farmers directly sell all their from *gher* to the local markets or to the shrimp traders or via foria to the shrimp traders. Shrimps traders collect shrimps from

Figure 6: Upzilla wise production variation in Khulna district in last five years

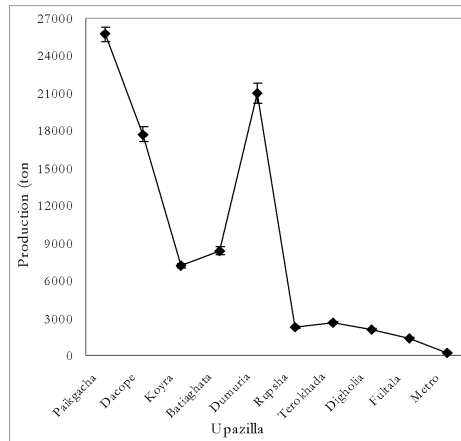
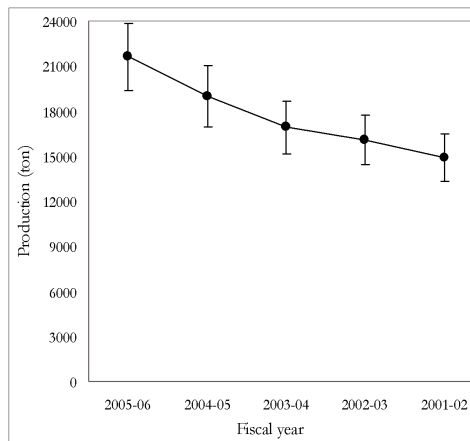


Figure 7: Year wise production variation in Khulna district



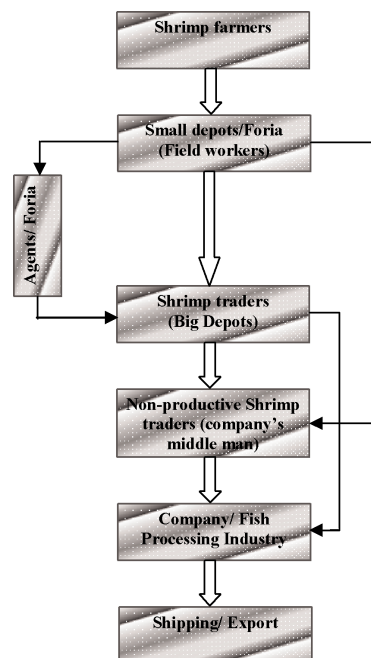
foria or shrimps farmers and supply them to the companies after 1 to 2 days preservation. Some people always work with the traders. Truck, pick-up and microbus are used for shrimp transport from traders to the companies. Bamboo

made containers with polythene cover are used for keeping the shrimps. Some agents work between shrimps traders and companies. Companies are the warehouse factories for processing of shrimps. Finally companies export headless shrimps to the international markets through Mongla/ Chittagong port. A big chunk of the profit goes to middleman or brokers. Brokers act as middlemen between the harvesters and the exporters. The rejected Prawns and shrimps from depots and companies (under grade and broken legs or soft shell or discolored shrimps) are transferred to the local market for domestic consumption at low price.

3.6 Major problems in Production and Marketing

Despite the great economic potential of prawns and shrimps in Bangladesh, the

Diagram 1: The pathway of shrimp distribution channel from harvesting to export



successful commercial shrimp production and marketing is hindered by different problems. The most crucial problems exist in Prawns and shrimps marketing and transportation, which can be categorized in the following way:

- ❖ Poor infrastructure facilities especially transport, ice factory, electricity etc.
- ❖ Lack of proper transportation system of prawns and shrimps from remote area to depot
- ❖ Lack of knowledge of proper marketing system and facilities
- ❖ Robbery/subscribing problems in rural and sub-city area
- ❖ Lack of consciousness/awareness about the right technique of prawns and shrimps culture
- ❖ The socio-economic status of the fishermen is so low that they cannot afford to make any big investment
- ❖ Supply of prawns and shrimps depends on foreign demand
- ❖ Lack of technical knowledge about shrimp grading, icing and processing
- ❖ Natural disaster and diseases are important obstacles for shrimp farming.

3.7 Key factors for sustainable shrimp farming

Although semi-intensive shrimp farming may be less detrimental to the environment than intensive systems of shrimp production, and less wasteful of land area than extensive farming, there are a number of factors on which the long-term sustainability of semi-intensive farming depends. The continuing high resource demands of such systems and their links to ecological degradation must be taken into consideration. The factors that should be considered to develop sustainable shrimp farming are the following:

- ❖ Availability of brood stock and efficient hatchery system to ensure predictable and steady supply of shrimp seed for grow-out operations.
- ❖ Suitable sites with quality water source, efficient drainage system and good infrastructure.
- ❖ Suitable farm design: construction and preparation for optimal water circulation treatment and storage of intake water, reconditioning and disinfecting of pond bottom, etc.
- ❖ Proper water management: pre-intake and discharge treatment, periodic exchange and aeration.
- ❖ Suitable stocking density considering the carrying capacity of the coastal culture environment.
- ❖ Nutrition: development of low-cost balanced feed, feeding management to avoid water pollution by feed waste accumulation.

- ❖ Shrimp health management: so far the best treatment and preventive measure against diseases is to maintain good water and pond bottom conditions.
- ❖ Farmer experience: consider new ideas from farmer's self-observation for development.

4. Conclusion

Bangladesh is a significant exporter of shrimp and well placed to develop and expand export market further. However, shrimp farming is still following traditional methods, except artificial stocking of shrimp post larvae. The country could not do much to increase production level up to expectation for lack of appropriate culture techniques. Most of the shrimp farms are unmanageably large having hardly exceeding 45 cm depth as against the required 1 meter, irregular shapes, uneven bottom, inadequate water supply and drainage system. Almost all fish markets operated by such traders, associations or cooperatives are very ill managed, unhygienic and unscientific. Since shrimp and prawn is a highly valued and highly demanded product in international markets, almost all shrimps are exported. It earns large amount of foreign currency. However, a sound trade infrastructure has not yet been established in Bangladesh. Government should take proper and advanced actions in infrastructure development such as road, transport, ice factory and banking system, and above all quality control must be developed in shrimp farming and marketing the product.

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