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 Khulna district of Bangladesh. Thousands of farmers in this area have converted their paddy fields to shrimp and prawn farms to accommodate 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 turn over 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 total production in shrimp and prawn farming from Khulna region is 21611 ton in this fiscal year 2005-06. And till 2004-05 the total earnings from shrimp export is approximately 400 million US$. Whereas the total farming land for cultured shrimps and prawns is 58472 ha in Khulna area. Last 5 years increasing index of farming made across over 29% from root year. The volume of shrimp export touched approximately 16764 ton from Khulna region in 2005-06. As a result employment being generated day by day and now the statistics is going over about 3.5 lakh directly in farming. Last 5 years increasing index of manpower involvement made across over 80% from root year. The average selling price of prawns from farmers to the shrimp traders are between Tk.122-382 and prawn are between Tk.300-750 per kg depending on grade. The shrimp/prawn is a highly valued product for the international markets and therefore, almost all shrimps/prawns are exported to the international markets. The average price of shrimps and prawns in the international markets varies between US$ 10 and 25 per pound depending on grade.

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 is 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; about 87000 persons are involved

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in shrimp farming and another 5000-6000 in shrimp processing industries (Hussain, 1994). Now this amount reaches in 3.5 lakh in shrimp farming 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 faming 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 125,000ha is used for brackish water shrimp farming and about 15,000 ha for fresh water giant prawn farming (BFRI, 1996). Now this feature 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 last decade and its contribution to foreign earnings has been quite remarkable. Last 2005-06 the total foreign earnings from shrimp export 2100 crore Tk. 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. Though in the last few years horizontally expansion of shrimp cultivation in Bangladesh occurs rapidly, but unfortunately, due to improper management practices appropriate level of production of shrimp was not achieved. Low production rate such as 197.4 to 225.6 kg/ha/season (Hoq et al., 1997) and poor management practice both appears as the major hindrance for compete in the international market and thus depriving the country from adequate foreign exchange earning. 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 and 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 were 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) 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 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. Sample no. 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 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

i) t-test: paired two samples for means

ii) Linear regression analysis

$y = a + bx$ (Hosmand, 1988)

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'

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

Where,

$x = x_i - \overline{x}$, $y = y_i - \overline{y}$, 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 counted in two ways in all Upazilas. Firstly the annual harvest of shrimp counted monthly from Upazila fisheries Office by turn. Secondly the production counted randomly selected depots as per local. The total harvest of shrimp and prawn and observed production in shrimp depots in Khulna district was 21611 and 18620 ton respectively where as the total area of shrimp farming is 58472 hector. The annual total harvest of shrimp was 5873, 4388, 1636, 2145, 5416, 616, 582, 569, 345 and 41 ton 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 ton at Paikgacha, Dacope, Koyra, Batiaghata, Dumuria, Rupsha, Terokhada, Digholia, Fultala, and Metro Upazila in Khulna district respectively. Where as 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) was found in Paikgacha and the minimum was 41 ton and 39 ton in Metro Upazila (Table-1).

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

	Production (ton)		
Upazila	Area (ha)	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

The maximum production variation was estimated in Paikgacha and the minimum was in Metro Upazila in Khulna district that shown in (Fig-1). The production variation changes with the rate of change in increasing production.

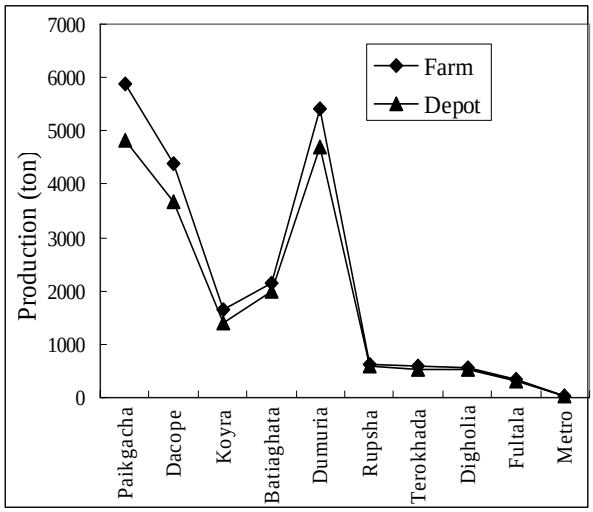

Figure-1: Production variation from Farm to Depots

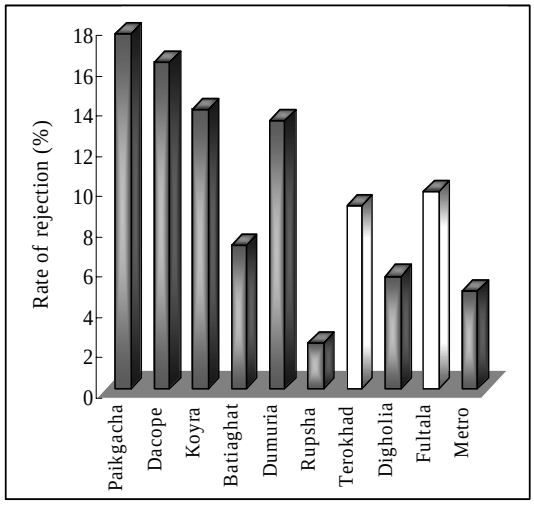

Figure-2: Percentage change of the rejection rate over Production from Farm to Depots

In all level of production there is some loss or gain estimated that may hamper the production frequency. In shrimp production, a major loss is happened from harvesting to depot which affect tremendously on the primary stakeholder. The rate of rejection of shrimp over from 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 (Fig-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 is encouraging the shrimp farming (Table-2).

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

The increasing rate of change of shrimp farming area is chronologically dominating. 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 comparative year 2001-02(Fig-3).

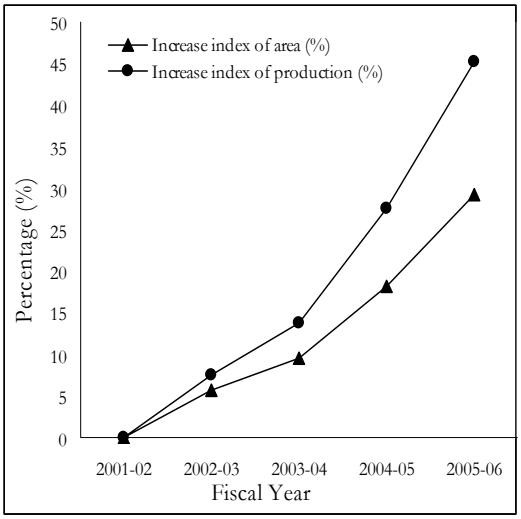

Figure-3: Increasing Index (%) of shrimp farming area and production in Khulna region

3.2. Employment generation and manpower distribution

The initiatives of shrimp farming in gher system enrich manpower involvement. The total manpower involved in shrimp farming 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 (Fig-4).

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

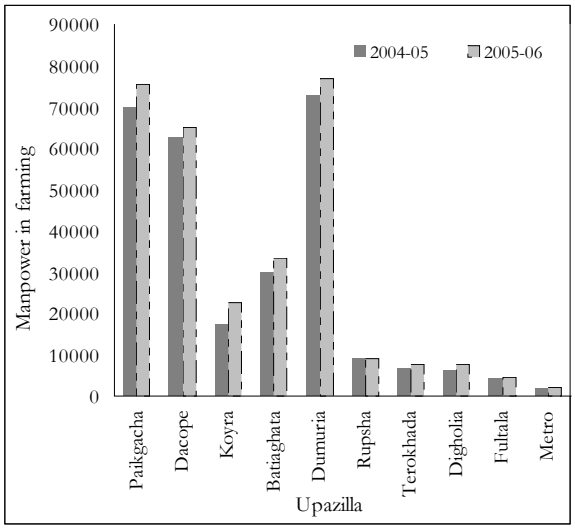

Figure-4: Upazila wise Manpower involvement in shrimp farming around 2004-05 and 2005-06 in Khulna district.

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 year respectively. Earnings of foreign currency are scoping the employment generation in shrimp farming in coastal belt of Bangladesh (Table-4).

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

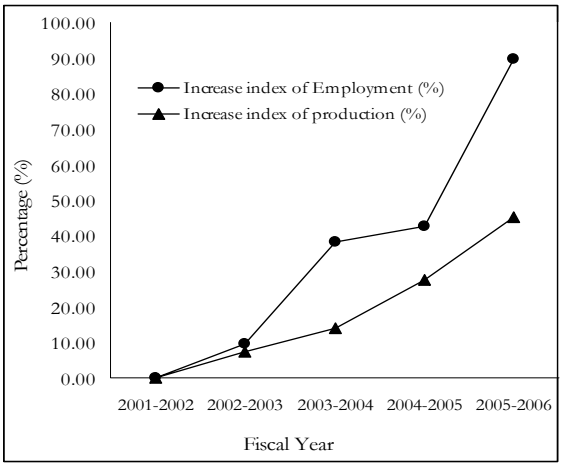

Figure-5: Increasing Index (%) of Employment and shrimp production in Khulna region

The increasing rate of change of employment generation in shrimp farming area is eventually bursting. Increasing index 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 comparative year 2001-02(Fig-5).

3.3. Shrimp production from Khulna region

Total production of shrimp from Upazila level of Khulna district showed a calculative phenomenon as increasing in significant level sequentially year by year. The cumulative production is always showed in higher as 14875, 16080, 16939, 18986 and 21611ton in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 respectively. Of total production Paikgacha significantly raised in higher as 4453, 4790, 4948, 5645and 5873 ton in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 respectively and the lower was to be counted in Metro Upazila as 30, 31, 36, 39 and 41 ton in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 respectively (Table-5).

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

Upazila	Production (ton)						
	2005-06	2004-05	2003-04	2002-03	2001-02	SD	Total
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		

The production trend from 2001-02 to 2005-06 made the highest deviation in Dumuria Upazila (± 778) and the lowest deviation in Metro Upazila (± 5) (Fig-6). The production deviation from different Upazila are ± 1571, ± 1683, ± 1765, ± 2023 and ± 2023 in 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 fiscal year respectively (Table-5)(Fig-7).The maximum deviation noticed in 2005-06 (± 2232) rather than 2001-02 (± 1571) (Fig-7). Where as, the production is high the deviation is high and thus vice versa. Market inconsistence, market demand, market competition and market price are responsible for mostly deviation of production variation.

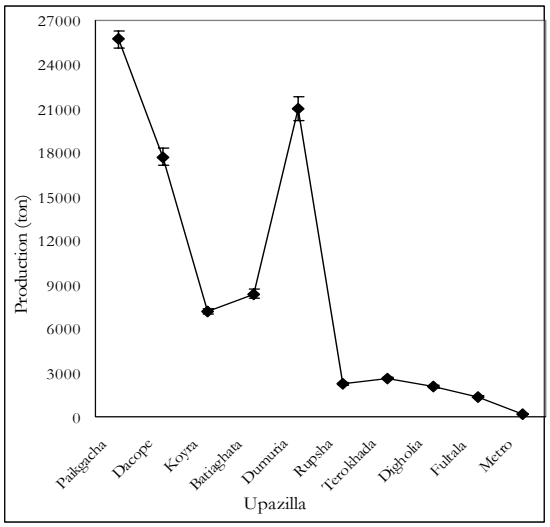

Figure-6: Upzilla wise production variation in Khulna district in last five years

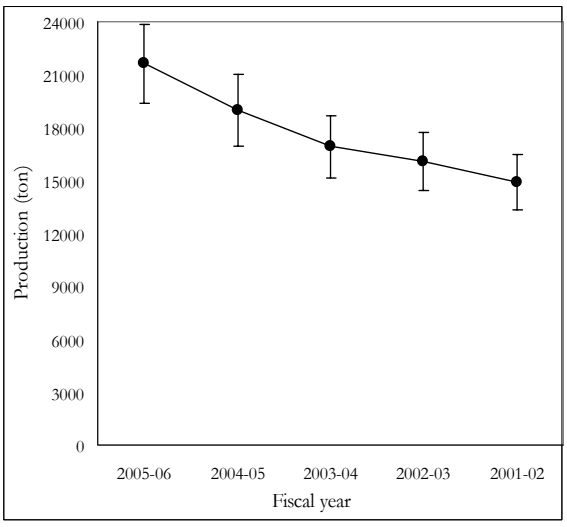

Figure-7: Year wise production variation in Khulna district

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. Generally the present supply chain of shrimps was found to be similar at all Upazilas in Khulna district. Farmers directly sell their all head on shrimps from gher to the local markets or to the shrimp traders or via foria to the shrimp traders. Shrimps traders collect head on shrimps from 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. Broker act as a middleman 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.

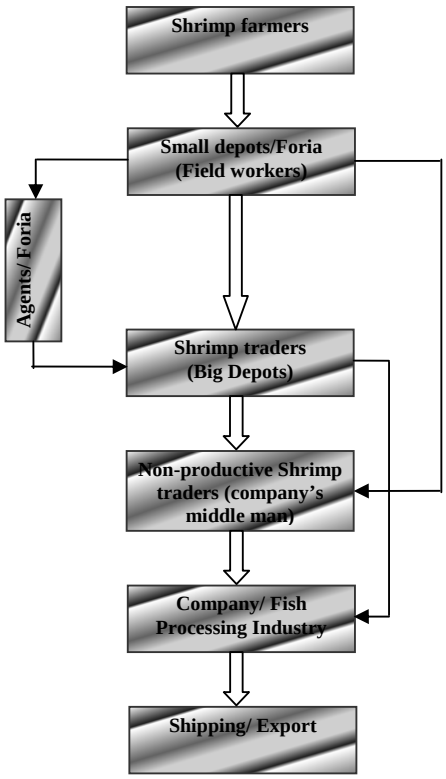

Diagram-1: The pathway of shrimp distribution channel from harvesting to export

3.6. Major problems in the production and Marketing

Despite the great economic potential of prawns and shrimps in Bangladesh, the successful commercial shrimp production and marketing is hindered due to the existing different problems. The most crucial problems exist in Prawns and shrimps marketing and transportation is 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 right technique of Prawns and shrimps culture
- The socio-economic status of the fishermen is so lower that they cannot afford even can't make the bigger 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 the important obstacle for shrimp farming.

3.7. Key factors for sustainable shrimp farming

Although semi-intensive shrimp farming may be less detrimental to the environment then 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 given below:

- 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

Shrimp farming in the country is still following traditional methods, except artificial stocking of shrimp post larvae. We could not do much to increase production level up to expectation for appropriately 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. Although Bangladesh is a significant exporter of shrimp and thus well placed to develop and export market for farmed output. Almost all fish markets operated by such people, associations or cooperatives are very ill managed, unhygienic and unscientific. Since shrimp and prawn is highly valued and demanding product in international markets, almost all shrimps are exported to the international markets. It earns large amount of foreign currency. However, a sound global commodity market 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 quality control must be developed in shrimp farming and marketing areas.

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