An Economic Analysis of Marine Fish Production in Cox’s Bazar District of Bangladesh

K M Mehedi Adnan, Jasim Uddin Ahmed
Sylhet Agricultural University, Sylhet, Bangladesh
Swati Anindita Sarker
Exim Bank Agricultural University, Bangladesh
(Received: 18/11/2015; Accepted: 26/04/2016)

Abstract
This study has investigated the different aspects of marine fishery and examined whether its potential exists for further contribution to the whole fish production of the country. The objectives of the study are estimating the costs and returns of marine fishing under different fishing technologies and to determine the factors that are responsible for variations in catch and income from fishing. Two major production technologies are used in small-scale marine fishing: longline and setbag net fishing. Average per trip gross returns for longline and setbag net were Tk. 280540 and 446990 per boat and their subsequent net returns were Tk. 122550 and 220020 per boat, correspondingly. Therefore, providing higher level of efforts and better management, setbag fishermen earned higher level of income compared to other type of fishing gear. Considering the profitability and other economic aspects, setbag netters were more efficient than fishermen using other type of gear. Some problems and constraints were identified and possible steps have been suggested for the gradual removal of the constraints with the help of government and forming the fishermen co-operatives by fishermen themselves.

Keywords: Marine fish, Long line, Setbag net, fishing gear, Cox’s bazaar
JEL Classification: A23
Paper Classification: Research Paper

Introduction
Marine fisheries play an important function in providing nutrition, creating employment and earning overseas trade of Bangladesh. This country has seashore of 480 km. The area of the continental shelf extends up to 66,400 km2 (BFRI 2007), which is suitable for small-scale fisheries activities in Bangladesh. The fisheries sub-sector accounts for 3.9% of the GDP, 8% of export earnings, 6% of total employment (BBS 2010) and 60% of animal protein (DoF 2012). As a major food item, fish stands next to rice, but the annual per capita consumption is only 18.06 kg or daily...
49.5 grams (FAO 2007). The fish production meets hardly 14.61% of the minimum requirement of animal protein (Nazma, 2009). The production of fish by 2008-09 has been estimated at about 2.7 million tones. (HIES, 2010).

**Objectives of the Study**

An investigation into the production behavior of fishing operation in a common property resource constitutes the broad objective of the present study. The detailed objectives of the study are as follows:

1. to determine the fisheries revenue of small-scale marine fishing under different fishing technology;
2. to examine the sharing arrangement and distribution of marine earning among the crews;
3. to find out the existing problems of marine fishing;
4. to suggest policy implication to improve small-scale marine fishing.

**Review of Literature**

A few numbers of studies have been undertaken on different economic aspects of marine fishing in Bangladesh, which are as follows:

Rashed (2012) presented a study on effects of setbag net (SBN) fisheries on the shallow coastal ecosystem of the Bay of Bengal. The coastal ecosystem of the Bay of Bengal (BOB) is described using a mass-balance model of trophic interactions to understand the effects of Set Bag Net on the ecosystem. The BOB model had 14 functional ecological groups; 13 living and one dead (detritus). The result showed that the fishery was heavily exploited and operated at a mean trophic level of 2.45. Continuously increasing fishing effort using SBN will lead to a rapid decline of most of the commercial marine resources and predicted to have a serious effect on the ecosystem functioning of BOB. Erisman (2011) conducted a study on spatial structure of commercial marine fisheries in Northwest Mexico and multivariate analyses revealed a clear spatial pattern in fishing activities, in which there was a positive linear relationship between the species composition of fisheries offices and both latitude and longitude. Rezaul (2010) studied on sustainability views of adaptation measures to the potential impacts due to climate change in the coastal zone of Bangladesh. The study was conducted as a case study in nine coastal agro-ecological zones of Bangladesh. This study revealed that several adaptation measures show high sustainability, some medium but most of them with a low sustainability in terms of effectiveness, efficiency and implementation ability. Nazma and Islam (2009) conducted a study which was designed to determine cost/return structures and economic efficiency of small scale marine fishing of the selected gears in Bangladesh. The findings of the study revealed that the selected fishing gears were highly profitable. It is concluded that set bag net fishing was more profitable compared to the other two gears.

World Fish center (2008) small scale capture fisheries, a global overview with emphasis on developing countries. They found that there exist a large diversity in fisheries and fishery systems in the world, there appears to be sufficient common features to allow for the use of small-scaled, due to their informal and dispersed characteristics, catches of and employment in inland fisheries tend to be greatly underreported. Chowdhury (2008) made an endeavor to bring forward a concise, factual description of the salient features of the present status of artisanal fisheries resources and its management for sustainable development of fishing communities in Teknaf coast, Cox’s Bazar, Bangladesh. Community based fisheries co-management program should
initiate immediately for the fisherman community of Naaf river estuary of Teknaf coastal region. This will go a long way to help sustain the coastal fisheries resources with active participation of the fishermen.

Research Gap

Although marine fishing has a bright prospect, few researchers works on economics in marine fishing have so far been done in Bangladesh. Therefore, the result of the study may be helpful to the fishermen, farm management and/or production economics specialists, policy makers, extension workers and other relevant officials of fisheries department to know the profitability as well as the major problems associated with marine fishing. This study may also provide information to the researchers for further studies of this nature.

Justification of the Study

Marine fish should be encouraged to convene the increasing demand for fish. In this regard, marine fish production can be increased by making best utilization of the existing marine resources through modern and scientific method of fish culture. In Bangladesh, mostly mechanized boat is used for small-scale marine fishing. The present study was designed to know the general features and characteristics of fishing boats and gears, cost and profit, problem associated with marine fishing and product marketing. In addition, results of production function analysis can indicate which inputs provide relatively higher returns to aggregate output and also the investigation into the share system is expected to provide information as to its variability across gear types. The variation in income among boat owner and crewmen will provide information on sharing arrangement of marine income in small-scale marine fishing.

Methodology of the Study

Type of Study

The main theme of the study lies on cost benefit analysis; therefore it is an analytical study.

Selection of the Study Area

Keeping in view the objectives of the present study, Cox’s Bazar district was purposively selected for this study. Before selecting the study area, the authors made a few visits to get acquainted with the characteristics of the fishermen and specially practices involved in small-scale marine fishing.

Fishing Gears and Sampling

For small-scale marine fishing generally, three types of gears or production technologies are used; gillnet, longline and setbag nets. For this study, two types of gear were selected randomly: 30 from longline and 45 from setbag net. There were five categories of fishermen. In data collection, long line fishing gear Head majhi, Asst. Head Majhi, Driver, Cook, Other crew were selected respectively 10, 8, 3, 3, 6 in number and setbag net it was 15, 10, 5, 5 and 10.

Preparation of Interview Schedule

Before preparing the final schedule, a draft schedule was developed by keeping in view the objectives of the study. The draft schedule was pretested in the study area by interviewing a few
fishermen by the researcher himself and then the final survey schedule was developed in logical sequence so that the fishermen could answer chronologically. The schedule included questions on the general characteristics of methods of marine fishing, general information of the fishing craft and gear, uses of human labour, cost of machinery and equipment, cost of fuel, lubricant, ice and salt, catch data and value of fish, the share system of distributing fishing income and other relevant aspect of marine fishing. After making necessary correction, modification and adjustment, a final survey schedule was developed.

Data Collection & Analysis of Data

For this study, data and information were collected from head majhi, assistant head majhi, driver, cook and other crew. The information was collected by random sampling through direct interview which was conducted by researcher himself. Several visits were made to this landing centre to collect correct and accurate information related to objectives of the study. After each visit, the collected information was checked for accuracy and clarity. In the present study, both the tabular and statistical techniques were used to know the effect of using inputs and other related factors of marine fishing.

Variables Used

There are nine independent variables for the study: Trip duration, Fuel cost, (Tk. /boat); Lubricant cost, (Tk. /boat); Ice cost, (Tk. /boat); Crew cost, (Tk. /boat); Depreciation cost, (Tk. /boat); Food cost incurred for crew (fishermen), (Tk. /boat); Bait cost incurred for longline fishing, (Tk. /boat) and Maintenance and Miscellaneous, (Tk. /boat) for finding one dependent variable fish catch revenue.

Hypothesis

Marine fish catch revenue will have no impact on different independent variables.

Research Model and Statistical Tools

In the present study, both the tabular and statistical techniques were used to know the effect of using inputs and other related factors of marine fishing. Multiple regression models were used to determine factors intensity and economic efficiency of marine fishing by different gears and to assess the contribution of variable factors involved in marine fishing. The general form of the marine fishery of production function described by Panayotou (1987), as a function of effort (X), which is a composite index of fishing inputs:

\[ Y = f(X) \]  \hspace{1cm} (1)

Effort itself can be disaggregated into the factors of production used to produce the catch that is labour, capital and time spent for fishing or more specially boat, gear, fuel, labour, and management ability. The boat may be represented by its tonnage capacity or the horsepower of its engine, gear by the length or mesh size; fuel by the corresponding expenditure; labour may be measured in terms of man-hours of fishing time; and management ability represented by the age and experience of the head crew.

Then equation (1) may be rewritten as:

\[ Y = f(X_1, X_2, X_3, \ldots, X_9) + U \]  \hspace{1cm} (2)
Where, $Y$ is an index of catch constructed by adding the quantities of individual species caught weighted by their relevant per unit prices (differential monopsony is assumed away); and $X_1, X_2, X_3, \ldots \ldots \ldots \ldots X_9$ stand, respectively for the trip duration, fuel cost, lubricant cost, ice cost, crew cost, depreciation cost, food cost incurred for crew, bait cost incurred for longline fishing and maintenance & miscellaneous cost. For econometric estimation with empirical data, equation (2) was given a log linear form, the estimated equation is:

$$\ln Y = \ln \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + \beta_8 \ln X_8 + \beta_9 \ln X_9 + V_i - U_i$$

Where,

- $Y =$ Fish catch revenue, (Tk. /boat);
- $X_1 =$ Trip duration
- $X_2 =$ Fuel cost, (Tk. /boat);
- $X_3 =$ Lubricant cost, (Tk. /boat);
- $X_4 =$ Ice cost, (Tk. /boat);
- $X_5 =$ Crew cost, (Tk. /boat);
- $X_6 =$ Depreciation cost, (Tk. /boat);
- $X_7 =$ Food cost incurred for crew (fishermen), (Tk. /boat);
- $X_8 =$ Bait cost incurred for longline fishing, (Tk. /boat);
- $X_9 =$ Maintenance and Miscellaneous, (Tk. /boat);
- $\beta_1 - \beta_9 =$ parameters; and
- $U_i =$ disturbance term.

### Factor Cost and Profitability of Small-Scale Marine Fishing

#### Total Cost

The average total cost amounted Tk. 157997 per trip per boat under longline and Tk. 226972 per trip per boat under setbag net fishing. (Table 1)

<table>
<thead>
<tr>
<th>Item wise cost</th>
<th>Average per boat</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per trip (setbag net)</td>
<td>Per trip (longline)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Value (Tk.)</td>
<td>% of total</td>
<td>Value (Tk.)</td>
</tr>
<tr>
<td>Fuel (liter)</td>
<td>59445.7</td>
<td>26.19</td>
<td>43439.67</td>
</tr>
<tr>
<td>Lubricant (liter)</td>
<td>3181.1</td>
<td>1.41</td>
<td>2721.67</td>
</tr>
<tr>
<td>Ice (No. of price)</td>
<td>14570</td>
<td>6.42</td>
<td>5111.33</td>
</tr>
<tr>
<td>Crew cost</td>
<td>133697</td>
<td>58.90</td>
<td>77770.23</td>
</tr>
<tr>
<td>Maintenance and miscellaneous</td>
<td>4842.4</td>
<td>2.14</td>
<td>2996</td>
</tr>
</tbody>
</table>

(Continued)
Food  |  5870  |  2.58  |  4060  |  2.57  
Depreciation  |  5365.6  |  2.36  |  4725  |  2.99  
Bait  |  17173  |  10.87  
Total Cost (per trip)  |  226971.8  |  100.00  |  157996.9  |  100.00  

**Gross Income/Gross Revenue**

The annual revenue is the monetary value the fishermen derive from their catch, most of which is sold, although a small amount are consumed by them at fishing and non-fishing time. Total return consisting of revenue from fishing was calculated by multiplying the total catch by their respective prices. The average annual gross returns from longline and setbag net fishing were found to be Tk. 280540 and 446990 respectively. (Table 2)

<table>
<thead>
<tr>
<th></th>
<th>Cost and rate of Return (Tk. `000)/trip</th>
<th>Setbag net</th>
<th>Longline net</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross return</td>
<td>446.99</td>
<td>280.54</td>
<td></td>
</tr>
<tr>
<td>Total cost</td>
<td>226.97</td>
<td>157.99</td>
<td></td>
</tr>
<tr>
<td>Net profit</td>
<td>220.02</td>
<td>122.55</td>
<td></td>
</tr>
<tr>
<td>Rate of return on operating Investment (RROI)</td>
<td>2.01</td>
<td>1.74</td>
<td></td>
</tr>
<tr>
<td>Rate of return on capital investment (RRCI)</td>
<td>83.30</td>
<td>59.37</td>
<td></td>
</tr>
<tr>
<td>Benefit cost ratio (BCR)</td>
<td>1.97</td>
<td>1.77</td>
<td></td>
</tr>
</tbody>
</table>

Note:

\[
RROI = \frac{\text{Gross revenue}}{\text{Operating capital}} \\
RRCI = \frac{\text{Gross revenue}}{\text{Depreciation}}
\]

Operating capital = Total cost - Depreciation

**Net Profit**

Net profit was calculated by deducting all costs from total returns and it was positive for all tonnage categories. (Table 2)

**Production Function Analysis**

**Interpretation of the Results**

Many factors might affect fish catch revenue of fishermen but it is quite difficult to include all variables in an analysis because of the multicollinearity or other logical aspects. So, important variables were included to keep the model as simple as possible. Seven individual variables were taken into consideration for production function analysis of longline and setbag. The most important independent impact of the variables on gross income for producing longline and setbag are interpreted below:

**Fuel cost (X2).** The co-efficient of fuel costs were positive both for longline and setbag and noteworthy at 5 and 1 percent level respectively, which indicates that holding other factors constant one percent increase in fuel cost per trip would increase the fish catch revenue by 0.348 percent and 0.425 percent for longline and setbag respectively. (Table 3)
Table 3: Estimated values of co-efficient and related statistics of Panayotou production functional model for longline and setbag fishing gear

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Longline</th>
<th>Setbag</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>12.47</td>
<td>10.49</td>
</tr>
<tr>
<td>Trip duration (X1)</td>
<td>0.146</td>
<td>0.145</td>
</tr>
<tr>
<td></td>
<td>(0.081)</td>
<td>(0.271)</td>
</tr>
<tr>
<td>Fuel cost (X2)</td>
<td>0.348**</td>
<td>0.425***</td>
</tr>
<tr>
<td></td>
<td>(0.154)</td>
<td>(0.162)</td>
</tr>
<tr>
<td>Lubricant cost (X3)</td>
<td>0.102</td>
<td>0.142</td>
</tr>
<tr>
<td></td>
<td>(0.27)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>Ice cost (X4)</td>
<td>0.120</td>
<td>0.137</td>
</tr>
<tr>
<td></td>
<td>(0.156)</td>
<td>(0.092)</td>
</tr>
<tr>
<td>Crew cost (X5)</td>
<td>0.524**</td>
<td>0.592**</td>
</tr>
<tr>
<td></td>
<td>(0.214)</td>
<td>(0.23)</td>
</tr>
<tr>
<td>Food cost (X6)</td>
<td>-0.091</td>
<td>-0.114</td>
</tr>
<tr>
<td></td>
<td>(0.069)</td>
<td>(0.076)</td>
</tr>
<tr>
<td>Bait cost (X7)</td>
<td>0.120***</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.042)</td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>0.70</td>
<td>0.65</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.69</td>
<td>0.63</td>
</tr>
<tr>
<td>F-value</td>
<td>6.48</td>
<td>5.98</td>
</tr>
<tr>
<td>Returns to scale (Sbi)</td>
<td>1.149</td>
<td>1.327</td>
</tr>
</tbody>
</table>

*** Significant at 1 percent level  
** Significant at 5 percent level  
* Significant at 10 percent level  

Note: Figures in the parentheses indicate standard error.

Crew cost (X5). The value of estimated coefficient of crew cost for longline 0.524, positive and statistically significant at 5 percent level indicating that keeping other same, 1 percent increase in the cost of crew would increase the fish catch revenue by 0.524 percent. For Setbag, the value of estimated coefficient of crew cost for setbag 0.592, positive and statistically significant at 5 percent level indicating that keeping other same, 1 percent increase in the cost of crew would increase the fish catch revenue by 0.592 percent. (Table 3)

Bait cost (X8): The value of estimated coefficient of bait cost for longline was 0.120, which was positive and statistically significant at 1 percent level indicating that keeping other variables same, 1 percent increase in the cost of bait would increase the fish catch revenue by 0.120 percent (Table 3).

R² and Adjusted R²  
The coefficient of multiple determinations R2 of the model was 0.70 and 0.65 for longline and setbag net fishing respectively. It indicates that about 70 and 65 percent of variations in fish catch revenue have been explained by the explanatory variables, which were used in longline and setbag net fishing respectively. The value of adjusted R2 was 0.69 and 0.63 for longline
and setbag net fishing, respectively. That indicating after taking into account the degree of freedom (df), about 69 and 63 percent of the variation in the dependent variable explained by the explanatory variables included in the model, which were used in longline and setbag net fishing respectively (Table 3).

**F-value**

The measure of the overall fit of the estimated regression, F-value of the equation derived longline and setbag net fishing, 6.48 and 5.98 which were highly significant at 1 percent level, implying that the variables significantly explained the variation in returns of longline and setbag net production (Table 3).

**Returns to Scale (\(\sum bi\))**

The summations of all the production function co-efficient of the equation for longline and setbag net production were 1.149 and 1.327, respectively. This indicated that the production function exhibited increasing return to scale for both longline and setbag fishing. That is, the fishermen were operating their longline and setbag fishing in the first stage of production function. In this case, if all the variables specified in the production function were increased by 1 percent, fish catch revenue would increase by 1.149 and 1.327 percent for longline and setbag production, respectively (Table 3).

**Result and Discussion of Hypothesis**

It is found that the null hypothesis is rejected. The independent variables will have effect on dependent variable.

**Sharing System and Distribution of Earning from Small-Scale Marine Fishing**

As is stated earlier there are two parties involved in fishing venture-one is the supplier of capital, the owner and the other one is the supplier of labour, the crewmen. In Bangladesh, the majority of boats are run by non-sea going owners. To run the fishing operations they usually employ a skipper and crewmen. For different size of setbag net boats and long line, the number of crewmen required ranges from 12 to 18 and 6 to 16 respectively.

**Share System and Distribution of Income from Longline Fishing**

The gross/net profit (net earnings) is divided between the supplier of capital and labour. Owner’s share varies with the capacity of engine. Owners get 5, 8 and 10 shares from boats having 22 horse power (H.P), 45 HP and 65 HP engines respectively. Longline unit consists of 12 crews on an average. Of the 21 shares of catch/revenue, 4 each are meant for the services of boat and net (33 HP). The rest 13 are distributed among the crew on the basis of pre-determined principle. Team of crew of a typical longline unit consists of head majhi, asst. head majhi, driver, cook and other crews. Assuming a crew sizes twelve (12), the sharing of income stands as follows (Figure. 1).
Figure 1. Share distribution of longline fishing gear

The head majhi get 3 shares, Assistant head majhi get 2 shares, driver get 1.5 shares and while all others receive 1 share each. The income derived from the above principles is presented in Table 4. The Head majhi received Tk 278000, Assistant head majhi received Tk 185330, Driver receives Tk 139000 and whiles all other ordinary crew got Tk. 92670 each per year (average).

Table 4 : Income distribution from longline fishing

<table>
<thead>
<tr>
<th>Boat HP</th>
<th>Head majhi</th>
<th>Asst. head majhi</th>
<th>Driver</th>
<th>Cook</th>
<th>Other crew</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>255</td>
<td>170</td>
<td>127.5</td>
<td>85</td>
<td>85</td>
</tr>
<tr>
<td>45</td>
<td>285</td>
<td>190</td>
<td>142.5</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>65</td>
<td>294</td>
<td>196</td>
<td>147</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>Average</td>
<td>278</td>
<td>185.33</td>
<td>139</td>
<td>92.67</td>
<td>92.67</td>
</tr>
</tbody>
</table>

Share System and Distribution of Income from Setbag Net Fishing

Kashem and Iqbal (1985) mentioned that there exist basically two systems of remuneration for setbag net fishermen, such as share basis and fixed salary basis. These systems and the rates vary usually between different coastal districts and also within the district based on season.

The setbag netters of the present study the remuneration system is completely different. During the peak season, the fishermen are hired by the boat owners on wage contract basis. Different categories of crew are given varying level of wage far 8 month period (i.e from mid-June to mid-February). The wage level for each category of crew varies with skill, net size and location. Table 5 presents the prevalent wage system of Moheshkhali area.

Table 5: Income distribution from setbag net fishing

<table>
<thead>
<tr>
<th>Boat HP</th>
<th>Head majhi</th>
<th>Asst. head majhi</th>
<th>Driver</th>
<th>Cook</th>
<th>Other crew</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>280</td>
<td>220</td>
<td>170</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>65</td>
<td>310</td>
<td>250</td>
<td>190</td>
<td>130</td>
<td>130</td>
</tr>
<tr>
<td>74 and above</td>
<td>350</td>
<td>280</td>
<td>210</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Average</td>
<td>313.33</td>
<td>250</td>
<td>190</td>
<td>126.67</td>
<td>126.67</td>
</tr>
</tbody>
</table>
A typical setbag net unit consists of head majhi, assistant majhi, engine driver and a set of crew members. The average crew member of setbag net unit is 11. The head fisherman gets a fixed average wage of Tk 313330 for 8 months fishing. The majhi, on the contrary, is paid Tk 250000 per fishing season. The engine driver and crew member received Tk 190000 and 126670, respectively per fishing season.

During the lean season, i.e. mid-February to mid-June, the fishermen operate fishing gear near the coast. They hire boat and net from the owners at a fixed rate (i.e. 50:50). The net value of catch is shared by the head majhi and gets 1.5 shares and all other receive 1 share each.

Common Sharing Principle for all Gears

Normally, a fishing boat consists of a boat owner, head majhi, assistant head majhi, driver, cook and 8 to 12 other crew. Among the various sharing system, one sharing system is widely used in marine fishing in Cox’s Bazar district. According to these sharing arrangement, firstly deducted the variable costs (fuel, oil, ice and food cost), then the fish revenue is divided into 16 shares. The net and boat owner receives 10 shares among the total 16 shares. Other 6 shares are distributed among the fishermen. These 6 shares are now divided into the total fishermen number. Then, the head majhi receives 3 shares, assistant head majhi receives 2 shares, driver receives 1.5 shares and other fishermen receive 1 share each. (Figure. 2)

Conclusions and Policy Recommendations

Fishing firms of the two types of gear under study still earn positive net profit. It has been observed from the study that the production of marine fish can be increased by developing and improving the fishing crafts and gears. In this regard, some problems and constraints which are identified in marine fishing should be removed or minimized. On the basis of the results, the following policy recommendation can be made for marine fishing.

For large scale fishing, more trawlers should be introduced to increase the judicial catch. Financial institutions should provide enough support to build mechanized and non-mechanized boat and to buy accessories. Sharing of catch revenue between fishermen and boat owner should be made rational and equitable. Institutional credit should be made available to the fishermen to meet their fishing requirements. Government should create facilities so that the fishermen can buy adequate instruments at fair prices, market their fishes at reasonable prices and obtain adequate credit at low interest rates. At the same time, government machinery should come forward to stop
the robbery during marine fishing. The government and concerned authority should take proper steps to develop the small scale marine fishing as well as fisheries sub-sector in Bangladesh.

Limitations of the Study

The limitations of the study are discussed below:

i. Most of the farmers did not keep any written documents of their farm business activities. As a result, researcher had to rely fully on the memory and sincerity of the farmers for the accuracy and reliability of data. So possibility of errors could not fully be ruled out.

ii. The study was conducted in limited areas taking into account very limited number of sample due to limitation of time and resources. Therefore, the findings of this study should be interpreted cautiously to generalize for the country as a whole.

iii. The farm specific technical efficiency were based on a single time period when it fact, resource allocation decisions are often long-term and based on projection and expectations over more than one time periods. Single period estimates of technical efficiency may also be of limited value since events in the sampled year may be year-specific and may also affect some farmers but not others. However, the necessary panel data is rarely available in developing countries to allow estimation of technical efficiency in this dynamic sense. Therefore, there had no option but to use cross sectional data in estimating technical efficiency.

Despite a few limitations, the findings of the present study may provide some valuable information to the marine fishermen, decision makers, extension workers and researchers.

Scope for Further Study

Although the present study provides some useful information for farmers, researchers and policy makers, it is not free from criticisms. Besides there was many things to include in this research work but for time shortage researcher avoid them. The weaknesses of the present study, of course, open up scopes for further research which are listed below:

i. Strengthened efforts and research should be conducted to raise profitability and efficiency in marine production.

ii. The study of other gear such as gillnet fishing may be considered to assess their profitability.

iii. Sharing arrangement, credit facility and export of marine fisheries can also be studied with respect to Bangladesh situation as a whole.

References


Authors’ Profile

**K M Mehedi Adnan** is an Assistant Professor of Agricultural Finance and Banking Department at the Faculty of Agricultural Economics and Business Studies, Sylhet Agricultural University, Bangladesh. He has authored and co-authored more than 10 national and international publications and a book published by Lambert Academic Publishing, Germany. He has presented his research achievements in many national and international scientific conferences.

**Swati Anindita Sarker** is a Lecturer of Agricultural Economics Department at the Faculty of Agricultural Economics and Rural Development, EXIM Bank Agricultural University, Bangladesh. She has authored and co-authored more than 7 national and international publications. She has presented her research achievements in many national and international scientific conferences. She holds a number of professional and affiliate memberships in home and abroad.

**Jasim Uddin Ahmed** is an Associate Professor of Agricultural Economics and Policy at the Faculty of Agricultural Economics and Business Studies, Sylhet Agricultural University, Bangladesh. He received PhD in 2016 from the Faculty of Agricultural Economics and Rural Sociology, Bangladesh Agricultural University, Bangladesh. His doctoral research was focused on ‘Poor farmers’ access to milk market for sustainable dairy farming in char areas of northern Bangladesh.’ Dr. Ahmed authored and co-authored more than 30 peer-reviewed publications. He presented his research achievements in many national and international scientific conferences. Dr. Ahmed holds a number of professional and affiliate memberships in home and abroad.