Economic and Social Benefits of Growing Peanut Instead of Boro Rice in a Sweet Water Scarce Area of Coastal Bangladesh

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Abstract
This study assessed the relative profitability and social impact of peanut cultivation over Boro rice production in a polder of coastal Bangladesh where there is a scarcity of sweet water for crop cultivation in the Rabi season. Sixty samples from a village namely Sekendarkhali of Amtali Upazila under Barguna district were randomly selected for the study. Data were collected through face-to-face interviews, focus group discussion, and key informant interviews, and different quantitative and qualitative methods were used to explain the data. Cost and return analysis was performed to assess the relative profitability of the two crops. Major findings of the study show that per hectare total costs, gross return, gross margin, and net returns for peanut and Boro production were Tk. 116170 and Tk. 91632; Tk. 132648 and Tk. 52419; Tk. 28540 and Tk. 27628; and Tk. 16478 and Tk. 39203, respectively, which indicate that peanut was more profitable than Boro rice. Moreover, benefit-cost ratios (BCR) of peanut and Boro rice production were found 1.14 and 0.57, respectively indicating peanut production is profitable for farmers in the study area but not the Boro rice production. It was also found that peanut cultivation has some positive social impacts. Adoption of peanut cultivation as a Rabi crop increases the cropping intensity of the study area, creates employment opportunities for both men and women, helps to ensure better nutritional status and better health of the farmers, helps the farmers to stay in the village and to build a better social relationship, increases the income of the farmers, and ensures a better standard of living. The study also identified some problems and constraints faced by the peanut growing farmers and suggested some recommendations to improve the present production of peanuts so that adoption and per hectare yield of peanut would possibly be increased.

Keywords: Profitability, Social Impact, Water Scarcity, Peanut, Boro.
1. Introduction

Agriculture is the mainstay of the economy of Bangladesh. Economic development is inextricably linked with the performance of this sector. It is one of the important livelihood options for the coastal people of Bangladesh. About 40 million people in the coastal areas of Bangladesh depend on agriculture (BBS, 2019). It has been identified as being of prime importance for achieving development goals in coastal areas. However, agriculture in coastal areas of Bangladesh is quite different from the other parts of the country. Along with disasters, the agriculture practices of these areas are always under threat. Due to the effects of frequent cyclones and storm surges, and poor management, coastal areas have become waterlogged and saline (Ali, 2018). Like many coastal villages in Bangladesh, Sekendarkhali village of Amtali Upazila under Barguna district is highly affected by salinity throughout the year except in the monsoon season when rainfall reduces the soil salinity. Farmers take lease as much land as possible during the Aman season (July to November) to increase crop production and to meet their family’s consumption demand (Afroz, 2017). Most of the land remains fallow for the rest of the year. In the past, some of the farmers tried to cultivate winter crops in the dry season but failed to get a good harvest due to a lack of freshwater. With limited crop production, unemployment reportedly increases; many men must seasonally migrate to different districts of Bangladesh to get work as day laborers. Their families also face critical food insecurity (SIAGI, 2018).

Bangladesh Water Development Board (BWDB) built 139 polders in the coastal area of Bangladesh in the early sixties and seventies to protect the low lying area from salinity intrusion and flooding for growing more food. Polders in southern Bangladesh contain many canals that connect the fields to the rivers. Water entry to the polder to irrigate and exit of floodwater to drain the polder is managed through sluice gates located in the dykes surrounding the polders. Such canals are also a feature of Sekendarkhali village. However, many years of mismanagement and lack of maintenance have led to siltation and a loss of canal function. Yet, these canals could also be storing water for irrigation in the Rabi season. Villagers report that now fields in Sekendarkhali remain fallow in Rabi and Kharif-1 seasons because of loss of the canal to act as a freshwater reservoir, lack of unity, and misconceptions among the local community (Singha, 2017). In order to address the problem of freshwater, the villagers took a collective action approach. With initial support by Shushilan (a local NGO) through the SIAGI (Promoting Socially Inclusive and Sustainable Agricultural Intensification in West Bengal and Bangladesh) project, they formed a Water and Silt Management Committee (WSMC) to build trust and harmony amongst each other. This committee advocated and negotiated with local government institutions, government officials, and the wider village community to help the re-excavation activities of the canal known as the Hafamari canal (SIAGI, 2018). After the re-excavation, it is now serving all of its functions. The farmers are now able to grow different types of crops and vegetables in the Rabi season using water from the canal. They are mostly interested in growing Boro rice, peanut, potato, sweet potato, wheat, pumpkin, etc. as Rabi crops. As a result, the cropping intensity of that particular area has been increased. But the availability of freshwater is not enough for cultivating Boro rice by all the WSMC members because Boro needs huge and rapid irrigation. Boro rice cultivation needs a huge amount of hired labor which is too costly as well in the southern coastal zone of Bangladesh. Because of these reasons, farmers are losing interest in Boro rice cultivation and searching for alternative crops which can be cultivated with fewer amounts of freshwater and less number of hired labor. Therefore, they have decided to grow various crops and vegetables instead of Boro rice. Peanut is one of the most suitable crops in this situation. With a limited amount of freshwater, a large number of farmers can grow peanut in comparison to Boro rice cultivation. Accordingly, most of them choose peanut because peanut production needs less irrigation than rice.
production. On the other hand, peanut cultivation also needs less physical effort and can be grown on a small scale without using any hired labor. Nutrition is not only the criterion on which peanut can be selected for cultivation. Other criteria such as profitability and adaptability are also to be considered as the reasons for cultivation by the farmers. Peanut is believed to be the crop that requires less irrigation, low production cost, generates employment for the family members of the farmers, and nutritionally superior to other cereal and non-cereal crops.

Though studies have been conducted to assess the comparative economic advantage of various crops, there is a rare instance of studies on the comparative assessment of economic profitability and social benefit of peanut production over Boro rice. Therefore, a comparative socioeconomic analysis is needed to determine the advantage of peanut production over Boro rice. Owing to this necessity, the overall objective of this study is to find out the economic as well as social benefits of the production of peanut instead of Boro rice in the study area. The specific objectives are: (i) to examine the comparative profitability of peanut and Boro rice production, (ii) to explore the social benefits of growing peanut, and (iii) to identify the problems of growing peanut in the study area. The present study will provide some valuable information regarding the relative costs and returns of production of peanut and Boro rice along with social benefits which hopefully will provide useful information to the researchers, extension workers, and policymakers to take necessary actions in popularizing various Rabi crops including peanut in the southern coastal belt of Bangladesh.

2. Literature review

2.1 Boro rice and peanut production

Nahar (2014) studied the comparative profitability of BRRI Dhan 29 and Anamika rice in some selected areas of the Mymensingh district. The findings showed that the cultivation of BRRI Dhan 29 and Anamika rice was profitable from the viewpoint of farmers. The net return from BRRI Dhan 29 and Anamika rice was Tk. 24,117 and Tk. 142,403, respectively. The Benefit-Cost Ratio (BCR) was 1.41 and 2.18, respectively for BRRI Dhan 29 and Anamika rice which indicates that Anamika rice was more profitable than BRRI Dhan. Yeasmin (2015) evaluated the viability of small farmers in Boro rice production in some selected areas in Bangladesh. She collected data from secondary sources based on household-level panel data collected by ICRISAT under the VDSA project. The Net return of small farmer was found 31324 Tk./ha, 29979 Tk./ha, 25719 Tk./ha, and 21777 Tk./ha for the year 2009, 2010, 2011, and 2012, respectively which shows that the profitability of small farmers was decreasing from 2009 to 2012. Basak (2011) studied the impact of increasing production costs of Boro paddy on price and its implications for food security. This study found that farmers earn a very negligible amount from their land compared to the investment they made in land, fertilizers, labor, etc. The study estimated that for producing each kilogram of Boro paddy Tk. 13.57 was required while Tk. 13.23 was required for Aman paddy production. He suggested that the government must reduce the price of agricultural inputs such as fertilizer, diesel, machinery, seeds, etc. Moreover, special incentive programs can be taken. Hasnain et al. (2015) studied the technical efficiency of Boro rice production in the Meherpur district in Bangladesh using a stochastic frontier approach. This study found that the average technical efficiency of Boro rice farms in the study area was 89.5 percent. Given the available technology, farmers could increase their production by 10.5 percent. Ferdous and Jahan (2018) examined the changes in the factor share of the production cost of HYV Boro rice over time. For computing the factor share of different cost components in total cost, three sub-periods were considered: Period I (1979-1990), Period II (1991-2003), and Period III (2004-2013). From the results, it was observed that the share of labor cost in total cost has increased significantly over time while the share of animal labor/power tiller cost has decreased over time. Share of seed cost and pesticide cost was not significant as compared to the other cost
items. Human labor cost occupied the major portion of total cost followed by power tiller and irrigation cost. The growth rates of different cost components have been calculated using the linear growth model as it was fitted well to the data. All the growth rates have shown positive signs; indicate that costs for all inputs have increased over time.

Ramakrishna et al. (2004) carried out a study during the rainy seasons of 2002 and 2003 in the drought-prone districts of Andhra Pradesh, India, to demonstrate the beneficial effects of improved groundnut production technologies. Improved production technologies gave higher yield, 1.14 tons/ha, and 1.02 tons/ha in 2002 and 2003, respectively compared to farmers’ practice.

Isik and Gul (2004) estimated peanut production cost and return in Adana, Osmaniye, and Icel provinces of Turkey. They found that the average gross value of groundnut production was $1255 per hectare and the production cost was $930 per hectare. Around 75% of the production cost was variable cost and 25% was fixed cost. The production cost for 1 kg groundnut was $0.85. The average net profit of groundnut production for the farmers was $325 per hectare.

Ngulube et al. (2001) carried out a study to estimate the production costs and profitability of peanut in Malawi. Production costs were US$ 894 with a high input level, US$ 617 with a medium level, and US$ 259 with a low input level. Net output in high, medium, and low input level farms was 2.96, 1.92, 1.16 tons/ha, respectively. The net benefits of high, medium and low input farms were US$ 695, US$ 415, and US$ 258 per ha, respectively.

2.2 Socioeconomic studies in coastal Bangladesh

Afroz (2017) carried out a study in the same area as the present study and examined that sunflower as a cash crop, can significantly contribute to increasing household income and food security and thus raising the standard of living of rural coastal people. The study found that the common marketing system involves many links with no value addition within the channels which potentially increases the total cost from double handling. The findings revealed that 40% of the total production was sold by farmers to chain actors in the 2017/2018 cropping season while the remaining 60% was left for domestic consumption.

Ali (2018) studied the perception and participation of the young generation (18-35 years) in agriculture in the southwest coastal zone of Bangladesh. He found that only 42% of respondents directly engaged in farming. The study found that respondents who are unmarried, very young, and belong to small families are less likely to be engaged in farming. Most of the youth consider that farmers work hard for little reward and their living standards influence the youth to work in the non-farm sector. Singh (2017) studied the nature of social exclusion, determine the risk factors associated with agricultural intensification, and cropping strategy of resource-poor farmers in Sekendarkhali village, the same area of the present study. He found that the initiatives for agricultural intensification in the study area taken by the government or other agencies mostly captured by the large farmers. The dominant and exploitative role of rich farmers pushed the resource-poor farmers in an invisible exclusion and denied from the social inclusion process.

Habiba (2018) studied 54 farm households in two villages of southwestern Bangladesh. The findings reveal that in addition to social norms, household composition and socioeconomic status, and improved crop practices have significant consequences on the workload and additional benefits derived by the household members through time commitments in their dairy farm and non-farm activities. The study also revealed a significant gender gap in time use on agricultural work, domestic work, and personal care and leisure between men and women in farm households in relation to their adopted crop practices.
3. Materials and Methods

3.1 Selection of the study area and sample

Keeping in view the main objectives of the present study, Sekendarkhali village under Amtali Upazila of Barguna district was selected purposively for the study (Figure 1). This locality covers a large area under agricultural practices and farmers in this area have recently started Rabi season agriculture. Moreover, this village is situated in a saline water zone of Bangladesh, which is recognized as a sweet water-scarce area. The village is not so densely populated. It has a population of about 1,450 people consisting of 292 households. The climatic condition of the selected area is not different from the other parts of the district (Banglapedia, 2015; Shushilan, 2016).

A total number of 60 farmers were selected randomly in the proposed research to fulfill the objectives of the study. Since the main purpose of the study was to find the economic suitability of growing peanut, a representative 50 peanut growing farmers were selected to fulfill the objective. In addition, to examine the benefit of producing peanut over Boro rice, a representative number of Boro rice farmers (10 farmers) were selected. The reason for selecting the limited number of Boro rice farmers was, due to a shortage of sweet water, currently, only a few farmers are cultivating Boro rice in the study area. That is why the sample size for Boro rice-growing farmers is much less than peanut growing farmers.
3.2 Methods of data collection
Primary data were collected through face-to-face interviews with the farmers with the help of a pre-tested interview schedule. The study also conducted two focus group discussions (FGDs) including both peanut farmers and Boro rice farmers. Key Informant Interviews (KIIs) were conducted with two field workers of Bangladesh Rice Research Institute (BRRI) and NGO Shushililan who were working closely with the community for the last few years. Before going to make an actual interview, consent was taken from the respondents or participants, brief information about the aims and objectives of the present study was clearly explained to them and other ethical issues were dealt with properly. The period of the investigation covered by the study was the Rabi season of 2018-2019. In the study area, peanut and Boro rice both are generally sown in November to December and harvested in March to April. The interview for this study area was conducted during April-May 2019.

3.3 Data analysis techniques
Socioeconomic characteristics of the farmers
Socioeconomic data were presented mostly in tabular and graphical forms. These forms are simple in calculation, widely used, and easy to understand. Descriptive statistics like sum, averages, percentages, and ratios were calculated to scrutinize the socioeconomic characteristics of sample farmers.

Profitability analysis of crop production
The profitability of peanut and Boro rice production from the viewpoint of individual farmers was measured in terms of gross return, gross margin, the net return, and benefit-cost ratio (undiscounted) (Dillon and Hardaker, 1993). The formula needs for the calculation of profitability is discussed below:

**Gross Return**
Gross return was calculated by simply multiplying the total volume of output of rice with per unit price received by the farmers. It was consisted sum of the volume of the main product and its by-product. That is,
\[ \text{Gross Return} = \sum (Q \times P) \]
Where, \( Q \) = Quantity of the product and \( P \) = Average price of the product

**Gross Margin**
The gross margin is the gross return over variable cost. The gross margin was calculated by the difference between gross return and total variable costs. That is,
\[ \text{Gross Return} - \text{Total variable cost} \]

**Net Return**
Net return was obtained by deducting all costs (variable and fixed) from gross return. That is,
\[ \pi = \sum (P_y \times Y) - \sum (P_x \times X) - \text{TFC} \]
Where, \( P_y \) = Price per unit of produce, \( Y \) = Quantity of the produce, \( P_x \) = Price per unit of inputs, \( X \) = Quantity of the inputs, and \( \text{TFC} \) = Total fixed cost

**Benefit-Cost Ratio (BCR)**
The BCR is a relative measure, which is used to compare benefit per unit of cost. The BCR is estimated as a ratio of gross returns and gross costs. The formula for calculating BCR (undiscounted) is shown below:
\[ \text{Benefit-cost ratio} = \frac{\text{Gross benefit}}{\text{Gross cost}} \]

**Social benefits of peanut production**
Social benefits of peanut production were identified on the basis of individual farmer’s perceptions including KIIs and FGDs generated through qualitative approaches. Figure 2 includes some indicators to explore the social benefit of peanut production in the study area.
Figure 2. Indicators of social benefits of growing peanut

Problem confrontation index (PCI)
The sample farmers were asked to give their opinion on 10 selected problems that were identified during the pre-testing period of the interview schedule and validated through KII and FGDs. Problem Confrontation Index (PCI) for each problem was computed by using the following formula:

\[
PCI = (P_h \times 3) + (P_m \times 2) + (P_l \times 1) + (P_n \times 0)
\]

Where, \(P_h\)=Number of respondents confronted the problem as high, \(P_m\)=Number of respondents confronted the problem as medium, \(P_l\)=Number of respondents confronted the problem as low, and \(P_n\)=Number of respondents confronted the problem as not at all. PCI could range from 0 to 300, where, 0 indicating no problem confronted and 300 indicating the highest problem confronted. After obtaining the PCI for each of the 10 problems, a rank order was prepared.

4. Results and Discussion

4.1 Socioeconomic characteristics of the sample farmers
This part provides information on some key socioeconomic characteristics such as age distribution, educational status, average farm size, and occupational status of the respondents in the research areas. From Table 1, it can be observed that about 48 percent of farmers were between 20-40 years, and 18 percent of farmers belonged to above 55 years of age category. Most of the farmers were in the age group of the most productive ages, which ranges from 20-55 years old. The percentage of illiterate farmers was 67% whereas only 21% of farmers have primary education. Agriculture is the main occupation and source of livelihood of the selected heads of the households in the study area. As the main occupation, 70 percent of the selected farmers were engaged in agriculture. Besides agriculture, some farmers were engaged in business, non-government or private services, and some in other types of jobs. The average farm size in the study area was 0.78 hectares and the average household size of sample farmers was 4.5, which is shown in Table 1.
Table 1. Distribution of respondents based on socioeconomic characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Range/Categories</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
<td>20-40</td>
<td>29</td>
<td>48.33</td>
</tr>
<tr>
<td></td>
<td>40.1-55</td>
<td>20</td>
<td>33.33</td>
</tr>
<tr>
<td></td>
<td>55.1-70</td>
<td>7</td>
<td>11.67</td>
</tr>
<tr>
<td></td>
<td>Above 70</td>
<td>4</td>
<td>6.67</td>
</tr>
<tr>
<td>Level of Education</td>
<td>Illiterate</td>
<td>40</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Primary</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>S.S.C.</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>H.S.C.</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Occupation</td>
<td>Agriculture</td>
<td>42</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Non-govt. service</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Average farm size (hectare)</td>
<td></td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>Average household size (person)</td>
<td></td>
<td>4.5</td>
<td></td>
</tr>
</tbody>
</table>

4.2 Comparative labor requirement for peanut and Boro rice cultivation

Both family and hired labor were used in peanut and Boro rice cultivation. However, peanut production was done mainly by family labor whereas Boro rice production required more hired labor. Figure 3 portrays that about 82% of the total labor required for producing peanut is family labor and among them 55% were male and 27% were female. For this reason, farmers have to worry less about labor costs when they choose peanut for production, and also the female members of the family have a strong contribution that reduces the labor requirement. On the other hand, in the case of Boro rice, only 33% of the labor requirement was fulfilled by family labor where there was no contribution of female family members for producing Boro rice. In total, 67% of labor was hired labor, hence the farmers had to pay a huge amount as labor cost which increases the total cost of production.

![Figure 3. Labor distribution for peanut and Boro rice cultivation](image-url)
4.3 Comparative profitability analysis of peanut and Boro rice cultivation

The objective of this section is to assess the comparative profitability of peanut and Boro rice production. Farmers in the study area used both purchased and home supplied inputs for the production of peanut and Boro rice, which were valued at the prevailing market rate during the survey period or at the price paid by the farmers. Purchased inputs such as hired labor, seeds, fertilizers, insecticides, irrigation charges, etc., involved direct expenses and therefore, the pricing of these inputs was easy. No cash payment was made for the home supplied inputs, and therefore the cost of these inputs was estimated by using the existing market price of these inputs. In the case of human labor, 120 man-days and 73 man-days were required for peanut and Boro rice production, respectively. The average wage rate was Tk. 600 per man-day for males and Tk. 400 per man-day for female labor, respectively depending on the season and availability of day labor in the research areas. The majority of the farmers in the research areas used power tiller for land preparation and since most of the farmers had no power tiller of their own, they had to hire power tiller for tilling the field. The price of seeds was Tk. 150 per kg and Tk. 50 per kg for peanut and Boro rice, respectively. Interest on operating capital was computed by taking all the variable costs into account. It was calculated at the rate of 14% for a year assuming that if the owner of a farm borrowed money from credit lending organizations, the interest would have to be paid at the above-mentioned rate. The output was also valued at the prevailing market price. Per hectare production of peanut and Boro rice was 2144 kg and 3609 kg, respectively whereas the market price of peanut and Boro rice were 61.87 Tk./kg and 14.52 Tk./kg, respectively. Table 2 presents the detailed costs and returns for peanut and Boro rice production.

<table>
<thead>
<tr>
<th>Table 2. Per hectare cost and return of peanut and Boro rice production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Items</strong></td>
</tr>
<tr>
<td>A. Variable cost</td>
</tr>
<tr>
<td>Cost of human labor</td>
</tr>
<tr>
<td>Cost of tillage</td>
</tr>
<tr>
<td>Cost of seeds</td>
</tr>
<tr>
<td>Cost of Urea</td>
</tr>
<tr>
<td>Cost of TSP</td>
</tr>
<tr>
<td>Cost of MOP</td>
</tr>
<tr>
<td>Cost of pesticides</td>
</tr>
<tr>
<td>Cost of irrigation</td>
</tr>
<tr>
<td>Cost of fencing/other costs</td>
</tr>
<tr>
<td>Total variable cost</td>
</tr>
<tr>
<td>B. Fixed cost</td>
</tr>
<tr>
<td>Lease value of land</td>
</tr>
<tr>
<td>Interest in operating capital</td>
</tr>
<tr>
<td>Total fixed cost</td>
</tr>
<tr>
<td>C. Total cost (A+B)</td>
</tr>
<tr>
<td>D. Gross return</td>
</tr>
<tr>
<td>E. Gross margin (D-A)</td>
</tr>
<tr>
<td>F. Net return (D-C)</td>
</tr>
<tr>
<td>G. Benefit-Cost Ratio (D/C) (Undiscounted)</td>
</tr>
</tbody>
</table>

It is apparent from Table 2 that the total cost of peanut and Boro rice were Tk. 116,169.82 and Tk. 91,632.3, respectively for one hectare of land in the study area. Per hectare, gross return from peanut and Boro rice production was Tk. 132,648.19 and Tk. 52,419, respectively. Per hectare, the gross margin of peanut and Boro rice cultivation was Tk. 28,539.73 and Tk. -
27,628.36, respectively. From the analysis, it is evident that the gross margin of peanut is positive. So, the production of peanut at least covers the variable costs of the peanut production. On the other hand, the gross margin of Boro rice is negative. So, on average, the farmers who cultivate Boro rice cannot cover the variable costs of the total production costs. That is why farmers are not interested to continue Boro rice production and shifting to another enterprise like peanut. Table 2 also reveals that per hectare net return for peanut and Boro rice production was Tk. 16,478.37 and Tk. -39,203.3, respectively. Net return for peanut was positive but for Boro rice it was negative. There were several causes behind this, such as lower production due to unfavorable soil conditions and less irrigation, less market demand, low per unit market price, a large number of hired labor requirements, high cost of labor, etc. Recently, all Boro rice farmers of Bangladesh faced the same problem of low market price and scarcity of hired labor resulting in a high wage rate of hired labor. Consequently, Boro rice farming becomes a loss-project for farmers, which was evident in the study area too. Moreover, BCR of peanut and Boro rice production were found 1.14 and 0.57, respectively. The results imply that peanut farmers received Tk. 1.14 in return from investing Tk. 1.00 in peanut production and Boro farmers received Tk. 0.57 in return from investing Tk. 1.00 in Boro rice production. Therefore, it can be concluded that peanut production is profitable for farmers over Boro rice production in the study area.

4.4 Social benefits of peanut production
The village Sekendarkhali is situated in a sweet water-scarce area of the southern coastal zone of Bangladesh where farmers have a limited choice of crops to be grown. So, the farmers choose the crops which not only have some economic benefits but also carry some benefits for the wellbeing of their society. From the previous discussion, it is seen that the net return of peanut production is positive and brings economic benefits to the farmers. Besides the economic benefits, the social benefits of peanut production were also explored in the present study. It was found that peanut production has a great positive impact on increasing employment opportunities, income, food intake, health, social relationship, social identity, and many more for both males and females.

4.4.1. Increased employment opportunities
The new avenue of Rabi cropping prevents seasonal migration and allows farmers to stay in the village. Previously, the farmers leased as much land as possible during the Aman season (July to November) to increase crop production and to meet their family's consumption demand and worked as a paid laborer (outside of the village) during the Aus and Rabi seasons as there was no opportunity to produce high valued crops in the field. But the re-excavation of the Hafamari canal allows the farmers to grow a high valued crop like peanuts.

"Peanut cultivation helped me not going outside of the village for selling my physical labor by leaving my family members. In addition, I am hiring two/three laborers daily for taking care of and harvesting the peanuts. My family and I are inspiring other farmers of the village too to increase the production area of the village" (Participant of FGD).

4.4.2. Better standard of living through increased income
The availability of sweet water allows farmers to choose between different crops to be produced on their land. Farmers can now produce Boro rice, different winter vegetables, sunflower, sweet potato, and many other crops. But among them, most of the respondents agreed with the statement that the income of the peanut growing farmers has been increased. Thus, farmers are now having a better standard of living. Their food consumption pattern has improved, they have now better houses than previously and they are now sending their children to school for education.
"I grew peanut on 15 decimals of land and made a good profit. I am expecting my earnings will be double in the next Rabi season if I would use my land perfectly and the production would not damage by the natural calamity" (Participant of FGD).

4.4.3. Better food intake
Like all other areas in Bangladesh, rice is the main staple food of the people of Sekendarkhali. As the village is in the southern coastal zone, people have a priority of fish in their daily meals. But only having rice and fish on a regular basis do not fulfill daily required calorie intake. Recently, the farmers started growing some vegetables but these are not enough to fulfill their daily calorie requirement. Peanut is rich with energy, protein, fat, calcium, and many other nutrients. So, having peanuts on a regular basis can mostly fulfill the daily nutritional requirement of a human being.

"Most of the farmers are marginal and small farmers. They do not have the ability to buy foods with high nutritional value. Peanut can help to fulfill the need for calorie intake. One hundred grams peanut contains 655 kilo-calorie. So, having only 100 grams peanut per day can fulfill a large portion of the calorie needs of the farmers" (KII participant).

4.4.4. Better health
There is a shortage of fruit trees in the study area. Fruit trees like mango, jackfruit, blackberry, battle nut, date palm have been disappeared. There are some banana trees only. In Bangladesh, people do not take fruits in the main course rather they take fruits occasionally for better health. Peanut can partially fulfill the demand of fruits as it has a great nutritional value and it can be eaten like other fruits.

"Children love to take fruit-type foods most. Previously I have to buy different fruits from the market for them but now I do not have to worry about it. My grandchildren like having peanut" (FGD participant).

4.4.5. Better social relationship
Farmers generally share their peanuts with their neighbors and relatives. This sharing helps to build better social relations among them. Therefore, many farmers exchange peanuts with other vegetables in the village. These help to build strong social bonding among them. They also entertain guests with peanuts.

"In the previous year I sent around 10 kg peanut to my elder sister who lives in a different village. She also sent me some pumpkins which she grew on her field" (FGD participant).

4.4.6. Increased women’s participation in agriculture
Women’s participation in the study area was very rare in 2-3 years back. But the opportunity of Rabi season cropping especially non-rice agricultural crop production increases the opportunity for women to participate in agricultural activities. Different vegetables and peanut cultivation make the pathway easier for women for participating in different agricultural operations. Women can also work as hired labor during peanut cultivation.

"I and my daughter used to sow the peanut seeds, take care of them, irrigate them by carrying water from my pond, apply fertilizer by myself, and finally harvest peanuts. I did not hire any additional labor for peanut cultivation" (Female FGD participant).

4.5 Problems of peanut production
The problems aroused in practicing peanut cultivation were: unfavorable soil condition, the high price of inputs, insufficient institutional credit, lack of sweet water, unfavorable natural condition, lack of technical knowledge and skills, labor-intensive and time-consuming, the return is not satisfactory, lack of motivation and information, and lack of market demand. The
problems were ranked according to their problem confrontation index (PCI) score, which is shown in Table 3. Though the farmers mentioned some problems, these are not very severe problems to them as none of the PCI scores crossed 200 among the total score of 300. According to the sample farmers, unfavorable soil conditions ranked as 1st with PCI score 172, followed by insufficient institutional credit ranked as 2nd with PCI score 158 and lack of technical knowledge and skills ranked as 3rd with PCI score 154. It was suspected that the lack of sweet water was a major problem for the farmers. However, due to recent canal re-excavation, the extent of this problem has reduced a lot and therefore this problem is ranked as number 6th problem.

<table>
<thead>
<tr>
<th>Identified problem</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Not at all</th>
<th>PCI</th>
<th>Rank order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfavorable soil condition</td>
<td>54</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>172</td>
<td>1</td>
</tr>
<tr>
<td>Insufficient institutional credit</td>
<td>47</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>158</td>
<td>2</td>
</tr>
<tr>
<td>Lack of technical knowledge and skills</td>
<td>41</td>
<td>13</td>
<td>5</td>
<td>1</td>
<td>154</td>
<td>3</td>
</tr>
<tr>
<td>High price of inputs</td>
<td>34</td>
<td>12</td>
<td>11</td>
<td>3</td>
<td>137</td>
<td>4</td>
</tr>
<tr>
<td>Unfavorable natural condition</td>
<td>26</td>
<td>17</td>
<td>12</td>
<td>5</td>
<td>124</td>
<td>5</td>
</tr>
<tr>
<td>Lack of sweet water</td>
<td>22</td>
<td>18</td>
<td>11</td>
<td>9</td>
<td>113</td>
<td>6</td>
</tr>
<tr>
<td>Return is not satisfactory</td>
<td>26</td>
<td>7</td>
<td>18</td>
<td>9</td>
<td>110</td>
<td>7</td>
</tr>
<tr>
<td>Labor intensive and time-consuming</td>
<td>12</td>
<td>19</td>
<td>13</td>
<td>16</td>
<td>87</td>
<td>8</td>
</tr>
<tr>
<td>Lack of motivation and information</td>
<td>3</td>
<td>16</td>
<td>12</td>
<td>29</td>
<td>53</td>
<td>9</td>
</tr>
<tr>
<td>Lack of market demand</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>56</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

5. Conclusions

Production of peanut is comparatively a profitable agricultural practice in the study area. Peanut, as a cash crop, can significantly contribute to increasing household income and food security, and thus raising the standard of living of rural people. As agriculture in Sekendarkhali and its surrounding villages are impacted by saline water and other natural hazards, the most important factor in the adoption of peanut cultivation was overcoming the hurdles of freshwater for irrigation which is primarily solved. Currently, farmers are happy with the return from peanut cultivation. Moreover, peanut cultivation has some positive social impact also. Therefore, it can be said that peanut can be considered as a suitable crop to grow in the southern coastal zones of Bangladesh. Some recommendations that arise from the findings are: encouraging the farmers to use organic fertilizers on the field which will help to reduce the salinity of the soil, encouraging the farmers to use their resources optimally and timely for increasing peanut yield by maintaining soil health, ensuring the supply of quality seed, and strengthening the extension services by the government which will have a positive impact on increasing peanut production. However, the research area was confined to only a village. Agricultural characteristics of this research area might not represent a generalized picture of the whole coastal zone of Bangladesh. Therefore, another study can be undertaken by taking a large representative sample to assess the impacts of peanut on income generation and employment opportunity for better generalization. Moreover, a comparative study can also be undertaken to assess the relative profitability of peanut and other competing crops.

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