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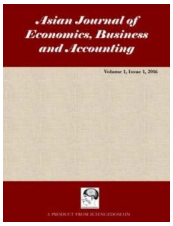

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Assessing Profitability of Farming of Disadvantaged Smallholders inside and outside Polder 29 in Khulna District of Bangladesh

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Authors' contributions

The entire research work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The present study is designed to compare profitability of growing crops by the selected disadvantaged smallholders living inside and outside the Polder No. 29 in Khulna district of Bangladesh. Primary data were collected from 120 respondents, of which 65 from inside the Polder 29 and 55 from outside the Polder 29 were selected randomly. The disadvantaged people outside Polder 29 (Latabunia) followed only one cropping pattern a year such as: (i) T. Aman paddy and Bagda. On the other hand, the disadvantaged people inside polder area followed two distinct cropping patterns a year such as: (i) T. Aman paddy and Bagda; and (ii) Boro paddy and T. Aman paddy. No disadvantaged people outside Polder 29 were found to be involved in small trading and livestock keeping whereas it was common inside Polder 29. So, a wider variation in cropping patterns and profitability of the disadvantaged people was observed as the farm is located inside and outside the Polder 29 (Latabunia). Profitability of disadvantaged people for Bagda cultivation within and outside Polder 29 was not much differs but profitability of disadvantaged people for T.

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Aman production inside Polder 29 was higher than the profitability for T. Aman production of Latabunia farmers and the difference was Tk 19142.00 per hectare. The concerned scientists should give top most priority to develop salt tolerance new variety of T. Aman paddy and MV Boro paddy for this area. Necessary steps could be taken to protect the land of outside farmers from the salinity or other appropriate steps could be taken to decrease salinity problem of the area.

Keywords: Cropping pattern; economic profitability; Bagda production; salinity problem and disadvantaged people.

1. INTRODUCTION

Bangladesh is one of the most densely populated countries in the World where around 28.00 percent of the population live in the coastal area. It has 710 km (kilometer) long coastline. The landward distance of the delineated coastal zone from the shore is between 30 and 195 km whereas the exposed coast is in between 37 and 57 km. The coastal zone is low-lying with 62.00 percent of the land have an elevation of up to 3 metres and 86.00 percent up to 5 metres [1]. Before 1960s, zamindaris or landowners held the duty of water management in the coastal areas. In this system communities would maintain the canal structure and when salinity was high they would build small localized mud walls that they managed jointly with the zamindars [2]. In the 1950s–1960s, existing embankments worsened for lack of appropriate maintenance so that tidal surges and salinity intrusion caused repetitive crop damage. Failures of crops caused due to saline inundation or monsoon flooding were reported in most areas one time every 3 years [3]. From this time, the government considered the necessity for securing the coastal areas and construction and improvement of embankments started in 1961 through the forerunner of the Bangladesh Water Development Board (BWDB). The term 'Polder' was used to designate areas that are surrounded by dykes or embankments, separating them hydrologically from the main river system and offering protection against tidal floods, salinity intrusion and sedimentation. The embankments include regulators and other structures to control water intake and drainage of the polderized area. In fact, Polder 29 was established in 1961. The coastal region of Bangladesh has 123 embanked polders, which were constructed to protect the land from saline water and to increase the successful agricultural crop production as well as to improve the livelihood of the poor people. Rahman et al. [4] conducted a study on farm level evaluation of T. Aman rice cultivation in selected saline and non-saline areas of Bangladesh. Begum et al. [5] studied on financial profitability of Aromatic rice production in some selected areas of Bangladesh. Anik and Talukder [6] performed a study on economic and financial profitability of aromatic and fine rice production in Bangladesh. Ayambila et al. [7] studied on economics of rice production in Ghana. Tasnoova et al. [8] conducted a study on a comparative study on fisheries policy issues and rice-shrimp farming system between Bangladesh and Vietnam. Kabir et al. [9] performed a study on economics of alternative Golda and Rice farming in polder areas of Khulna district. Islam et al. [10] studied economic study on production and marketing of shrimp and prawn seed in Bangladesh. Feroz et al. [11] conducted a study on the profitability analysis of Bagda farming in some selected areas of Satkhira district of Bangladesh. Rahman et al. [12] studied on comparative profitability and efficiency analysis of rice farming in the coastal area of Bangladesh. This study reveals that T. Aman rice production was profitable in both of saline water controlled and uncontrolled areas. However, the researcher felt the gap of the past studies from the above literature reviewed and need of conducting this study. The main objectives of this study were to compare profitability of growing crops by the selected disadvantaged smallholders living inside and outside the Polder No. 29 in Dumuria Upazila of Khulna district in Bangladesh. In this study, an attempt has been made to assess and compare the per hectare total costs, gross return, gross margin, net return (i.e., profit) and benefit-cost ratios (undiscounted) of different crops (Paddy, Bagda, etc.) production. Different cropping patterns practiced by the disadvantaged people within and outside Polder 29 were also discussed in this study.

2. METHODOLOGY OF THE STUDY

Keeping in view the objectives of the study as well as time and resource constraints, village Latabunia in Shahosh union in Dumuria Upazila (which is outside the Polder 29) and from Polder number 29, two villages namely: (i) Shorafpur and (ii) Mallopara in Shorafpur Union and three

villages namely: (i) Kanchannagor; (ii) Khoribunia; and (iii) Telikhali in Vandarpara Union under Dumuria Upazila of Khulna District were selected purposively. A stratified random sampling technique was followed in this study. In total 120 respondents, in which 65 from inside the Polder 29 and 55 from outside the Polder 29 were selected randomly. It may be noted here that the disadvantaged people in this study have been considered as those persons who have less than 50 decimals of cultivable land. The disadvantaged people in the study area have broadly been classified into two categories such as: (i) Wage labourers, whose main source of income for livelihood entirely depends on wage-earning as day labourers; and (ii) Marginal farmers are also resource-poor people but they might have a small piece of owned land (less than 50 decimals of cultivable land) or rented in around 50 decimals of cultivable land from the local landlords and/or rich people for the cultivation of crops. This implies that these people are earning a greater proportion income from crop cultivation. Wage labourers, of course, again classified into two: (i) Male wage labourers; and (ii) Female wage labourers. It may be noted that no female marginal farmers was found in the study area. Thus, 30 male wage labourers, 20 female wage labourers and 70 marginal farmers were selected for the study. The data were collected for the whole year of 2011. However, the formal data for the study were collected during the February 2012. It was, of course, a normal year. The study followed the survey method. The author herself conducted the survey. In this survey method, primary data were collected from the respondents by face to face interview with the help of interview schedule designed for the study. For profitability analyses of the marginal farmers' activity budgets were prepared [13]. Since the aim of the most selected marginal farmers were not commercial, the gross margin (GM) analysis was employed to estimate the profitability of smallholders' farming taking into account different cropping patterns by the disadvantaged people. The GM was estimated directly by deducting total variable cost from total return. The activity budgets were prepared for T. Aman, Bagda and Boro paddy farming. The following algebraic equation was used:

$$GM = TR - VC$$

$$GM = \sum Py_i.Y_i - \sum Px_i.X_i$$

Where,

GM = Gross margin (Tk/ha);
TR = Total return (Tk/ha);
VC = Variable cost(Tk/ha);
Py_i = Per unit price of the i^{th} produce;
Y_i = Quantity of i^{th} produce;
P = Per unit price of i^{th} inputs;
X_i = Total quantities of the ith inputs;
i = 1, 2, 3,…, n; and
n = Number of inputs.

3. RESULTS AND DISCUSSION

3.1 Different Cropping Patters Inside and Outside Polder 29

Cropping Pattern may be defined as the yearly sequence of crop production followed in a given locality. It was observed that there are two cropping patters exist inside Polder 29 such as:

Pattern 1: Bagda – T. Aman paddy and
Pattern 2: Boro – T. Aman paddy.

It was observed that about 62 percent of the respondents preferred to cultivate Bagda because they think that Bagda cultivation is more profitable. The disadvantaged people inside Polder 29 cultivated Bagda from the month of February to July. All disadvantaged people in Polder 29 grew T. Aman paddy from August to December. About 38 percent of the disadvantaged people preferred Boro paddy. The disadvantaged people who preferred Boro paddy reported that Boro has a stable yield but Bagda cultivation is uncertain. If virus attracted then all Bagda died and they got nothing. Some respondents grew Boro paddy instead of Bagda farming from the month of January to May. There is only one cropping patterns exist outside Polder 29 (Latabuia) such as: Bagda – T. Aman paddy. The disadvantaged people outside Polder 29 cultivated Bagda from the month of February to July. They grew T. Aman paddy from August to December. The disadvantaged people in Latabunia reported that the powerful people opened the pipes for saline water for Bagda cultivation and as a result, saline water came to the farmers land. For this reason, they have to cultivate Bagda and they cannot produce MV Boro paddy for saline water.

3.2 Costs of Producing T. Aman and Boro Paddy Inside and Outside Polder 29

For the convenience of analysis, the costs items were classified into two categories: (i) variable cost; and (ii) fixed cost. Family labour costs, for example, were estimated by applying the

opportunity cost principle. Opportunity cost is defined as an income, which an input is capable of earning in an alternative employment in or outside the farm [14]. Total cost was calculated by adding up all costs used in the production process. Per hectare total cost of T. Aman paddy inside and outside Polder 29 were Tk 49,005.00 and 48,918.00, respectively. Per hectare total cost of Boro paddy production inside Polder 29 was Tk 55,337.00 (Tables 1, 2 and 3).

3.3 Economic Returns of T. Aman and Boro Paddy Production Inside and Outside Polder 29

It was observed that farmers in Polder 29 got higher gross return for T. Aman paddy than the farmers in Latabunia because, the return from T.Aman paddy was very low in Latabunia for higher salinity problem. The per hectare gross return of T. Aman paddy within and outside Polder 29 were Tk 71,401.00 and 52,172.00, respectively and the per hectare gross return of Boro Paddy inside Polder 29 was Tk 85,800.00. Per hectare net return of T. Aman and Boro paddy inside Polder 29 was Tk 22,396.00 and 30,463.00 respectively, whereas per hectare net return for T. Aman paddy outside Polder 29 was Tk 3,254.00 which was much lower than the net return inside Polder 29. The reason of this variation is the salinity problem in Latabunia. T. Aman production was very low in Latabunia due to higher salinity which is caused by Cyclone Aila (2009). Per hectare gross margin for T. Aman and Boro Paddy inside Polder 29 were estimated at Tk 57,626.00 and 67,341.00, respectively while per hectare gross margin for T. Aman paddy in Latabunia was Tk 38,362.00 only. Undiscounted BCR for T. Aman Paddy inside and outside Polder 29 were 1.46 and 1.10, respectively on total cost basis. Again, for Boro paddy BCR was 1.60 on total cost basis (Tables 1, 2 and 3).

Fig. 1. Geo map of Dumuria Upazila of Khulna District in Bangladesh (Study area)

Table 1. Activity budgets: Per hectare costs and returns of MV transplanted Aman paddy inside polder 29

Items of returns/costs	Total quantity/ha	Per unit price (Tk)	Returns/Costs (Tk/ha)	Percentage of total returns/costs
A. Gross returns				
Main product	4158 kg	16/kg	66528	93.18
By-product (Straw)	n.a	n.a	4873	6.82
Total	-	-	**71401**	**100.00**
B. Variable costs				
Power tiller	2 times	10/dec.	4940	10.08
Seedlings	-	-	1980	4.04
Fertilizers:				
Urea	91 kg	20/kg	1820	3.71
TSP	79 kg	22/kg	1738	3.55
MOP	59 kg	15/kg	885	1.81
Gypsum	38 kg	6/kg	228	0.47
Total fertilizer costs			4671	9.53
Insecticides	n.a		2184	4.46
Total variable cost	-	-	**13775**	28.11
C. Gross margin (A-B)	-	-	**57626**	**-**
D. Fixed costs				
Family labour	81 Man-days	250/Man-day	20250	41.32
Interest on OC		@ 10%	287	0.59
Cost for leased in land	-	-	14693	29.98
Total fixed cost			**35230**	71.89
E. Total cost (B + D)			**49005**	**100.00**
F. Net return (C – D)	-	-	**22396**	-
G. Undiscounted BCR	-	-	**1.46**	-

Source: Field survey

Table 2. Activity budgets: Per hectare costs and returns of MV transplanted Aman paddy production outside polder 29

Items of returns/costs	Total quantity/ha	Per unit price (Tk)	Returns/costs (Tk/ha)	Percentage of total returns/costs
A. Gross returns				
Main product (Paddy)	2987 kg	16/kg	47797	91.61
By-product (Straw)	n.a	n.a	4375	8.39
Total	-	-	**52172**	**100.0**
B. Variable costs				
Power tiller	2 times	10/dec.	4940	10.10
Seedlings	-	-	2460	5.03
Fertilizers:				
Urea	90 kg	20/kg	1800	3.68
TSP	76 kg	22/kg	1672	3.42
MOP	58 kg	15/kg	870	1.78
Gypsum	40 kg	6/kg	240	0.49
Total fertilizer costs	-	-	4582	9.37
Insecticides	n.a		1828	3.74
Total variable cost	-	-	**13810**	28.23
C Gross margin (A - B)	-	-	**38362**	**-**
D. Fixed costs				
Family labour	80 Man-days	250/ Man-day	20000	40.88
Interest on OC		@ 10%	288	0.59
Cost for leased in land	-	-	14820	30.30
Total fixed cost	-	-	**35108**	71.77
E. Total cost (B + D)	-	-	**48918**	**100.0**
F. Net return (C – D)	-	-	**3254**	-
G. Undiscounted BCR	-	-	**1.10**	-

Source: Field survey

Table 3. Activity budgets: Per hectare costs and returns of MV Boro paddy inside polder 29

Items of returns/costs	Total quantity/ha	Per unit price (Tk)	Returns/costs (Tk/ha)	Percentage of total returns/costs
A. Gross returns				
Main product (Paddy)	5044 kg	16 /kg	80704	96.06
By-product (Straw)	n.a	n.a	5096	5.94
Total	-	-	**85800**	**100.0**
B. Variable costs				
Power tiller	2 times	10/dec.	4940	8.93
Seeds	58 kg	30/kg	2010	3.63
Fertilizers:				
Urea	117 kg	20/kg	2340	4.23
TSP	83 kg	22/kg	1826	3.30
MOP	65 kg	15/kg	975	1.76
Gypsum	48 kg	6/kg	288	0.52
Irrigation	n.a	-	4200	7.59
Insecticides/pesticides	n.a	-	1880	3.40
Total variable cost	-	-	**18459**	-
C. Gross margin (A - B)	-	-	**67341**	**-**
D. Fixed costs				
Family labour	87 Man-days	250/Man-day	21750	39.30
Interest on OC	-	@ 10%	308	0.56
Cost for leased in land	-	-	14820	26.78
Total fixed cost	-	-	**36878**	
E. Total cost (B + D)	-	-	**55337**	**100.0**
F. Net return (C – D)	-	-	**30463**	-
G. Undiscounted BCR	-	-	**1.60**	-

Source: Field survey

3.4 Costs of Bagda Cultivation Inside and Outside the Polder 29

Total cost was calculated by adding up all costs used in the production process. Per hectare total cost of Bagda productions within and outside Polder 29 were Tk 45,269.00 and 48,097.00, respectively (Tables 4 and 5).

3.5 Economic Returns of Bagda Production

Per hectare Bagda productions inside and outside Polder 29 were 208 kg and 206 kg, respectively. With Bagda production, farmers also had wild stock of white fish such as Nilotica, Pissa, Tengra, etc. The per hectare gross returns of Bagda production were Tk 123,000.00 and 121,700.00 inside and outside Polder 29, respectively. Per hectare net return for Bagda inside Polder 29 and Latabunia were Tk 77,731.00 and 73,603.00, respectively. Per hectare gross margins for Bagda production were estimated at Tk 106,241.00 and 103,137.00 inside and outside Polder 29, respectively. Undiscounted BCR for Bagda production inside and outside Polder 29 were found to be 2.72 and 2.53, respectively, on total cost basis (Tables 4 and 5).

3.6 Comparison of Profitability Following Different Cropping Patterns between Inside and Outside of Polder No. 29

It can be seen from Table 6 that there is a wider gap in profitability between inside and outside farmers of Polder 29. In other words, the farmers of Polder 29, who were following the same cropping pattern, earned much higher profit than the outside farmers. One of the main reasons was that per hectare yield was much higher in polder area than Latabunia, since salinity within the polder area was relatively lower and, hence, rice yield was higher. Above all, there was a single cropping pattern following the outside farmers. In fact, marginal farmers inside Polder 29 got Tk 23,270.00/ha per year more profit than the outside farmers.

Table 4. Activity budgets: Per hectare costs and returns of Bagda production inside polder 29

Items of returns/costs	Total quantity/ha	Per unit price (Tk)	Returns/costs (Tk/ha)	Percentage of total returns/costs
A. Gross returns				
Bagda	208 kg	550/kg	114400	93.00
Other fish (Pishsa, Nilotica, Tengra, etc.)	43 kg	200/kg	8600	7.00
Total	-	-	**123000**	**100**
B. Variable costs				
Shrimp seeds (No.)	24534 (no.)	500/thousand	12267	27.10
Feed cost	-	-	3252	7.18
Lime	65 kg	16/kg	1040	2.29
Urea	10 kg	20/kg	200	0.44
Total variable costs	-	-	**16759**	37.02
C. Gross margin (A - B)			**106241**	-
D. Fixed cost				
Family labour	55 Man-days	250/ Man-day	13750	30.37
Interest on operating capital	-	@ 10%	419	0.93
Cost for leased in land	-	-	14341	31.68
Total fixed cost			**28510**	62.98
E. Total cost (B + D)	-	-	**45269**	**100.00**
F. Net return (C – D)	-	-	**77731**	-
G. Undiscounted BCR	-	-	**2.72**	-

Source: Field survey

Table 5. Activity budgets: Per hectare costs and returns of Bagda production outside polder 29 (Latabunia)

Items of returns/costs	Total quantity/ha	Per unit price (Tk)	Returns/costs (Tk/ha)	Percentage of total returns/costs
A. Gross returns				
Bagda	206 kg	550/kg	113300	92.10
Other fish (Pishsa, Nilotica, Tengra, etc.)	42 kg	200/kg	8400	6.90
Total	-	-	**121700**	**100.0**
B. Variable costs				
Shrimp seeds (no.)	25075 (no.)	500/thousand	12538	26.07
Feed cost	-	-	4840	10.06
Lime	67 kg	15/kg	1005	2.09
Urea	9 kg	20/kg	180	0.37
Total variable costs			**18563**	38.59
C. Gross margin (A-B)			**103137**	-
D. Fixed costs				
Family labour	57 Man-days	250/ Man-day	14250	29.63
Interest on operating capital	-	@10%	464	0.97
Cost for leased in land	-	-	14820	30.81
Total fixed costs			**29534**	61.41
E. Total costs (B + D)	-	-	**48097**	**100.0**
F. Net return (C – D)	-	-	**73603**	-
G. Undiscounted BCR	-	-	**2.53**	-

Source: Field survey

Table 6. Comparison of profitability following different cropping patterns between inside and outside of polder 29

Area	Cropping patterns	
	T. Aman paddy + Bagda (Tk/ha/yr)	T. Aman paddy + Boro paddy (Tk/ha/yr)
Inside polder 29	100,127.00	52,859.00
Outside polder 29 (Latabunia)	76,857.00	-
Difference	23,270.00	-

Source: Adapted from Tables 1, 2, 3, 4 and 5

4. CONCLUSION

The findings of the present study clearly indicate that for being inside Polder 29, the disadvantaged people can practiced diversified crop production such as T. Aman paddy, Boro Paddy, Bagda, etc. whereas the disadvantaged people outside Polder 29 practiced only one pattern such as, Bagda and T. Aman paddy. Per hectare net return of T. Aman and Boro paddy inside Polder 29 was Tk 22,396.00 and 30,463.00 respectively, whereas per hectare net return for T. Aman paddy outside Polder 29 was Tk 3,254.00 which was much lower than the net return inside Polder 29. Per hectare net return for Bagda inside Polder 29 and Latabunia were Tk 77,731.00 and 73,603.00, respectively. However, profitability of disadvantaged people for Bagda cultivation within and outside Polder 29 was not much differs but profitability of disadvantaged people for T. Aman production inside Polder 29 was higher than the profitability of disadvantaged people for T. Aman production in Latabunia and the profitability difference was Tk 19142.00 per hectare. Since salinity outside the polder area was relatively higher and, hence, rice yield was lower in that area. The concerned scientists should give top most priority to develop salt tolerance new variety of T. Aman paddy and MV Boro paddy for this area. Necessary steps could be taken to protect the land of outside farmers from the salinity or other appropriate steps could be taken to decrease salinity problem of the area. The output of T. Aman paddy of the disadvantaged people was very low in Latabunia and it could be considered as an important aspect in further research to improve the paddy production in the area. It is also essential to do action research in future to decrease the salinity level and to protect the study area from natural hazards.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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