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Comparing The Cost And Return Analysis Of Rice Production In Three Different Locations In North-Western Region Of Bangladesh

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Abstract
The realization of the objective of increasing food grain production depends heavily on expanding the use of modern technology, particularly crop and resource management technologies, since the adoption rate of modern rice varieties is nearing saturation. Modern rice varieties (MVs) were introduced to Bangladesh agriculture to accelerate the production during late sixties. In recent years, the widespread use of high yielding modern rice varieties has played a key role in boosting rice output and productivity across Bangladesh Additionally, this research presents an overview of the estimated contributions of various factors and income shares involved in modern Boro paddy cultivation. The estimated cost of producing MV Boro rice per hectare amounted to BDT 60435 in Rangpur, BDT 50592 in Rajshahi, and BDT 59533 in Dinajpur. Among the cost items, labor cost accounted the highest share of the total costs (almost 30 percent) in all areas followed by irrigation cost. The MV Boro productivity in Dinajpur was higher (4561 kg/ha) than Rajshahi (3711 kg/ha) and Rangpur (4513 kg/ha). The rate of profit was also substantially higher for the farms in Dinajpur (nearly 18 percent) than that of Rajshahi (15 percent) and Rangpur (16 percent). Applying the functional income distribution approach, factor payments and factor shares of gross returns per/ha were estimated. On a percentage basis, returns to current inputs were the highest earner among all other factors of production in case of all the areas. The share to human labor varied between 27 to 28 percent in the study areas and was higher in case of Rajshahi farms.

Keywords: *Modern technology, Productivity, Economic returns, Factor share, Income share, Factor payment.*

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I. Introduction

Agriculture has long been a core part of Bangladesh's economy and is crucial for improving rural living standards and supporting growth. Meeting the expanding demand for food requires a consistent and accelerated rise in agricultural productivity. Farmers often prioritize profitability when deciding which crops to grow and whether to adopt new technologies (Jaman et al., 2023). The income generated from crops and the efficiency in using inputs influence how well farmers can secure and maintain the resources needed to boost future output. In agriculture, improved production is often linked to how effectively resources are utilized. Maximizing the effectiveness of inputs allows farmers to boost production using the same level of resources. Similar to other cereal crops, rice production can be improved by better utilizing key resources like land, labor, and capital, along with effective management practices that ensure these inputs are used efficiently. Rice is grown on approximately three-quarters of the total agricultural land and therefore rice has predominantly led the growth in crop agriculture. It currently contributes close to 70 percent of crop share in gross domestic product (GDP) of the agricultural sector.

Taking these aspects into account, the research was carried out with the following set of objectives:

i. To assess the production costs and revenue generated from rice farming across three selected areas and
ii. To examine and measure how returns are distributed among stakeholders in the selected locations.

II. Literature Review

As described by Hayami and Ruttan (1985), technological change occurs when production methods are altered through deliberate use of resources aimed at generating innovative knowledge, which is then reflected in organizational systems, materials, and design advancements.

However, Smith (1977) viewed the division of labor as a result of intentionally driven technological or organizational developments. While Hicks (1932) had earlier characterized technological progress as a neutral transformation of the production function, most scholarly work on technological change began to gain momentum only after the end of World War II (Mowery & Rosenberg, 1996).

According to Quizzin and Ahn (1984), applying the profit function method to assess efficiency presents three key challenges: (i) the coefficients in the profit function often exhibit high standard errors, reducing the likelihood of rejecting the null hypothesis of profit maximization; (ii) the method depends on sufficient cross-sectional variation in variable input prices, which tend to be relatively uniform; and (iii) while it can compare inefficiency levels across different farmer groups, it does not measure the exact distance from an efficiency frontier.

Utama (2002), in estimating allocative efficiency from input, output and their corresponding price data followed three steps, first is to determine the actual profit, namely Π at the output level correspond to the actual levels of input used. Second is to use the maximum potential profit, namely Π * using the relevant first order condition for profit maximization. Both Π and Π * are estimated using the farm specific production function. Third is to measure the allocative efficiency by obtaining the ratio of Π to Π * i.e. (Π /Π *).

Alirajan and Obwona (1994) applied a time-invariant panel data model using a translog stochastic frontier production function to analyze Indian rice farmers over five successive harvest seasons. The study found that individual technical efficiency scores varied between 0.64 and 0.91, with an overall mean of 0.70. Factors such as farming experience, level of education, credit availability, and frequency of extension services were found to significantly impact differences in farmer efficiency.

III. Methodology

1. Profitability Analysis

Analyzing costs and returns is a widely used approach to assess and compare the profitability of various farming enterprises or technologies. Profitability, in this context, is calculated as the difference between total income and total expenses (Babu et al., 2025). To evaluate the profit levels of farmers cultivating MV rice within the study regions, a standard profit model was applied.

$$\prod = P_1Q_1 + P_2Q_2 - \sum_{i=1}^{n} Px_i X_i - TFC$$

Where,

$\prod$= Profit for each plot per season
P_1= Price received per unit of harvested paddy
Q_1= Total quantity of paddy output obtained from the plot
P_2: = Unit price of the by-product associated with paddy cultivation
Q_2= Quantity of by-product yielded from the same plot
P_{xi}= Price per unit of the *i*-th variable input used in production
X_i=Amount of the *i*-th input applied to the plot
TFC= Sum of all fixed costs incurred in the production process

2. Factor Share Analysis

The analysis of input shares is commonly employed in economics to evaluate how income is distributed among the various factors involved in production. There is considerable literature about factor share analysis for measuring income distribution, cost and returns and technology choice (Srivastava and Heady 1973, Ranade and Herdt 1978, Raju and Singh 1979, Hayami and Kikuchi1981). The past works have estimations for many areas: an economy as a whole, an industry, all rice farms in a country, or region or an individual farm. Basically Income distribution is generally assessed using two main approaches: (i) personal income distribution and (ii) functional income distribution. The functional approach focuses on how income is allocated among the various production inputs namely land, labor, capital, and operating resources. Personal division of income, on the other hand, assesses how earnings are shared among those involved in the production process, with particular attention to landowners, hired laborers, farm operator and capital owner (Kikuchi 1984). In this study, however, the first approach was employed.

The concept of factor shares, as outlined by Kikuchi (1984), describes the share of production costs attributed to each input in relation to the total output value. That is

Factor share of input, $x = PxX / PY$

Where,
P_x = price of input x
P = unit selling price of the final product
Y = total amount of output produced and
X = quantity of input x

When a farmer acquires inputs and sells their produce at fixed per unit prices, following the above procedure, the factor share of each input was

Proportional contribution of present inputs (C) = P_c C/PY
Proportion of output contributed by labor (L) = P_1L / PY and
Proportion of output attributable to land (A) = P_a A/PY

where, P_c, P_1, and P_a are the unit prices of the input factors C, L and A respectively. C, L, and A represent the actual amounts of inputs utilized in the production of output. In this case, the values in the numerator reflect the input costs borne by farmers, while the denominator consistently represents the total income earned from production. Factor costs also called factor payments, are the payments for input purchased. A key drawback of the factor share method is the need to estimate prices for inputs that are not purchased through the market. However, they are generally valued at their opportunity costs. In this study, factor share estimation was performed for MV Boro production under both the production environments and in the process the factors of production were specified as current inputs, labor, land and residual (i.e. operator's surplus).

IV. Data Source

This research utilized both primary and secondary sources of data, with primary information collected through a structured sample survey.

Primary data

Primary data for the study were initially collected through direct field surveys (Babu et al., 2024; Babu et al., 2025). The research was conducted in a total of six villages, two each from Dinajpur, Rangpur, and Rajshahi districts. In each district, one upazila was randomly selected, and from each selected upazila, two villages were randomly chosen to serve as the study areas.

Sample selection

A simple random sampling method was employed to select the sample households for the study. Initially, a complete list of all farming households within each village was prepared. Due to limitations in time and resources, 50 households were randomly chosen from each village using a random number table. These farms were surveyed during the Boro season of 2021. Data collection was carried out through face-to-face interviews with the selected farmers using a structured questionnaire. The survey gathered information on various aspects such as household demographics, land use, farming practices, input utilization, access to agricultural inputs and extension services, as well as the involvement of government and non-government organizations. Additionally, farmers were asked about the challenges they face in adopting new technologies and cultivating crops.

Secondary data

In addition, secondary data were utilized to enrich the overall analysis. For this purpose, information was gathered from various official publications of the Bangladesh Bureau of Statistics, along with relevant academic articles, books, and research papers. Time-series data on rice production, cultivated area, and yield were sourced from the *Statistical Yearbook of Bangladesh*, the *Economic Survey* issued by the Ministry of Finance, and annual reports from the Bangladesh Rice Research Institute.

V. Results And Discussion

1. Cost and return analysis in MV Boro production

Evaluating costs and returns is a widely used approach to assess and compare the profitability of various agricultural activities, crop combinations, or technological interventions. Comparing the costs and returns across various technologies or crop types provides insight into their relative profitability, thereby assisting farmers in choosing the most suitable technology or farming enterprise. In such analysis, researchers are usually interested to investigate the gross margin accrue from an enterprise. Gross margin refers to the amount remaining after subtracting total variable costs from the total revenue earned.

Table 1 outlines the breakdown of costs and profit margins associated with modern Boro rice cultivation in the selected regions. The estimated total production cost per hectare of MV Boro rice was BDT 60,435 in Rangpur, BDT 50592 in Rajshahi, and BDT 59533 in Dinajpur. The per hectare cost of fertilizer was about BDT 10820 for Rangpur which was more than double of that of Rajshahi and almost similar to that of Dinajpur. The seed cost was a bit lower in Rangpur and Dinajpur than that of Rajshahi. The cost of other inputs such as land preparation, human labor, manure and pesticides was almost similar in three locations. Irrigation cost although differed in absolute term between three areas, but if considered as a share of production costs, it accounted about 14 percent of the total costs in all areas. In the analysis, family labor was valued at the market price, therefore, net benefit in MV Boro production turned out to be very low. But in reality the opportunity cost of family labor is very nominal. Nevertheless, considering the shadow price of family labor it was valued at the market price (Jaman et al., 2025; Mim et al., 2025). If the computation is done without valuing the family labor and assuming that the opportunity cost of labor is zero, then net return will turn out to be very high. That is, if we consider the rate of profit on cash cost basis then it would be 35.05 percent, 39.28 percent and 38.68 percent for Rangpur, Rajshahi and Dinajpur farms respectfully. But considering the full cost it was 15.30 percent, 14.45 percent and 17.85 percent for Rangpur, Rajshahi and Dinajpur farms respectfully. In our upcoming/further discussion we would be concentrated in full cost concept.

Among the cost items, labor cost occupied the highest share of the total costs (almost 29 percent) in all areas followed by irrigation cost (Figure 1). Operating surplus was computed by deducting variable costs from gross return, estimated at BDT 15596/ha in case of tenant farm and BDT 25786/ha in case of owner farm for the Dinajpur area, which was higher than that of Rajshahi and Rangpur farms. This was because the MV Boro yield/productivity in Dinajpur was higher compared to that of Rajshahi and Rangpur.

2. Interest on Operating Capital

Operating capital referred to the actual cash expenditures on purchased inputs, including hired labor, draft power, power tiller use, seeds, organic and chemical fertilizers, pesticides, and irrigation services. The interest on this working capital was calculated annually at a 12 percent rate. The interest on working capital was calculated annually using a rate of 12 percent, as specified. The used formula was

$$\text{Interest on operating capital} = \frac{\text{Operating capital}}{2} \times \text{rate of interest} \times \text{time}$$

The timeframe discussed here refers to the duration between the transplanting and harvesting stages. In this context, the interest on working capital used for MV Boro paddy cultivation was computed based on a four-month production cycle. Accordingly, the calculated interest on working capital amounted to BDT 1022 in Rangpur, BDT 823 in Rajshahi, and BDT 1002 in Dinajpur districts, respectively. It was about 2 percent of the total cost.

Table. 1. Structure of costs and returns (BDT/ha) for modern Boro rice cultivation in the study areas.

Items	Rangpur		Rajshahi		Dinajpur	
	Total value	% of total output value	Total value	% of total output value	Total value	% of total output value
Planting input expense	1835	2.44	2442	3.88	1789	2.38
Livestock labor expense	1672	2.23	588	0.94	1721	2.30
Motorized tiller	3280	4.37	4210	6.81	3110	4.14
Manual labor expense	20033	26.69	18240	28.94	21001	27.95
Soil nutrient	10820	14.42	4810	7.63	9189	12.23
Manure	588	0.78	619	0.98	610	0.82
Pesticide	937	1.25	813	1.29	1051	1.40
Irrigation	10122	13.48	9120	14.47	9870	13.13
Land rent	10126	13.49	8927	14.16	10190	13.51
Capital use charge	1022	1.36	823	1.30	1002	1.33
Overall expense Entire expense Monetary expense	 60435 51629	 80.52 68.79	 50592 41566	 80.29 65.96	 59533 50599	 79.24 67.35
Paddy yield (kg/ha)	4513		3711		4561	
Gross value: from paddy (BDT/ha) from by product (BDT/ha)	 69726 5326	 92.37 7.53	 57892 5120	 91.87 8.13	 70148 4981	 93.37 6.63
Total value of output (BDT/ha)	75052	100.00	63012	100.00	75129	100.00

Operating surplus for tenant farm (BDT/ha)	14617	19.48	12420	19.71	15596	20.76
Operating surplus for owner farm (BDT/ha)	24743	32.97	21347	33.88	25786	34.32
Unit cost of production (BDT/kg)						
Total cost approach	13.40		13.63		13.05	
Monetary cost level	11.44		11.20		11.09	
Price of paddy (BDT/kg)	15.45		15.60		15.38	
Rate of profit (%)						
Total cost approach	15.30		14.45		17.85	
Monetary cost level	35.05		39.28		38.68	

Note: * Rate of profit = (Paddy price – Unit cost)/ Unit cost
*Operating surplus (tenant) = GR – Total cost including land rent
*Operating surplus (owner) = GR – Total cost excluding land rent

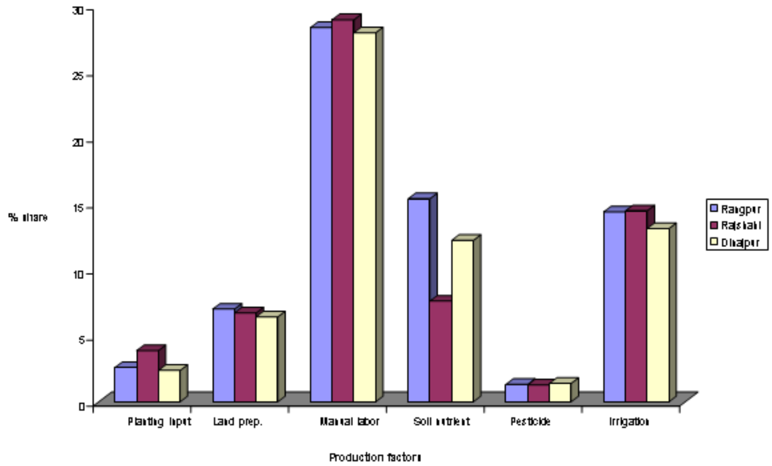

Fig: 1. Pattern of cost shares by the factors of MV Boro production

3. Cost and return analysis for various quartile groups

Benefit cost ratio analysis is shown in Table 2. Based on the complete cost assessment, the table indicates that the upper quartile group achieved an overall BCR of 1.36, with values ranging between 1.22 and 1.40 across the various locations. It is maximum in case of Rajshahi area followed by Rangpur and Dinajpur area. This indicates that, farmers belong to upper quartile group in Rajshahi area are more conscious about the use of modern rice production technologies.

Now, in case of lower quartile group the overall BCR is 1.02. In this case, the Rangpur and Dinajpur farms are showing almost similar trend. But the BCR of Rajshahi farms is less than unity. This is happening because of, the majority of the lower quartile group sample households in Rajshahi area devote their land to MV Aus. For that reason, in Boro season they used to cultivate early maturable Boro variety BRRI dhan28 which gives a lower yield compared to that of BRRI dhan29. Whereas, BRRI dhan29 is the most preferred variety in Rangpur and Dinajpur locations.

Table.2. Structure of Benefit cost ratio for different quartile groups in the study areas.

Items	Rangpur		Rajshahi		Dinajpur	
	Top ranked segment	Bottom ranked segment	Top ranked segment	Bottom ranked segment	Top ranked segment	Bottom ranked segment
Present input expense (BDT/ha)	28504	20103	18996	16614	26189	18829
Manual labor expense (BDT/ha)	22107	17959	19187	17295	25108	16894
Livestock labor expense (BDT/ha)	1590	1754	408	770	1417	2027
Motorized tiller expense (BDT/ha)	3720	2840	4486	3934	3582	2638

Land rent (BDT/ha)	10126	10126	8927	8927	10190	10190
Capital use charge	1136	908	860	786	1138	865
Overall expense (BDT/ha) Entire expense Monetary expense	 67183 57393	 53690 45866	 52864 43432	 48326 39704	 67624 57475	 51443 43723
Yield of paddy (BDT/ha)	5906	3173	4729	2646	5109	3039
Gross value: from paddy (BDT/ha) from by product (BDT/ha)	 91247 3112	 49022 7540	 73772 4110	 41278 6130	 78576 3406	 46740 6356
Total value of output (BDT/ha)	94359	56562	77882	47408	81892	53096
Profit cost ratio Total cost approach Monetary cost level	 1.40 1.65	 1.05 1.24	 1.47 1.79	 0.98 1.20	 1.22 1.43	 1.03 1.21

Again, considering cash cost the BCR of upper quartile group in case of Rajshahi area is also the highest which is followed by Rangpur and Dinajpur area. In case of lower quartile group, the BCR of three the study locations are showing almost similar trend.

4. Sensitivity analysis

Sensitivity analysis helps estimate how results may change if actual conditions differ from the main assumptions made during decision-making. Our agriculture sector generally suffers from various kinds of uncertainties. Among them, price of the inputs and outputs as well are very important. This is because even a slight variation in price can significantly impact the overall profit structure (Rouf et al., 2018**)**. Hence, this study carried out a sensitivity analysis under two assumed scenarios. Initially, what would happen in the profitability of the sample farmers if total cost including both cash cost and full cost increases by 10 percent, 15 percent and 20 percent respectively. Again, the second scenario explores how the profitability of the sampled farmers would change if their total yield increased by 10 percent, 15 percent, and 20 percent as a result of adopting more efficient technologies.

Table.3. Sensitivity analysis when cost increases and its effect on MV Boro profitability.

Discounted measure	Rangpur		Rajshahi		Dinajpur	
	Top ranked segment	Bottom ranked segment	Top ranked segment	Top ranked segment	Bottom ranked segment	Top ranked segment
BCR at 10% increase Total cost approach Monetary cost level	 1.28 1.49	 0.98 1.12	 1.34 1.63	 0.89 1.08	 1.10 1.30	 0.94 1.10
BCR at 15% increase Total cost approach Monetary cost level	 1.22 1.42	 0.92 1.07	 1.28 1.56	 0.86 1.04	 1.05 1.24	 0.90 1.06
BCR at 20% increase Total cost approach Monetary cost level	 1.17 1.37	 0.88 1.03	 1.23 1.49	 0.82 1.00	 1.01 1.19	 0.86 1.01

Table.4. Sensitivity analysis when yield increases and its effect on MV Boro profitability.

Discounted measure	Rangpur		Rajshahi		Dinajpur	
	Top ranked segment	Bottom ranked segment	Top ranked segment	Top ranked segment	Bottom ranked segment	Top ranked segment
BCR at 10% increase Total cost approach Monetary cost level	 1.54 1.80	 1.15 1.34	 1.61 1.96	 1.07 1.30	 1.33 1.56	 1.12 1.32
BCR at 15% increase Total cost approach Monetary cost level	 1.61 1.88	 1.19 1.39	 1.68 2.04	 1.11 1.35	 1.38 1.63	 1.17 1.38
BCR at 20% increase Total cost approach Monetary cost level	 1.67 1.95	 1.24 1.45	 1.75 2.13	 1.15 1.40	 1.44 1.70	 1.21 1.43

Table 3 and Table 4 reveal that, if the cost increases by various percent the cultivation of MV Boro rice still remains profitable specially for the upper quartile group farmers. But as the cost increases the BCR shows a decreasing trend. Again, due to technological progress if the paddy yield of the sample farmers increases by various percent, the MV Boro rice cultivation become more profitable for both upper and lower quartile group sample farmers.

Pattern of sharing returns from MV Boro

Factor payments and factor shares of gross returns from MV Boro rice per hectare were estimated based on prevailing market prices of each factor of production as described in earlier chapter. The distribution of shares of returns earned from MV Boro by factors of production (e.g. current inputs, land. labor and capital) is presented in Table 5.

Although the study areas fall under different production ecologies/ environments, the share of returns from output for different factors of production did not differ that much. Current expenditures, which reflect the working capital demands, generated between 28 percent and 33 percent of the gross income. On a percentage basis, returns to current inputs were the highest earner among all other factors of production in case of all the areas. The share to human labor varied between 27 to 29 percent in the study areas and was higher in case of Rajshahi farms.

The use of power tiller for rice cultivation was more dominant in Rajshahi than Rangpur and Dinajpur and that is why the share of power tiller to the gross value of output in Rajshahi was higher than that of Rangpur and Dinajpur. In absolute term, it was BDT 3280, BDT 4210 and BDT 3110 for Rangpur, Rajshahi and Dinajpur farms respectively. In all regions, MV Boro farming resulted in a positive residual surplus, meaning the gross output value exceeded the total cost of inputs, but the share of residual was nearly 21 percent for the Rangpur and Rajshahi farms while it was about 22 percent for the Dinajpur farms indicating that, the yield performance of MV Boro rice was slightly higher in flood prone regions compared to areas not affected by flooding

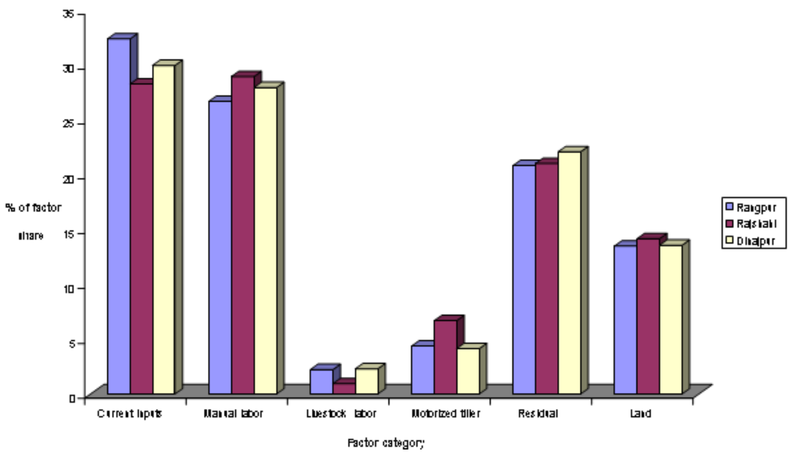

Fig: 2. Distribution patterns of factor shares by component

Table. 5. Comparative factor shares of different production participants in MV Boro production in the study areas

Factors	Rangpur		Rajshahi		Dinajpur	
	Factor payment	Factor share (%)	Factor payment	Factor share (%)	Factor payment	Factor share (%)
Gross value of production	75052	100.00	63012	100.00	75129	100.0
Current inputs [a]	24303	32.38	17805	28.26	22509	29.96
Manual labor	20033	26.69	18241	28.94	21001	27.94
Family	7196	9.58			7310	9.72
Hired	12837	17.10	7812	12.40	13691	18.22
			10428	16.54		
Livestock labor	1672	2.22	589	0.94	1722	2.29
Family	588	0.78			621	0.83
Hired	1084	1.44	391	0.62	1100	1.46

			198	0.32		
Motorized tiller	3280	4.37	4210	6.68	3110	4.14
Residual [b]	15637	20.83	13243	21.01	16598	22.09
Land [c]	10126	13.49	8927	14.16	10190	13.56

Note: **a.** Covers expenses for seeds, soil nutrient, pesticides, manures, irrigation, and related inputs.
b. Residual is computed as: Total output value minus the combined cost of current inputs, labor (manual and livestock), motorized tillerer use, and land charges.
c. Refers to the average seasonal rent for land.

Table. 6. Comparative income shares of different production participant's in MV Boro production in the study areas

Production participants	Rangpur		Rajshahi		Dinajpur	
	Income/value (BDT/ha)	Percentage of share	Income/value (BDT/ha)	Percentage of share	Income/value (BDT/ha)	Percentage of share
Net Gain	50749	100.0	45209	100.00	52621	100.00
Farmer	33547	66.11	30373	67.18	34719	65.98
Land	10126	19.95	8927	19.75	10190	19.36
Family labor	7196	14.18	7812	17.28	7310	13.89
Own livestock labor	588	1.16	391	0.87	621	1.18
Residual	15637	30.81	13243	29.29	16598	31.54
Hired labor	12837	25.29	10428	23.07	13691	26.01
Hired livestock labor	1084	2.14	198	0.44	1100	2.09
Motorized tiller	3280	6.46	4210	9.31	3110	5.91

Note: * Value added = Land + Family labor + Own livestock labor + Residual + Hired labor + Hired livestock labor + Motorized tiller
* Farmer = Land + Family labor + Own livestock labor + Residual

As reflected in Table 6, the majority share of income across all locations went to the farmers, with the next highest shares attributed to residual earnings and hired labor, respectively. Among the areas, Rajshahi area occupied the highest amount of farmer income share compared to that of other two locations.

VI. Conclusions

The study was conducted in three areas under three different production environments of Bangladesh. One upazilas from Dinajpur and one upazilla from Rangpur district represent mainly the flood prone ecosystem and the other upazilas under Rajshahi represents flood free ecosystem. The research primarily relied on firsthand data gathered through household surveys using a structured interview format. Additional information from secondary sources was utilized to complement the primary data.

MV Boro farming profitability was analyzed as part of the assessment. The gross margin was calculated by subtracting the total variable expenses from the overall return. The estimated cost of producing MV Boro rice per hectare amounted to BDT 60435 in Rangpur, BDT 50592 in Rajshahi, and BDT 59533 in Dinajpur. The cost of fertilizer per hectare was about BDT 10820 for Rangpur which was more than Dinajpur and almost double of that of Rajshahi. The cost of other inputs such as land preparation, human labor, manure, fertilizer and pesticides was almost similar in three production environments. Irrigation cost although differed in absolute term between three areas, but if considered as a share of production costs, it accounted about 17 percent of the total costs in all areas. However, among the cost items, labor cost accounted the highest share of the total costs (almost 30 percent) in all areas followed by irrigation cost. Operating surplus was derived as the difference between gross returns and variable expenditures. A higher operating surplus was observed for both tenant and owner farmers in the Dinajpur region. The MV Boro productivity in Dinajpur was higher (4561 kg/ha) than Rajshahi (3711 kg/ha) and Rangpur (4513 kg/ha). The rate of profit was also substantially higher for the farms in Dinajpur (nearly 18 percent) than that of Rajshahi (15 percent) and Rangpur (16 percent).

Applying the functional income distribution approach, factor payments and factor shares of gross returns per/ha were estimated. The share of returns from modern Boro output for different factors of production did not differ that much. Between 34 percent and 37 percent of the gross returns were absorbed by the cost of current inputs, indicating the level of working capital involved. On a percentage basis, returns to current inputs were the highest earner among all other factors of production in case of all the areas. The share to human labor varied between 27 to 28 percent in the study areas and was higher in case of Rajshahi farms.

The use of power tiller for rice cultivation was more dominant in Rajshahi than Rangpur and Dinajpur and that is why the share of power tiller to the gross value of output in Rajshahi was higher than that of Rangpur and Dinajpur. In absolute term it was BDT 4211, BDT 3280 and BDT 3110 for Rajshahi, Rangpur and Dinajpur farms respectively. The residual (or operators surplus) was positive in the cultivation of MV Boro in all the areas but the share of residual was nearly 20.83 percent for the Rangpur farms while it was about 21.01 percent for the Rajshahi farms and 22.09 percent for the Dinajpur farms indicating that, the yield performance of MV Boro rice was superior in flood prone zones compared to areas not affected by flooding.

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