

Minimizing cost of production through introducing community based agricultural mechanization for the smallholders in Bangladesh

Abstract

For achieving food security, Bangladesh has to go for vertical expansion of agricultural output over the current situation of its cultivable land. One of the most important means to boost up the vertical expansion of agricultural production is to adopt small scale agricultural mechanization suitable for the smallholders. In addition rural labour force has started to shift from agricultural to industrial sector and service sector, creating an acute agricultural labour shortage during peak planting and harvesting times which resulting in yield reduction and excess cost of production. This study was an attempt to develop a community based agricultural mechanization for the smallholders by introducing Krishi Sheba based service system in rural Bangladesh. By using Transplanter & Reaper machine it was possible to save at least 40 labour for a acre of land. On the other hand, it will bring a net income of around Tk. 104000 for a six month period by using this community based service system. Overall, the labor shortage crisis of the community farmers and the cost of production have been minimized significantly.

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Introduction

By 2050, global population is expected to reach 9.6 billion.¹ As a result, the consumption of staple cereals, including rice, wheat, maize, as well as fish and meat products is expected to increase dramatically—particularly in rapidly developing countries.² This situation has been complicated day by day by decreasing arable agricultural land and migration of active labour from agriculture to non-agriculture sector in Bangladesh. The demand of cereals by the year 2030 has been projected to reach 43.82 million tons at an anticipated per capita income growth rate of 2%. This implies that the production of cereals will have to be increased by 2030. Scope for horizontal expansion of cultivable land is limited. To achieve the increased food production target Bangladesh has to go for vertical expansion of agricultural output over the current situation of its cultivable land. One of the most important means to boost up the vertical expansion of agricultural production is to adopt agricultural mechanization suitable for the Bangladeshi smallholders. Currently, 150 rice reapers and 100 combined harvesters are being used in Bangladesh. The mechanization of rice harvesting has only reached 15% of the rice planting area. The use of mechanical harvesters in rice production can avoid losses of about 3% per season. Agricultural labours are decreased from 63% in 2007 to 47% in 2012. Moreover, rural labour force has started to shift from agricultural to industrial sector and service sector, creating an acute agricultural labour shortage during peak planting and harvesting times which resulting in yield reduction and excess cost of production.

To establish strategies for the successful mechanization of rice harvesting, it is necessary to find out some alternative ways. Therefore, this study was an attempt to develop a community based agricultural mechanization for the smallholders by introducing Krishi Sheba based service system in rural Bangladesh. Therefore, farm mechanization for the smallholders in Bangladesh is inevitable to reduce the cost of production through introducing community based agricultural mechanization. The theme of this research work was to

develop a community based service center which will provide services and training to the small farmers. As smallholders are economically poor they cannot able to purchase modern agricultural machineries. At first we made a cooperative society. There was a project manager from the community, he was known as local service provider (LSP). The community applied for loan to BKB @ 9% interest rate.

Results at a glance

Table 1, Table 2 & Figure 1, Figure 2



Figure 1 A farmer is planting rice with Rice Transplanter Machine.



Figure 2 A farmer is cutting rice with reaper machine.

Table 1 Comparative analysis of conventional method and modern method (Transplanter & Reaper) for Producing rice

Items	Conventional method (Tk.)			Modern method using rice transplanter & reaper machine (Tk.)			Hiring from local merchant farmer (Tk.)		
	No. of labor	Wage rate	Cost (Tk.)	No. of labor	Wage rate	Cost (Tk.)	No. of labor	Wage rate	Cost (Tk.)
Planting Cost (Human Labor)	21	400	8400	1	450	450	1	450	450
				Fuel cost	1.5 L ×100	150	Fuel cost		150
Harvesting Cost (Human Labor)	21	400	8400	1	450	450	1	450	450
				Fuel cost	1.5 L ×100	150	Fuel cost		150
Operation payment	-	-	-	-	-	1500			3000
Total cost			16800			2700			4200
Total cost saved	14100						1500		
Total no. of labor	42			2			2		
Labor saved	40 persons						0		

Source Authors' estimation based on field survey, 2017

Table 2 Cost-Benefit analysis of Rice Transplanter and Reaper Machine for 10 acres of land for 6 months period

Items	Cost (Tk.)	
	For 1 acre	For 10 acres
Initial investment (390000+170000)		560000
Labor Cost saved	14100	141000
Total Income	14100	141000
Cost items		
Labor cost	900	9000
Fuel cost	300	3000
Depreciation @5%	2800	28000
Repair & Maintenance @5%	2800	28000
Project manager salary @Tk. 5000 per month	600	30000
Shade Rent @Tk.1800 per month	1080	10800
Repayment of Loan@ 9% for 6 months	1220.8	12208
Total cost	9700.8	97008
Net income or profit	4400	44000
Approximate salvage value at the ending of the project	Tk.48000	
Income from salvage value @ 6 months	8000	
Total net income	44000+8000=52000	
Annual total income	104000	
Expected project duration @ 5 years	Tk. 520000	

Source Authors' calculation based on field survey, 2017.

Impact for the smallholders in Bangladesh

1. Reduced the labor shortage crisis of the community farmers;
2. Minimized the cost of production; and
3. Community farmers' livelihood has been improved significantly.

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Conflicts of interest

The contents are the sole responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government.

References

1. Gerland P, Raftery AE, Sevčiková , et al. World population stabilization unlikely this century. *Science*. 2014;346(6206):234–237.
2. Godfray HCJ, Garnett T. Food security and sustainable intensification. *Philos Trans R Soc B Biol Sci*. 2014;369(1639):1–10.