

## Effect on mode of payment of irrigation market through improving water conveyance system for boro rice

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**Abstract:** The present investigation was undertaken to control the water losses in the existing irrigation water conveyance system for *boro* rice through Improving Irrigation Market System Project for a period of two years (2009-2010) and by the water sellers and farmers. Improve earthen channel-IEC (improve water conveyance system) composed by a mixture of clay, cow dung and rice husk (2:1:1). It is needed 2-3 days for drying and used. The 10 water seller were trained on improving water conveyance system and set IEC demonstrations by maintaining 600ft per demo keeping control channel (farmer practice) for boro rice cultivation at Bogra and Gaibandha districts. The water seller saved 15 % irrigation cost from demo channel than control. The two irrigation cost of payment mode was existed crop and fuel share methods. Payment through crop sharing mean 1/4<sup>th</sup> portion of rice given to the water seller after rice harvesting and fuel share mean paid engine rent Tk 1200-1600/season/acre to water seller and farmer were used engine by his own fuel and labor. The water seller improved the water conveyance system through IEC and reduced 15% irrigation cost. The benefited farmers those who completed mode of payment by the fuel share method because they received water by improve earthen channel resulting quick supply of water in farmer field and saved time, fuel and cost. On the contrary, the crop sharing farmer did not benefit due to water seller took 1/4<sup>th</sup> rice after saving the 15% irrigation cost. So, Irrigation marketing system affected by the mode of irrigation payment systems and water loss minimized by promoting IEC which also lead to ground water and environment.

**Key words:** Boro rice, irrigation, market, water, conveyance system

### Introduction

Bangladesh has about 9.94 million hectares of cultivable land, out of which about 62.45% is brought under irrigation (BADC, 2009-10) by using surface and underground water for crops production especially for boro rice production. The remaining 37.55% land remains outside irrigation coverage due to not only lack of development of irrigation facilities but also due to on-farm water distribution and management practices of the existing facilities (Sattar *et al.*, 2009). Proper water distribution/conveyance system plays a vital role in reduction of irrigation cost. In Bangladesh, farmers normally used of weak earthen channel system for water distribution common in minor irrigation sectors. These earthen channels suffer from a number of problems such as low conveyance and application efficiency, relatively small area coverage due to high seepage, leakage and evaporation losses. About 50% water is lost through leakage, seepage and percolation which is collectively termed conveyance loss (Biswas *et al.*, 1984) as a result irrigation cost is high for boro rice cultivation. Irrigation payment system by farmer to water seller is two methods such as crop and fuel share methods in Bogra and Gaibandha district. The Improving Irrigation Market System Project is aimed to reduce the irrigation cost by promoting the improving earthen channel (IEC) through reducing the water loss caused by leakage, seepage, percolation etc. The fuel share method of irrigation payment system in favor of farmer because if minimize the water loss so quick water reach in to farmer field consequently farmer can save the fuel and become benefited but in case of crop share method water seller do not take the less irrigation cost from farmer though cost is reduced by promoting improve earthen channel. The present study was attempted to find out the comparative effect of payment systems for irrigation of *boro* rice through IEC and its performances.

### Materials and Methods

The improve earthen channel (IEC) demonstration were set during 2009-2010 in Sonatala and Sariakandhi upazila under Bogra and Gobindhaganj and Palashbari Upazila

under Gaibandha district. Those shallow machine owners are sell the full time irrigation water as profession to boro rice or other crops farmer is called the water seller. The water sellers were provided training through lecture and practical methods. With the support of project, water seller made the improving earthen canal demonstration by maintaining the training knowledge.

**The improving earthen channel (IEC):** The improving earthen channel (IEC) was prepared in such a way that the bottom of the channel was elevated from the surrounding land (Photograph 1 & 2). After cutting the soil, the soil in the channel was compacted by hammering and finally the bottom and side of the channel were layered by a mixture of clay, cow dung and rice husk and the ratio was 2:1:1. After layering, 2-3 days was needed for drying and then it was ready to be used for irrigation.



Photograph 1. Improve earthen irrigation channel

### Mode of Irrigation Payment

**Crop share method:** Crop share was a method of irrigation payment system where farmer direct provides crop/rice to water seller as irrigation cost just after harvesting the rice for one season. In general farmer 1/4<sup>th</sup> portion of total rice pay to water seller. Farmer was paid crop sharing method so 1/4<sup>th</sup> portion rice mean 660kg rice was paid to water seller for one acre land since total

2640kg yield of boro rice in one acre land so farmers are paid Tk. 11550 per acre land as irrigation cost



Photograph 2. IEC with irrigation water

**Fuel share method:** Fuel share was a method of irrigation payment system where farmer paid engine rent Tk. 1200-1600 per acre land per season to water seller and farmer was used the engine of that water seller by his own fuel.

Farmer if pay fuel sharing method so farmer was paid Tk1600 engine charge per season and used about 88 liter fuel by own for one acre land for 30 numbers irrigations (in general 30 numbers of irrigation is required per season for *boro* rice cultivation) and additional need 5 liter for 1<sup>st</sup> irrigation.

## Results and Discussion

### Irrigation cost reduction by using improve earthen channel:

Under the Improving irrigation Market System Project, the 10 demonstrations were set on improve earthen channel (lined) with control channel (unlined) for boro rice. Each water seller maintained the two channels for his shallow machine one for improve earthen channel and another control channel. The water seller observed and documented that how much irrigation time is required for one acre land by crossing 600 ft improve earthen channel and control channel.

**Table 1.** Water seller wise effect of irrigation

Name of the water seller	Irrigation time (hr) / acre land/ irrigation		Irrigation time (hr) / acre land/ 30 irrigations		Fuel required (lt) / acre/ 30 irrigations		Fuel price (Tk) /acre land/ 30 irrigations		Save fuel price (Tk)	Save irrigati on cost (%)
	Demo canal	Control canal	Demo canal	Control canal	Demo canal	Control canal	Demo canal (a)	Control canal (b)		
Shohidul Islam	3.03	3.54	91	106.06	68.25	79.55	3139	3659	520	14
A. Motaleb	3.03	3.38	91	101.52	68.25	76.14	3139	3502	363	10
Farazul Islam	3.33	3.67	100	110.00	75	82.50	3450	3795	345	9
Nazrul Islam	3.03	3.79	91	113.64	68.25	85.23	3139	3920	781	20
Haider Ali	4.17	4.86	125	145.83	93.75	109.37	4312	5031	719	14
Sider Rahman	3.33	4.08	100	122.50	75	91.88	3450	4226	776	18
Moinul Haque	2.53	3.03	76	90.91	57	68.18	2622	3136	514	16
Sabu Mia	3.17	3.75	95	112.50	71.25	84.38	3277	3881	604	16
Masud Rana	2.53	3.18	76	95.38	57	71.53	2622	3290	668	20
Badsa Prodan	3.33	3.80	91	106.06	75	85.41	3450	3929	479	12
Average	3.15	3.71	93.60	110.44	70.88	83.42	3260	3837	577	15

Table 1 showed that average 93.60 hour time required for one acre land irrigation by using the demo channel on the contrary 110.44 hour time required for the same size land for irrigation by using control channel for 30 numbers irrigation. It was found that 16.84 hour time saved for one acre land irrigation per season by using the demo channel. About 12.50 liters fuel was required for the 16.84 hour shallow machine operating and this fuel value was about

Tk. 577 was saved and since 16.84 hour save so it labor value Tk. 300 and the total saved Tk. 877. The one water seller average 10 acres land covered by one shallow machine so they saved the cost Tk. 8770 for one season by using improve earthen channel. It was also revealed that average 15 % irrigation cost reduced by using improve earthen channel.

**Comparative statement of improve earthen channel and control channel:** It is observed that no more cost for preparing the improving earthen channel than control channel. The comparison is showed in the following table.

In table 2 showed that Tk. 6000 spent for only first year but all following year need less money since the improve channel do not break for every next *Aman* rice season so need only repairing cost for following year. In case of control channel every year is broken for next *Aman* rice so need more money for again preparing the new channel. Here statement that Tk 14000 required for preparing improve earthen channel and Tk. 15000 required for control channel for every fifth year. The similar result also found by Maniruzzaman *et al.*, 2002 for PVC and plastic pipe irrigation conveyance system.

**Effect of mode of payment system for irrigation market:** Irrigation mode of payment system is played vital

roll for irrigation market. Within the two systems including crop share and fuel method were affected to water seller or farmer from perspective of benefit. In the table 3 revealed that if water seller and farmer were negotiated crop share method so farmer gives Tk. 11550 equal value rice to water seller for one acre land just after harvesting the rice, it was highlighted that every cost such as fuel, mobile, labor etc were bearded by the water seller. On the contrary if water seller and farmer were negotiated fuel share method so farmer give Tk. 1600 to water seller as machine charge for per acre land and farmer was spent Tk. 6317 for fuel and labor so total spent 7917 for one acre land. Here comparative statement (Table 3), farmer was spent irrigation cost Tk. 11550 for crop share method and Tk 7917 for fuel share method for one acre land in outsider demo areas.

**Table 2.** Statement of improve earthen channel and control channel

Year	Cost (Tk.) for 600ft channel	
	Demo channel	Control channel
First year	6000	3000
Second year	2000	3000
Third year	2000	3000
Fourth year	2000	3000
Fifth year	2000	3000
Total	14000	15000

**Table 3.** Comparative analysis of two mode of payment system for irrigation

By crop share method		By fuel share method		
1/4 <sup>th</sup> portion rice (kg)	1/4 <sup>th</sup> portion rice price (Tk.)	Machine charge (Tk.) /acre (a)	Demo Channel (b)	Control Channel (c)
660	11550	1600	5290	6317
(Yield: 2640kg/acre)			6890	7917
Total irrigation cost	11550		(a+b)	(a+c)

**Calculation**

**1. For demo channel:** Fuel: 70.88 L/ acre/season, Fuel: 05 L/ acre for 1<sup>st</sup> irrigation, Total: 75.88 Liter, Fuel: 46 Tk./Liter ( 2009-10), Fuel cost: Tk. 3490, Labor: 12 for 31 irrigation, Labor: 150/person, Labor cost: Tk. 1800, Total cost: Tk. 5290.

**2. For control channel:** Fuel: 83.42 L/ acre/season, Fuel: 05 L/ acre for 1<sup>st</sup> irrigation, Total: 88.42 Liter, Fuel: 46 Tk./Liter, Fuel cost: Tk. 4067, Labor: 15 for 31

irrigation, Labor: 150/person, Labor cost: Tk.2250 and Total cost: Tk. 6317

In project areas farmer got opportunity to use the water seller made improve earthen channel for irrigation. In this case farmer so less spent the irrigation by fuel method and here the cost were Tk. 1600 for machine charge and Tk. 5290 for fuel and labor so total cost Tk. 6890 (in table-3) per acre land due to less used 12.5 liter fuel (in Table-1) and less use the 2 labors since 16.84 hours (table-1) saved for 30 irrigations by using improve earthen channel. Here

comparative statement (Table 3), farmer was spent irrigation cost Tk. 11550 for crop share method and Tk. 6890 for fuel share method for demo areas.

In the project areas water seller did not take reduce amount of rice than 660 kg (equal value Tk. 11550) in crop share areas since water seller reduced the irrigation cost by made improving earthen channel. The project intervention finding that promotion of improve earthen channel can be benefited to farmer where mode of payment is existed in fuel method. In case of crop sharing areas only water seller is benefitted by promoting improve earthen channel which is no ultimate goal of the project since farmer is poor than water seller.

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