Public Paddy e-Procurement Program in Bangladesh: Effects and Efficacy

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Outline of the presentation

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Background

- Public procurement of food-grains in Bangladesh has significant implications for production and public food-grain stock (Ahmed, et al., 2022).
- The government buys foodgrains from domestic markets, stores the procured foodgrains in public warehoused and distributes through different channels of the Public Food Distribution System.
- Objectives of public food grains procurement programmes include providing price support for farmers, market price stabilization and building public stock for food-based assistance distribution (Ahmed, howdhury & Ahmed, 1993).

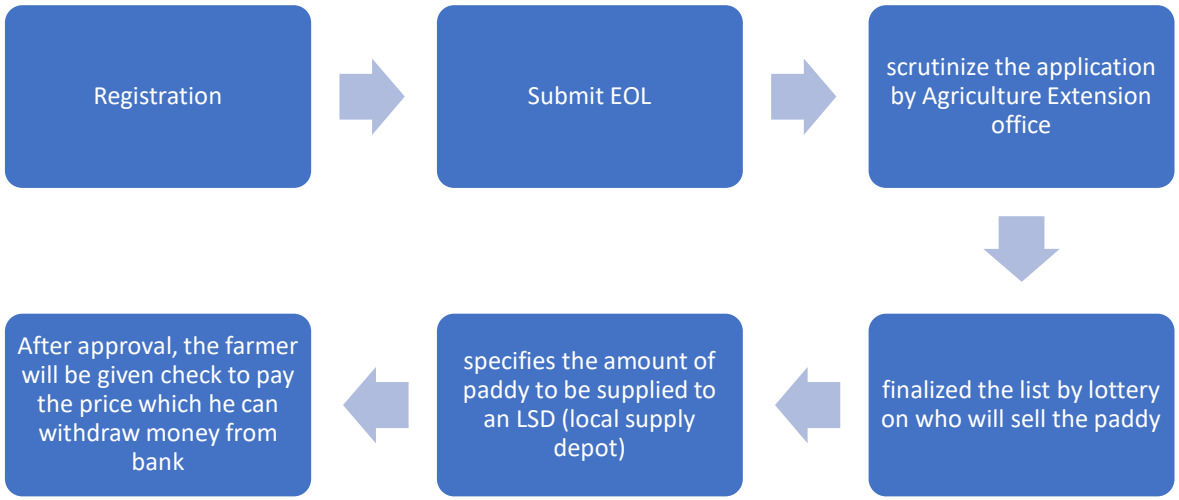
- The program intends to purchase paddy directly from farmers through thousands of purchasing centers all over the country. However, evidence suggests that the bulk of the purchase comes from traders or intermediaries; thus, the program benefits the intermediaries more than the farmers (Quasem, 1979; Islam, 1980).

- The drawbacks might include service irregularities, high administrative costs, leakage, inefficient implementation, mismanagement, etc.

"Krishoker App": Mobile phone app based paddy procurement system

- In this context, the government started a mobile phone-based/e-procurement system of paddy in 2019/20 in a few sub-districts.
- Under this system, the government selects farmers through a computer-based lottery from the eligible pool and buys paddy directly from them.
- The main objective of this program is to prevent irregularities in the paddy procurement operations in Bangladesh for the benefit of the farmers, so that the farmers will get fair price of the product and will not be seen as the middlemen exploiters.
- Earlier, farmers had to go to the Upazila office for information on sale of paddy. But now to participate in this program, from applying for sale of paddy to paddy deposit, various information and status can be informed via digital/ sms to farmers mobile.

The steps of mobile-app based paddy procurement system



Research Questions

This study assesses the following research questions

- Are farmers benefitted from the new program?
- Does the paddy e-procurement system improve the targeting efficiency of the program?
- What explains the non-participation in the program?

Research design and data

- The study areas have been selected purposively based on the extent and volume of rice production and procurement.
- We have four groups of interest.

- *Program Sub-districts*

(i) Participant farmers (G1): farmers who registered, won the lottery and sold paddy to procurement center using e-procurement;
(ii) Eligible but non-participant (G2): farmers who registered but lost the lottery;
(iii) Non-willing and non-participant (G3): farmers who did not take part in the registration and lottery; and

- *Non-program sub-districts*

(i) Non-participant traditional farmers (G4): Farmers from non-program sub-districts who have sold their paddy using traditional method.

Analytical approach

- The random assignment of the treatment through lottery offers us a unique setup to establish causal inference.

- The difference between (G1) and (G2) of the outcome variables yields the average treatment effect (ATE) of the intervention. Formally, in the regression framework, let Y_i is the outcome variable. "Treatment" variable which takes the value of 1 if farmers are the participants in the program and 0 otherwise. Here, X_i is the vector of other covariates.

- $Y_i = b_0 + b_1.treatment + b_2.X_i e_i$.....(i)

The outcome variable Y includes

- Farmers' benefit from the program

i. Income from Boro

ii. Income from rice

- We will exploit the difference between G1 and G4 to examine how the new e-procurement method fare with the traditional one in terms of targeting efficiency

- In addition to (i), we will include two more benefits to the households:

i. Number of visits to the public office for rice selling

ii. Costs related to participating in government's procurement incurred by the farmers (e.g., transportation)

- The regression model used to estimate the paddy e-procurement program participation function is

- $y_i = \beta X_i + e_i \,; \quad i = 1, \ldots, n$ .....(ii)

- Where y_i is the dependent variable which takes a value of 1 if the household participated and a value of 0 if the households did not participate in the paddy e-procurement program. X_i is a vector of variables capturing household and the farm-level characteristics, β is the vector of parameters to be estimated and e_i is an error term

Results and Findings

Table 1: Socio-demographic characteristics of the sample households

	All households (N=1265)
Male headed HH (%)	98
Age of the HH head (years)	48.28
education of HH head (years)	7.03
HH size (No.)	4.84
HH possesses any smart phone (%)	58.66
HH was affected by any natural disaster in the last 5 years (%)	71.7
Distance to procurement centre (km)	7.72
Distance to nearest market (km)	1.53
Small farmer (50-149 decimal) (%)	39.48
Medium farmer (150-249 decimal) (%)	29.24
Large farmer (more than 250 decimal) (%)	31.28

Table 2: Average treatment effects: Income effects (household gross income) (Group1 vs Group2)

Outcome variables	Group (N=622)	Potential outcome-means	ATE (G1 vs G2)
Income from Boro cultivation (Tk.)	G1	135,325***	31,972***
	G2	103,353***	
Income from total rice cultivation (Tk./year)	G1	224,659***	42,645***
	G2	182,014***	

Data source: Field survey, 2021. Significance levels: 10%*, 5%**, 1%***.

Control variables: If the HH is male headed, Age of the HH head, education of HH head, HH size, If HH possesses any smart phone, If HH was affected by any natural disaster (flood, drought, river erosion) in the previous year , *Upazila* level dummies

Table 3: Average treatment effects: Transaction effects (Group1 Vs Group4)

Outcome variables	Group (N=636)	Potential outcome-means	ATE (G1 vs G4)
No. of visits to the procurement centre for paddy selling	G1	2.82*** (0.088)	0.990** (0.451)
	G4	1.83*** (0.075)	
Costs related to participating in govt. procurement incurred by farmers (Transportation cost : Tk./maund)	G1	18.52*** (1.260)	8.41*** (1.338)
	G4	10.11*** (0.514)	

Data source: Field survey, 2021. Significance levels: 10%*, 5%**, 1%***. A fully robust standard errors (SE) are in parentheses.

Control variables: If the HH is male headed, Age of the HH head, education of HH head, HH size, If HH possesses any smart phone, If HH was affected by any natural disaster (flood, drought, river erosion) in the previous year, *Upazila* level dummies

Table 4: Targeting efficiency of the program

	Group1	Group4
If the hh is a farm hh (farmer)(%)	95.44	83.13
HH met all criteria's (%)	87.95	69.28
Used own krishi card (%)	77.78	63.82

Table 5: Participation effects (Group1 Group2 Vs Group3)

	Model 1		Model 2	
Outcome variable	(participation=1, no participation=0)		log of total amount of paddy sold at procurement centre (maund)	
	Coefficient	SE	Coefficient	SE
Farmer (=yes)	0.242**	0.131	1.145***	0.175
Male headed HH (=yes)	-0.553	0.573	0.019	0.669
Age of the HH head (years)	-0.005	0.003	-0.001	0.005
Education of HH head (years)	0.027***	0.010	0.045***	0.014
Household size (No.)	-0.022	0.028	0.016	0.038
If HH possesses any smart phone (=yes)	0.195**	0.092	0.237**	0.133
If HH was affected by any natural disaster (=yes)	0.068	0.096	0.064	0.176
Distance to procurement centre (km)	-0.016**	0.008	-0.022**	0.012
Farm size				
Medium farmer	0.058	0.104	0.002	0.145
Large farmer	0.199*	0.120	0.381**	0.174
Prob> chi2	0.000		0.000	
No. of observations	933		933	

Data source: Field survey, 2021. The *Upazila* level dummies are included in the model. Significance levels: 10%*, 5%**, 1%***. SE is fully robust standard error.

Conclusions

- Paddy e-procurement has a positive effect on rice income.
- We find the transaction cost is comparatively higher for e-procurement than the traditional system due to mismanagement. Need to take appropriate action to reduce the irregularities.
- The farmers far off from the LSDs are less interested in the procurement program compared to those located nearer the LSDs.
- Education can influence the participation. Farmers awareness program can be undertaken.
- Many times “Krishi card” are using by the non-farmers and farmers are not aware about it. In this case, it is necessary to provide a registered mobile phone number in the card.