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FARMERS' PERCEPTIONS ABOUT BAU-STR DRYER: A GENDER-SENSITIVE ANALYSIS IN BANGLADESH

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ABSTRACT

The study was conducted to determine the socio-demographic traits of farmers who used the BAU-STR dryer to dry their paddy, evaluate howgender-based farmers perceived the technology, and determine the challenges farmers experienced while implementing postharvest technology. Data were gathered from 132 sample farmers in Bangladesh'sMymensingh, Netrokona, Barishal, and Jhalakathi districts between the months of January and February 2022 using the purposive sampling technique. The sample farmers were interviewed face-to-face using a semi-structured questionnaire to gather data, which was then evaluated using descriptive statistics, the Gender Perception Index (GPI), and the ProblemConfrontation Index (PCI). Results of the descriptive analysis revealed that32% of male farmers were 25-34 years and 27% of them had 11-20 years of farming experience. 41% of female farmers belonged to the age categoryof 35-44 years and 38% of them had 21-30 years of farming experience. 30% of male and 47% of female respondents completed primary education only. About 92% of female and only 27% of male respondents received microcredit. About 95% of females participated in the paddy drying task, in which only 56% of males participated. 69% of sample farm households belonging to small farm sizes and 45% of them had medium annual income.The GPI discovered that while both male and female respondents had favorable opinions of the BAU-STR dryer's technological advantages, there were notable disparities in how they decided to employ technology and how much money to spend. The PCI determined that the main obstacles to implementing new postharvest technology were a lack of sufficient finance, high-interest rates, and small land sizes. According to the study's findings, utilizing women-friendly postharvest technologies might reduce postharvest losses, increase household income, raise living standards, andboost the nation's food security situation.

Keywords: *BAU-STR dryer, Paddy drying, Gender perception index, Technology, Postharvest, Food security*

JEL classification: Q16, Q18

INTRODUCTION

The economy of Bangladesh depends extensively on the agricultural sector. This sector employs 37.75% of Bangladesh's workforce [1] and contributes 12.07% to the country's GDP [2]. The primary food crop of Bangladesh is paddy, and it ranks third among countries that produce paddy globally [3]. The production of paddy is essential to Bangladeshi citizens' ability to support themselves. In Bangladesh, women perform 99% of post-harvest agricultural tasks such as parboiling, drying, winnowing, cleaning, processing, grinding, storing, and preserving, even though their labor is still not acknowledged [4]. Due to the misconception that they work less than men owing to physical infirmity, they are paid less than male laborers in the agricultural industry. Bangladeshi women work in the informal agriculture sector for 16 hours on average each day, according to research by the Centre for Policy Dialogue (CPD). This donation is worth more than 601 billion US dollars in monetary terms. The GDP of the nation would have increased significantly if this sum had been contributed to it [5]. Women are specifically in charge of drying and storing grains at the household level following harvest [4]. In Bangladesh, traditional sun drying methods are still used despite the availability of a variety of drying systems and sophisticated technologies, due to the country's inferior technological advantage and limited technological capability. Dependence on sunshine during the wet and winter seasons prevents sun-drying from safely removing moisture from grains and slows paddy drying, which ultimately results in 1.56–5% grain loss during the drying stage alone [6]. Post-harvest losses arise from delayed, insufficient, or inadequate drying processes that lower grain quality [7]. The use of mechanical BAU-STR Dryer for grain drying purposes is playing a good role in rural women in Bangladesh compared to the traditional sun drying method, making an impact on minimizing post-harvest losses, saving wasted time, and developing women-friendly technology in case of postharvest activities [8]. In this study, gender-specific perceptions reveal how farmers' social and cultural perspectives on the use of BAU-STR drying technology differ between men and women. Men and women in Bangladesh exhibit different views toward the same items due to socially imposed restrictions and regulations. Nordhagen [9] argues that recommendations for Postharvest loss reduction strategies should be based on analyses that are gender-sensitive and identify any gender-based obstacles that actors encounter at crucial loss points in the supply chain. These analyses should also take into account the different needs, capacities, and preferences that women and men have. So, the particular goals of this study were to evaluate the socioeconomic traits of farmers who used the BAU-STR drier, to examine how

gender influenced farmers' perceptions about the dryer, and to identify the main barriers to farmers' adoption of postharvest technology. As a result, not only farmers who are interested in mechanical drying will benefit from the findings of this study, but also rice millers, wheat and maize growers, and scholars. The study will also help policymakers better understand the innovation of women-friendly postharvest technologies based on the findings from very consistent and high-quality databases.

THEORETICAL BACKGROUND

There is a considerable amount of research studies that have empirically investigated gender differences in the adoption of agricultural technology [10]. Research showed that widespread adoption of post-harvest technology could result in a favorable perception [11]. A measurement called the Gender Perception Index (GPI) asks respondents to express their views on a variety of chosen variables from a gender perspective. In this study, GPI was calculated using closed-ended interview questions. The respondents were asked to give their opinion on ten selected indicators, which were identified during pretesting of the questionnaire and the indicators used by Amir [12] and Kabir [13]. Fig. 1 highlights the four stages of technology innovation to scaling, the responses from sample farmers were recorded based on their perceptions of ten selected statements.

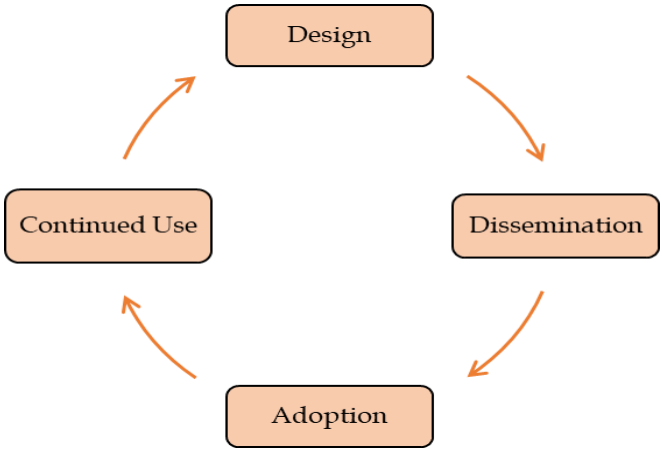

Figure 1: *Stages of technology innovation to scaling [14]*

RESEARCH METHODOLOGY

Selection of the study area

The availability of the BAU-STR dryer was an influential factor in the selection of the study regions. The participants in this research were paddy farmers who adopted BAU-STR dryer from the Phulpur upazila in Mymensingh, the Purbadhala upazila in Netrokona, the Wazirpur and Babuganj upazila in Barishal, and the Nalchity upazila in the Jhalakathi district in Bangladesh.

Sampling technique, sample size, and data collection

Data were obtained from 132 sample farmers (61 male and 61 female) using the purposive sampling technique and farmers were interviewed via a structured close-ended questionnaire.

Data analytical technique

Collected data were analyzed using "descriptive statistics" which describes the socioeconomic characteristics of paddy growers in the study area based on the number, percentages, rank order, etc. The gender perception index (GPI) was measured using a five-point scale. Gender perception index (GPI) = SA× 4 + A × 3 + N × 2 + D ×1+SD ×0. Where, SA =the total number of respondents who expressed "strongly agree; A = the total number of respondents who expressed "Agree"; N = the total number of respondents who expressed "Neutral"; D= the total number of respondents who expressed "Disagree" and SD = the total number of respondents who expressed "Strongly disagree" on their perception. The weights assigned were 0 for "strongly disagree", 1 for "disagree" and 2 for "neutral" 3 for "agree" 4 for strongly agree. The weights of responses of all the indicators were added together to obtain the gender perception score. To measure the constraints which farmers faced in adopting any postharvest technology, Problem Confrontation Index (PCI) was used by using a structured questionnaire. The sample farmers were asked to give their opinion on ten selected problems. The respondents were given four alternative responses ("high =3", "medium =2", "low =1", and "not at all =0") for each of the ten selected problems. Problem Confrontation Index (PCI) = Ph × 3 + Pm × 2 + Pl × 1 + Pn × 0. Where, Ph = the total number of respondents who expressed the problem as "high"; Pm = the total number of respondents who

expressed the problem as "medium"; Pl = the total number of respondents who expressed the problem as "low"; and Pn = the total number of respondents who expressed the problem as "not at all". The computed PCI of the 10 problems for 132 respondents could range from 0 to 396, where 0 indicates 'no' problem confrontation and 396 indicates 'high' problem confrontation.

RESULTS AND DISCUSSION

Socio-demographic profile of respondents

This research study assessed the socioeconomic characteristics of the respondents which can be used as an important indicator in making comparisons among different categories of them. Age is a very important demographic factor that influences the efficient allocation of resources, ability to do work, and attitude towards various social and economic aspects of life. One individual character which pertains to individual personal makeup and plays a key role in individual adoption behavior is age [15]. People's perception of different issues also varies with their age differences. Table 1 reveals that 32% of male respondents were in the age category of 25-34 years and 41% of female respondents were in the age category of 35-44 years. The level of literacy is generally considered an index of the social advancement of a community. Most of the sample adopter farmers both male and female were educated up to the primary level around 30% and 47% respectively. Only 8% of male and 2% of female participants completed the graduation level (Table 1). Farming experience is another important variable that has a positive effect on attitudes toward using new technology in traditional agricultural practices. Table 1 represents that 27% of male farmers had farming experience for 11-20 years and 38% of female farmers had 21-30 years which was the highest. This figure indicates that most of the adopter farmers had a good experience in agriculture. One of the most economical sources of funding for farmers is small or microcredit. It is seen from Table 1 that among the sample farmers, most of the female respondents who adopted the BAU-STR dryer used microcredit to a large extent which is about 92%, and male respondents' use rate was only 27%. The results indicate that microcredit access to rural women has a positive impact on new technology adoption decisions. The study results also reflect that only 56% of male respondents participated in paddy drying activity whereas about 95% of female respondents performed the drying task of paddy (Table 1).

Table 1: *Socioeconomic characteristics of sample paddy growers*

Selected Characteristics	Scoring	Categories score	Farmers (N=132)			
			Male		Female	
			Frequency	Percentage (%)	Frequency	Percentage (%)
Age	Number of years	15 up to 24 years	5	8	2	3
		25 up to 34 years	21	32	20	30
		35 up to 44 years	14	21	27	41
		45 up to 54 years	16	24	13	20
		55 up to 64 years	10	15	4	6
Education	Years of schooling	No Formal Education	14	21	15	23
		Primary (1-5th)	20	30	31	47
		Secondary (6-10th)	19	29	17	26
		Higher Secondary (11-12th)	8	12	2	3
		Graduation (>12th)	5	8	1	2
Farming experience	Years	0-10	5	8	3	5
		11-20	18	27	18	27
		21-30	12	18	25	38
		31-40	15	23	11	17
		>40	16	24	9	14
Micro-credit received	Scale score	No	48	73	5	8
		Yes	18	27	61	92

Source: Author's calculation, based on field survey (2022)

Farm size is very important for the optimal resource allocation of farm households. Therefore, farm size is measured in this study by using the formula; Farm size = Own cultivated land + Leased in land + Mortgaged in the land - Leased out the land- Mortgaged out the land. In this study, according to BBS [16] the farmers were classified into five categories based on farm size: Landless, Marginal, Small, Medium, and Large. Table 1 shows that most of the sample farm households were small belonging to 69% which mainly reflects the scenario of our rural Bangladesh. Only 1% were landless and about 2% were large farmers. The annual family income of farm households is the amount of income earned by all employed family members in one fiscal year. This includes everything from the on-farm income to off-farm income i.e., salary, daily wages, bonuses, commissions, overtime, etc. According to HIES [17] report, the average annual household income is almost TK 192000.

It appears from the result depicted in Table 1 that most of the respondents i.e., 45% were in the medium income category and had an annual family income from TK 121000 to TK 250000. That indicates most of the respondents who adopted the BAU-STR dryer have an average annual family income above theHIES reported income level.

Farmers' perception about gender sensitive BAU-STR dryer technology

The adoption and use of different kinds of agricultural technologies depend on the gender of the household head. Table 2 reveals the perception of male and female members of the household based on the design, dissemination, adoption, and use of the BAU-STR dryer. Most of the farmers have the same perception of the technology benefits reflecting its design and use. According to Gender Perception Index (GPI), almost all male and female farmers confessed that the BAU-STR dryer reduces the time spent by women when performing the drying task which ranked the first position according to both male and female perceptions (Table 2). In this case, there is no gender-based difference. Most of the farmers also positively perceived that it is a women-friendly technology and it improves the technical know-how of women. It is more convincing for farmers to use this technology to make easier their drying task of paddy. It is due to the technology used being time-saving, weather independence, environment-friendly, using locally available raw materials as fuel, labor-saving, and easy to operate (Table 2). Access to take decisions for adopting this technology has ranked 2nd highest score in the perception index given by men and scored 9th in the female perception. Fig. 2 clearly shows there is a great difference between the male and female responses which reflects that most of the decisions about farming and adopting new technology are predominantly made by men [10].

Male farmers are positively perceived with the statements that they have enough access to decide to adopt technology, they have enough access to control the income from the sale of service by this technology and they have enough access to act as a service provider of BAU-STR dryer. Women showed negative perceptions of these statements (Table 2 and fig. 2). The study results attempted to analyze the pattern of women's participation in the decision-making process and their perceptions regarding agricultural technology inclusion, which shows that women are often less concerned in the decision-making process even at the family level [18].

Table 2: *Gender Perception Index (GPI) from the perspective of male and female farmers*

Perception Statement	Male Perception		Female Perception	
	GPI score	Rank order	GPI score	Rank order
1. Is the BAU-STR dryer women-friendly technology?	220	5	224	2
2. Is it increases the technical know-how of women?	221	4	222	3
3. Has it reduced the time spent by women performing the drying task?	241	1	245	1
4. Are there socio-cultural barriers to women operating this machine?	77	10	91	8
5. Do you think women have access to get service providers to come to their farms?	148	7	143	4
6. Do you think women have enough access to repair the machinery as per their requirements?	146	8	139	5
7. Have you had enough access to decide on adopting the technology?	234	2	81	9
8. Do you think you have enough access to credit for buying this technology?	117	9	104	7
9. Have you had enough access to act as a service provider of the BAU-STR dryer?	166	6	61	10
10. Have you had enough access to control the income from the sale of services through this technology?	232	3	109	6

Source: Author's Calculation, based on Field Survey (2022)

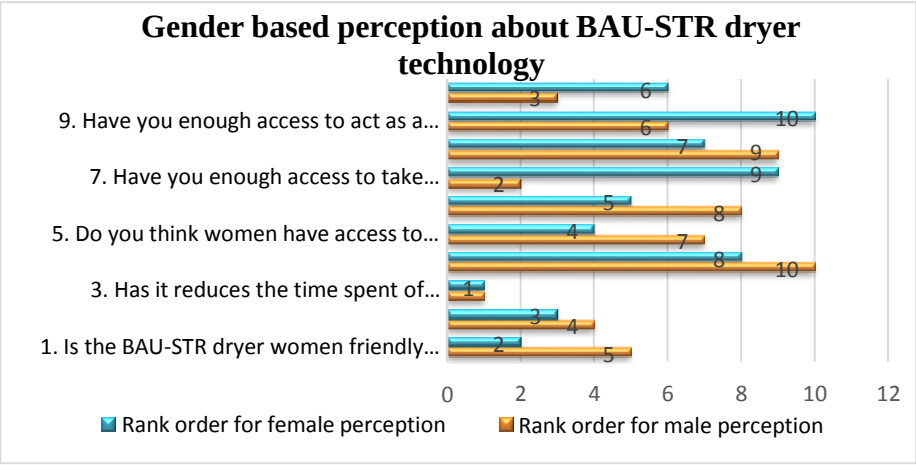

Figure 2: *Gender-based perception of BAU-STR dryer technology (Author's calculation, 2022)*

Constraints of adopting new postharvest technology

Due to high expenses, seasonal labor shortages, unfavorable weather conditions, and timeliness of operation, farmers in Bangladesh are becoming more interested in mechanization for crop post-harvesting tasks. Farmers are interested in utilizing new technologies, but they frequently run into difficulties when trying to do so. The majority of respondents noted that one of the biggest problems in the study areas with the highest PCI score 379, is the shortage of enough capital (Table 3). The respondents noted that the high-interest rate of credit is the second highest problem scoring 374 in the PCI and the small size of the land is the third largest problem scoring 365 (Table 3), as they claimed they cannot use heavy machinery.

According to Table 3, the fourth largest problem with implementing new postharvest technology, which received a PCI score of 353, is the higher cost of the machinery. Similarly, respondents in the research locations noted that they have very limited access to credit, which received the PCI's fifth-highest value. Several respondents, especially all the women, claimed that most technologies are not women-friendly; this problem received a score of 335 on the PCI. Poor levels of automation can also discourage young people from farming and hurt women farmers disproportionately, according to a study by Baudron [19]. According to Table 3, the seventh, eighth, ninth, and tenth-ranked problems in the PCI are lack of proper knowledge about technology and training facilities,

inadequate extension services, inadequate service providers and market dealers, and inadequate farmers' interest in adopting new technology respectively. Farmers in some areas have also voluntarily adopted one or more tillage implements, sowing implements, paddy threshers, dryers, and plant protection equipment because they believe these implements improve operation quality and lessen the laboriousness associated with traditional methods [20]. Nonetheless, it has been noted that the majority of farmers in our nation are unaware of postharvest technology, even though ineffective postharvest management resulted in significant losses. The rural people are mostly poor and hardly can buy costly machines individually.

Table 3: *Summary results of Problem Confrontation Index (PCI)*

Problem Statement	**PCI**	**Rank order**
Lack of adequate capital	379	1
High-interest rate of credit	374	2
The small size of land holding	365	3
The high price of the machinery	353	4
Inadequate credit access	351	5
Most of the technologies are not women-friendly	335	6
Lack of proper knowledge and training	326	7
Inadequate Extension services	274	8
Lack of adequate service providers	139	9
Lack of farmers' interest to adopt a new technology	75	10

Source: Author's calculation, based on field survey (2022)

CONCLUSION

Traditional sun-drying practice in our country is more labor-intensive and time-consuming and is mainly done by women. Therefore, smallholder women farmers face a lot of problems while drying grains and a huge amount of postharvest losses also take place in the drying stage. Adopting the BAU-STR Dryer leads to not only reduced postharvest losses but also helps the women by reducing their time in drying which they may use in other income-generating activities. The study results reveal the socioeconomic status of farmers who adopted the BAU-STR dryer and identified major differences in the male and

female farmers' perception of the improved drying technology and also identified major problems faced by them in adopting new postharvest technology. The results of this study can be helpful to make some recommendations for enhancing the adoption of new postharvest technology and improving the status of women farmers in Bangladesh: the agricultural extension department should provide adequate training to farmers, especially the women farmers, banks should provide sufficient loans with lower interest rates, policymakers should take proper steps to introduce women-friendly agricultural technology, provide training and easily reachable services to local farmers, Government should take proper steps to inform the farmers and keep up to date them about newly invented technologies in agriculture, law and order enforcing agencies should be vigilant to minimize the division of agricultural land by applying proper land reform policy. If these conditions were improved, it could be a boom for a larger extent of adoption of farm machinery and implements simultaneously, helping in increasing the farm mechanization process.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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