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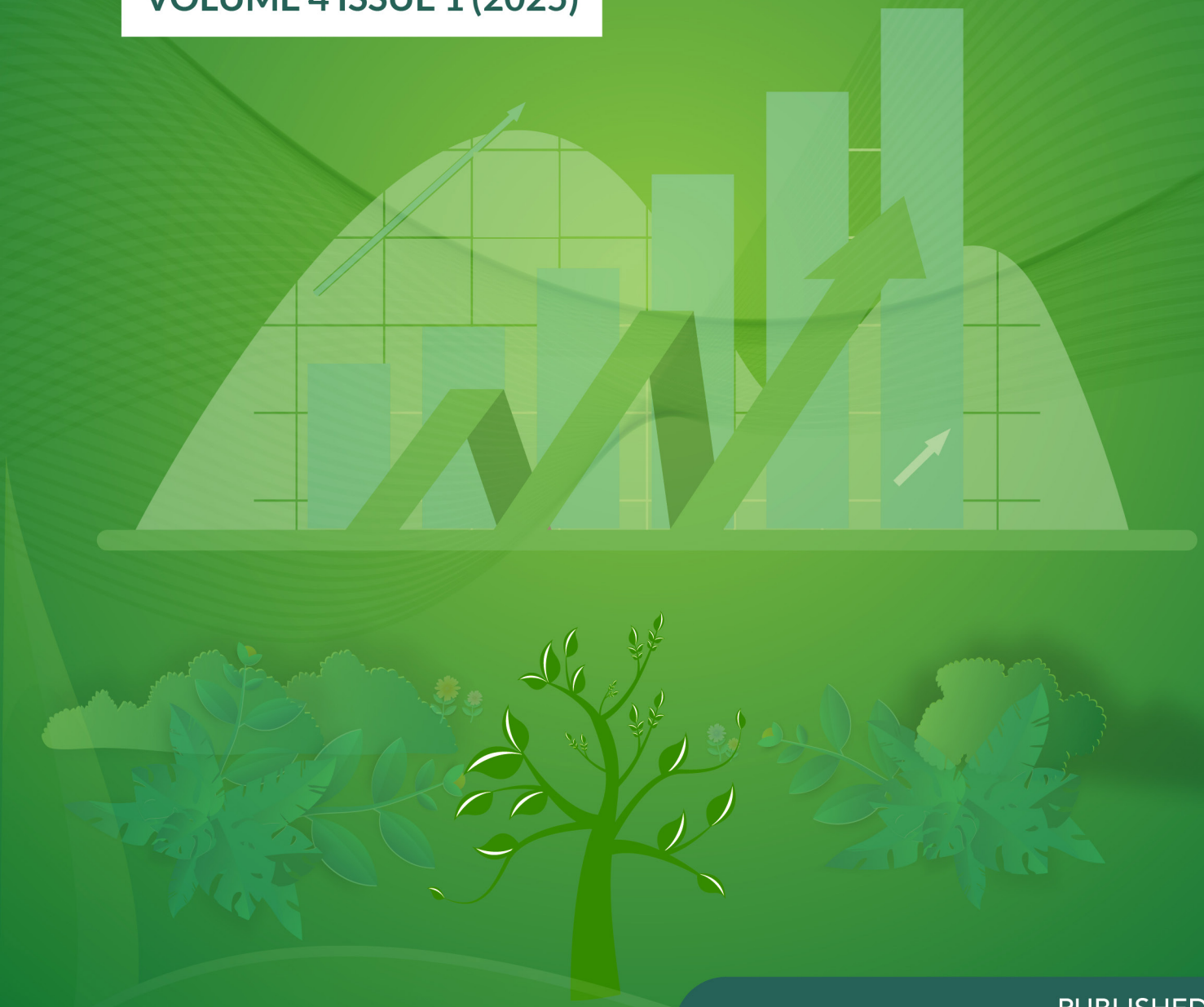

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Entrepreneurs' Perception on the Benefits of Organic Vegetable Farming in Bangladesh

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ABSTRACT

Bangladesh's farmers use unnecessary chemical inputs, including fertilizers, with the aim of producing more. Over-reliance on chemicals poses challenges to maintaining socially, economically, and environmentally sustaina-ble agriculture. Farm entrepreneurs are more interested in environmentally friendly agriculture than farmers in general. In addition, a growing number of consumers are interested in purchasing safe and reliable crops. Or-ganic farming is one of the promising options because certification allows consumers to choose environmentally friendly products. In promoting organic farming, government policies focus on vegetables. With this back-ground, this study aims to better understand the entrepreneurs' perception on organic vegetable farming benefits in Bangladesh. Also, this study attempted to investigate the challenges and suggestions in the organic vegetable marketing. Next, a face-to-face interview survey through prescribed questionnaires was conducted among 129 organic farm entrepreneurs in Muradnagar. We examined the results of the questionnaire survey and found that the respondents' organic farming experience is positively and significantly correlated with the benefits of organic farming. They (more than 90%) found that organic vegetable farming is an eco-friendly farming method, where-as the demand for organic vegetables is increasing, and customers pay more for organic products. Easy docu-mentation and supervised policy enforcement can guide organic product certification in Bangladesh.

INTRODUCTION

Since the 1980s, eco-friendly farming practices have gained attention as an effective method to curb rural poverty and pollution (Patil, *et al.*, 2010). As early as 1981, for example, the FAO began promoting integrated pest man-agement practices for rice production among developing countries like Bangladesh through its Inter-Country Program (FAO, 2011). It introduced a similar integrated pest management program for vegetables in 1995 (Ah-med, *et al.*, 2009).

The Bangladesh government began implementing the National Integrated Pest Management Policy in 2002 to promote eco-friendly agriculture. By the end of 2006, nearly 117,000 rice and 78,000 vegetable farmers had re-ceived training (FAO, 2011). Several studies afterward showed an increase in organic crop production and con-sumer demand for organic produce partly because of growing concerns over health and environmental damage caused by agriculture (Rakib, *et al.*, 2020; Mukul, *et al.*, 2013; Kumar, 2019; Karim, 2018; Parvez, *et al.*, 2018). Iqbal (2015) found that Dhaka consumers were willing to buy organic products, mostly fruits and vegetables, with up to 20% of higher premiums.

Despite this positive picture, Dasgupta *et al.* (2005) found that more than 47% of Bangladeshi farmers overused pesticides. The misconception that organic farming is ineffective in terms of pest and disease control still influ-ences farmers in Bangladesh (Hossain, 2011; Musa *et al.*, 2015). Other critics pointed out about a shortage of organic inputs, little promotional coverage, and consumers' limited awareness (Hossain, 2011; Islam, *et al.*, 2019; Sarker & Itohara, 2008). Musa, *et al.* (2015) found prevalent misconceptions among farmers, who mixed up conventional and organic practices as a notable constraint.

Despite an increasing number of studies on organic farming in Bangladesh, we still do not know how organic vegetable production is perceived by farm entrepreneurs. What could be the actual impeding factors for farmers to expand organic crop production in Bangladesh? Therefore, this paper seeks to better understand farm entre-preneurs' perceptions about the benefits of organic vegetable farming and its challenges. In the following discus-sion, we first ex-plain the methodology we used in this study, followed by our investigation results and discussion, and conclusion

MATERIALS AND METHODS

Study Area

Bangladesh's economy is predominantly dependent on agriculture. Agriculture contributes to about 14% of the GDP. It hires 40.6% of the total workforce (BBS, 2021). Bangladesh has nearly 8.7 million hectares of cropped area with 197% cropping intensity. The cropping intensity has increased in the last two decades as the policy emphasized more on producing high value horticultural crops, mostly vegetables and fruits. About 90 types of vegetables are grown. About 30.33 million metric tons of vegetables were produced in the 2020-2021 fiscal year (MOA, 2021). Vegetable exports increased from 23,198 metric tons in 2008-2009 to 93,353 metric tons in 2017-2018 (HF, 2019). For the study area, we selected Muradnagar town in Cumilla district, one of Bangladesh's largest sub-districts. The town is located 84 kilometers from Dhaka (the

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capital city) (Figure 1). Its land area of 340.73 km2 with 101,809 households, including 79,357 farm households (BBS, 2019a). In total 42 cropping patterns were observed here with 217% cropping intensity. Out of total cultivable lands (24,293 ha), vegetables were grown in about 1,177 ha of land in 2021. The total volume of vegetable farmers in this town produced in 2020-2021 was 33,575 metric tons. Nearly 9,859 metric tons of chemical fertilizers were used for agricultural production in 2010-2011 (UAO, 2022).

The Bangladesh Agricultural Research Institute (BARI), a prominent research institution, launched a campaign in 2006 to promote organic farming in several districts, including Cumilla. That effort sought to enhance soil health, agricultural yield, and minimize local farmers' reliance on chemical pesticides and fertilizers. Government organ-izations (GOs) and non-governmental organizations (NGOs) conducted workshops, seminars, and field demon-strations to disseminate information about the benefits and procedures of organic farming and integrated pest management. Over time, participating farmers experienced positive outcomes, inspiring others to adopt sustain-able agriculture practices (UAO, 2021).

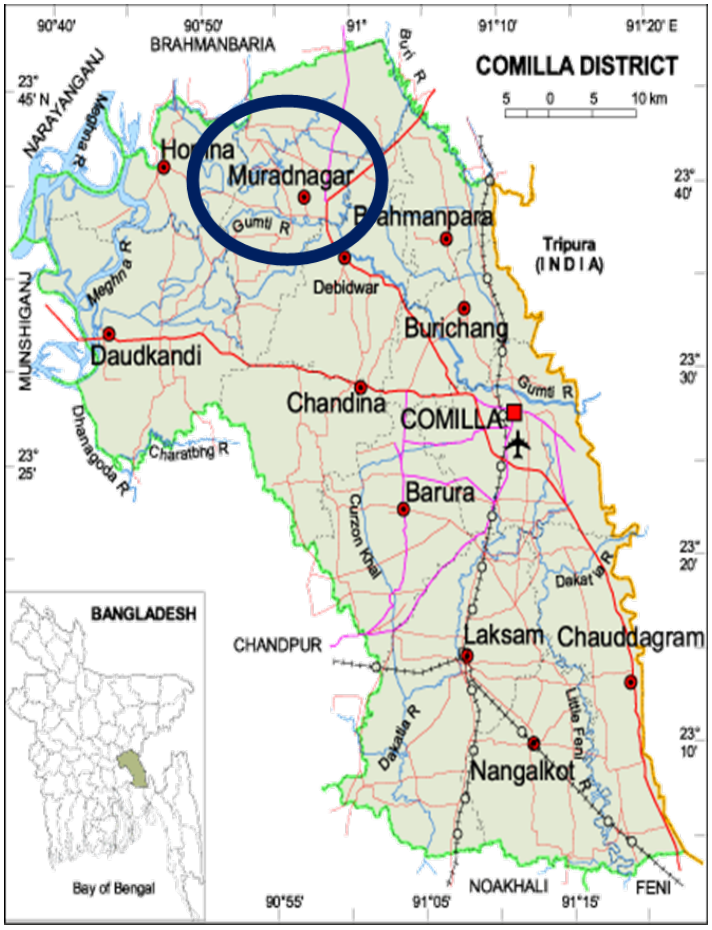

Figure 1: Location map of the study area. Encircled area indicates Muradnagar Sub-District

Data Collection and Analysis

In collecting data for this paper, we conducted a structured questionnaire survey from March to April 2022 among 129 organic farm entrepreneurs. There are three crop seasons in Bangladesh and the Department of Ag-ricultural Extension (DAE) provides seasonal training for farmers. Generally, one farmer can participate in one training session per season. A total of 195 farmers were trained on organic farming in 2020-2021 fiscal year by the Muradnagar Agriculture Office. Out of these trained entrepreneurs, I received feedback from 129 organic farmers.

Before the questionnaire survey, we conducted a literature review to help design the questionnaire. Our literature review included peer-review journals, research reports, and published government documents. In selecting peer-review journal papers, we used database searches, including JSTOR, Google Scholar, and the Tulips search engine of the University of Tsukuba Library system. In extracting information from published government documents, we first examined relevant legal/policy frameworks, such as the National Agriculture Extension Pol-icy, 2020 and National Organic Agricultural Policy, 2016. These documents instructed how local agriculture offi-cials dealt with organic farming extension. In addition, the first author worked as an agriculture cadre officer under the Bangladesh Civil Service for seven years and conducted field surveys in service areas.

The questionnaire survey was divided into three sections: (1) respondents' socio-demographic information such as age, gender, education, experience, participation in training, and business engagement, (2) respondents' or-ganic farming adoption, and their economic and environmental benefits from it, (3) the target market of organic farm produce and its marketing challenges. The responses to our questionnaire were coded and analyzed by using Microsoft Excel (version 16.46), and the results are described in tables and figures in the following discussion. We categorized respondent's age into three groups. Those who belonged to 18-35 age group was "young," those in 36-50 age group was "middle-aged," and those in 51 years and above were the "older." To quantitatively ana-lyze socio-demographic variables, we assigned score 1 for up to two years of respondent's conventional farming experience, score 2 for six to 10 years, score 3 for 11 to 20 years, and score 4 for more than 20 years. For quanti-fying educational qualification, score 1 was assigned to no formal education, 2 for primary education, 3 for sec-ondary education, and 4 for graduate degrees. Similarly, we assigned score 1 for up to two years of respondent's organic farming business experience, score 2 for 3 to 5 years, and score 3 for more than 5 years. To understand perceptual variation among the respondents on the economic and environmental benefits of or-ganic vegetable farming, we compared the average rating of each variable on a 5-point Likert-scale from 1 (strongly disagree) to 5 (strongly agree). Similar formulas were also used for understanding the challenges and required suggestions in the marketing of organic vegetables. A correlation analysis was then performed between socio-demographic variables and organic vegetable farming benefits.

RESULTS AND DISCUSSION

Socio-demographic Characteristics of the Respondents

The first section of the questionnaire attempted to identify respondents' socio-demographic characteristics (Ta-ble 1). We found that about 74% of the respondents were either young or middle-aged. In comparison, the na-tional statistics show that those between 18 and 50 years old comprised about 54% of the population (BBS, 2019b). Those who were 51 years or older consisted of about 26%. We also found that the male respondents constituted about 89%. In terms of education, about 4% completed an undergraduate degree or above whereas about 31% had secondary education (classes 9 to 12). Those who completed primary education (classes 1 to 8) consisted of 55%. Except for about 10% without formal education, the overall literacy rate was about 90% that exceeded the national average of 72.3% (BBS, 2019b).

Table 1: Socio-demographic information of the respondents

Variable	Category	Frequency	Percentage (%)
Age group (years)	18 to 35	31	24.03
	36 to 50	65	50.39
	51 and above	33	25.58
Gender	Male	115	89.15
	Female	14	10.85
Education	No formal education	13	10.08
	Primary (Class 1 to 8)	71	55.04
	Secondary (Class 9 to 12)	40	31.01
	Graduate and above	5	3.88
Conventional farming experience (years)	Up to 5	24	18.60
	6 to 10	33	25.58
	11 to 20	45	34.89
	21 and above	27	20.93
Training on conventional farming	Once a year	102	79.07
	Twice a year	27	20.93
	More than twice a year	0	0
Organic farming business experience (years)	Up to 2	50	38.76
	3 to 5	47	36.43
	6 and above	32	24.81

Note: Sample size=129

Regarding conventional farming experience, we found that about 25% had six to ten years, about 35% had 11 to 20 years of experiences, and about 21% had more than 21 years. It means that about 81% had more than six years of conventional farming experience. With regards to DAE's training on conventional agriculture, about 79% participated once a year and about 21% participated twice a year. Regarding organic business experience, we found

that about 36% had three to five years of experiences, about 25% had more than six years of experiences. It means about 61% had a minimum of at least three years of organic business experience. Only 39% had been engaged in organic farming businesses for two years.

Benefits of Organic Vegetable Farming

In the second section of the questionnaire survey, we attempted to understand how the respondents perceived environmental and economic benefits from adopting organic vegetable farming.

Before asking about benefits, we first attempted to identify their regular farming practices. With multiple choice, the respondents were asked to choose the following options: (1) crop rotation, (2) reduced tillage, (3) crop resi-due use, (4) quality seed use, (5) organic manure use, (6) bio-pesticide use, (7) integrated pest management, (8) integrated disease management, and (9) post-harvest management. In response, we found that the respondents regularly practiced crop rotation (25%), tillage reduction (10%), crop residue use (12%), quality seed use (15%), organic manure application (6%), bio-pesticide use (9%), integrated pest management (8%), integrated disease management (9%), and post-harvest management (7%) (Figure 2).

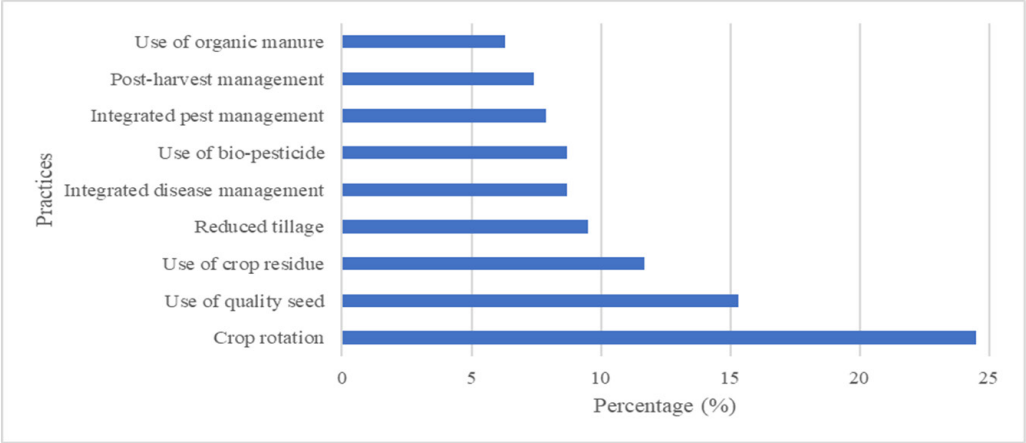

Figure 2: Adoption of organic practices by the respondents

In the next question, the respondents were asked about environmental concerns in connection to practicing or-ganic vegetable farming. We offered a set of statements on a five-point Likert scale to the respondents in order for them to understand the level of environmental consciousness among organic vegetable entrepreneurs and to gain insights into their motivations and activities aimed at promoting sustainable agriculture methods. In re-sponse, nearly 67% of the respondents strongly agreed that organic vegetable farming is an eco-friendly farming method, and about 55% strongly agreed that OVF is one of the best ways of getting safe foods. The respondents agreed that OVF uses appropriate levels of tillage, OVF increases soil fertility and water holding capacity, OVF conserves biodiversity, and OVF minimizes chemical runoff into water bodies in about 51, 50, 64, and 63% re-spectively (Figure 3).

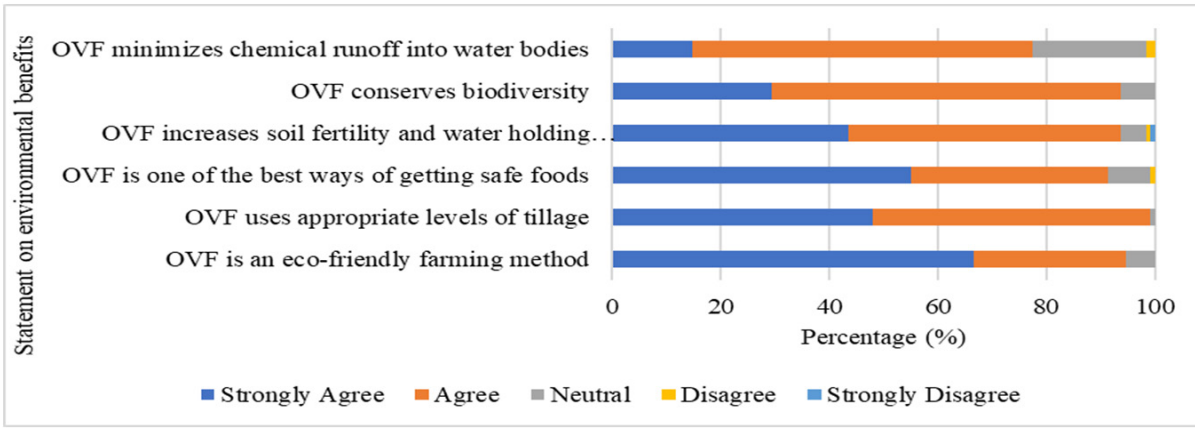

Figure 3: Opinions on the environmental benefits of organic vegetable farming
Note: OVF=Organic Vegetable Farming

We asked the respondents with another set of Likert-scale statements to understand their opinion about eco-nomic benefits that may be expected to obtain from practicing organic farming. Farmers usually work hard in the fields to produce, and effective marketing aids them be able to support themselves financially. Therefore, one of the key considerations for selecting profitable crops for oneself is the economic advantage. We found that about 54% of the respondents strongly agreed that demand for organic vegetables is increasing. In addition, about 60% agreed that organic vegetable farming can minimize disease and pest attacks, and about 57% agreed that intercropping and mixed cropping can minimize space and time. About 55% of the respondents agreed that OVF increases better quality products with good size and shape of produce, and more than 49% agreed that OVF could create employment opportunities (Figure 4).

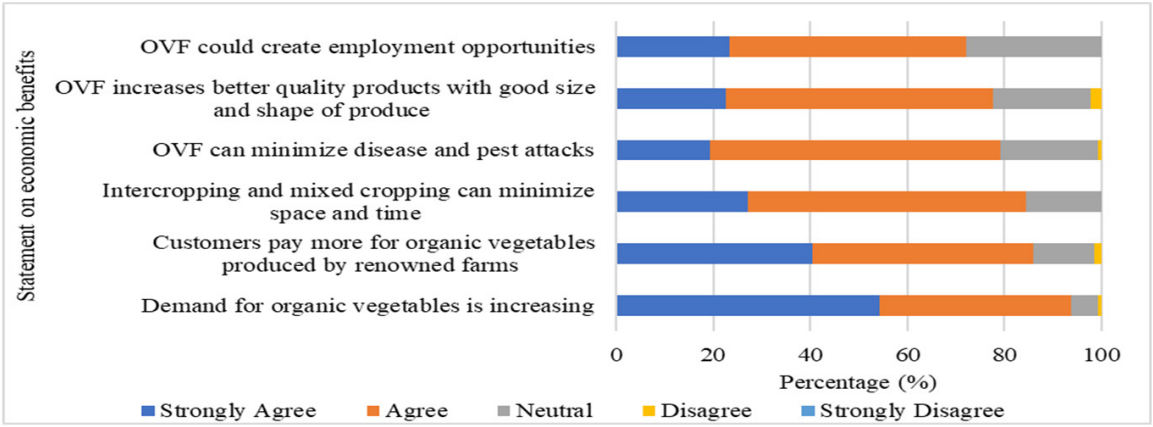

Figure 4: Opinions on the economic benefits of organic vegetable farming
Note: OVF=Organic Vegetable Farming

According the respondents' opinions. the correlation analyses intended to understand the relationship between the benefits of organic vegetable farming and respondents' socio-demographic characteristics such as age, gen-der, education, conventional farming experience, participation in conventional farming training, and experience in the farming business. We found that respondents' longer experience in the organic farming business was strongly correlated with their positive response to the benefits of organic vegetable farming. Therefore, it can be said that the respondents benefited more from organic farming through longer organic farm business experience. However, age, gender, education, conventional farming experience, and participation in conventional farming training were not significant to understand respondents' perceptions of organic vegetable farming benefits (Table 2).

Table 2: Factors affecting the respondents' perception on organic vegetable farming benefits

Socio-demographic variables	The respondents' perception on organic vegetable farming benefits	
	Pearson Coefficient of correlation	Significant (2-tailed)
Age	.085	.336
Gender	-.023	.796
Education	-.119	.179
Conventional farming experience	.023	.792
Participation in conventional farming training	-.022	.800
The organic business experience	.250*	.004

Total number of respondents=129
** Correlation is significant at the 0.05 level (1-tailed)*

Challenges and Suggestions in Organic Vegetables Marketing

To pinpoint the areas where they want assistance or resources to enhance their marketing strategy, it is crucial to comprehend the difficulties that organic vegetable farmers encounter in promoting their produce. Additionally, it can inform policymakers about the issues that organic farmers encounter in the marketplace, which

could lead to policy changes that could be advantageous for organic agriculture. It also helps consumers about the ad-vantages and significance of organic agriculture, which can lead to increased demand for organic produce. Therefore, finding areas for development and growth in the organic agriculture sector requires asking questions about the difficulties that organic vegetable farmers experience in marketing their produce.

We presented the respondents with a series of Likert-scale statements to better grasp their perspectives on these difficulties. In response, about 68% of the respondents thought that the local certification of organic products is time-consuming. According to their strong agreement and agreement, about 65% respondents felt that organic products are not sufficiently known among customers. Approximately 79% agreed with the statement that the poor transport facilities to reach large markets. A syndicate system of middlemen can mislead the market by giv-ing wrong price in-formation, as supported by 85% of respondents as strong agreement and agreement. Fur-thermore, about 90% of the respondents strongly agreed and agreed that post-harvest management facilities are limited in rural areas (Figure 5).

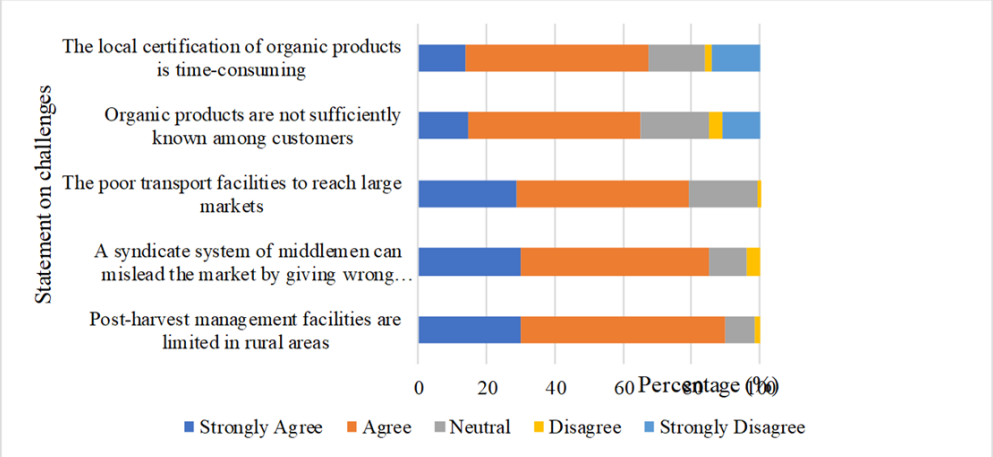

Figure 5: Opinions on the challenges in organic vegetable marketing

The respondents were asked with a series of Likert-scale statements to give suggestions for overcoming the above opined challenges. In response, about 83% of the respondents thought that digitalization of the certification process may minimize the hassles. About 85% respondents felt that building an effective link between farmers and private food processing companies may minimize post-harvest losses. Approximately 90% agreed with the statement that supermarkets need to know more about organic products at my farm and others nearby. They are willing to increase production with easier and quicker access to city markets, as supported by 86% of respondents as strong agreement and agreement. As their strong agreement and agreement, over 84% of the respondents indicated that product pricing should be designed to meet the needs of the target groups as their strong agree-ment and agreement. Furthermore, about 92% of the respondents strongly agreed and agreed that mass media coverage of organic products may attract more consumers (Figure 6).

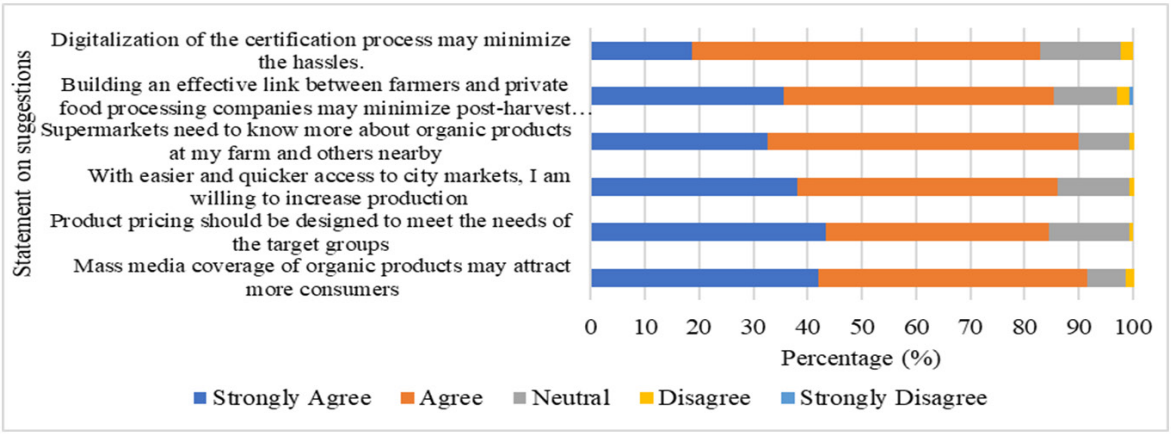

Figure 5: Opinions on the suggestions to meet the challenges in organic vegetable marketing

CONCLUSIONS

This paper has discussed the perception on benefits of organic vegetable farming and summarizes the findings and provides recommendations for promoting organic vegetable farming in Bangladesh. Examining the socio-demographic data from the respondents, we found majority of the respondents were young or middle-aged man who had primary education. On the conventional farming experience, most of the respondents had at least an absolute experience of six years, and were trained by DAE annually in conventional agriculture practicing. Regarding the organic business experience, majority of the respondents had a minimum of three years of experience.

We observed that the most of the farm entrepreneurs prefer organic vegetable production since these do not have a negative effect on the surrounding environment. Additionally, there was a specialized market for the quality organic produces, and consumers were always ready to spend on it. The organic vegetable producers found insufficient market information as a major difficulty, when the information transfer could expand market.

The results of this study also established that a positive correlation between respondents' responses to the advantages of organic vegetable farming and their longer experience in the organic agriculture. This finding might prompt the relevant authorities to provide an appropriate capacity building program to enhance the commercialization of organic product marketing. Increased coordination between farmers and extension workers is re-quired for the rapid dissemination of organic vegetable farming skills. For the new entrepreneurs, agricultural training is one of the important contributors to this effort. The Department of Agricultural Extension, Bangla-desh can facilities here through provides better training for newer with logistic supports.

This study was carried out in one sub-district only with selected 129 respondents. A large-scale study area and a greater sample size would help to reveal more persuasive results. Therefore, further investigation might be pursued in other districts to assure farmer-friendly organic agricultural promotion.

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