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Contribution of Selected Factors on Farmers' Work Performance towards Fertilizer Application in Rice of Bangladesh

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Abstract: There is enormous possibility to increase rice yield in Bangladesh. Inefficient and often imbalanced fertilizer use impedes farmers from achieving expected yields. It is evident from past research that farmers have resorted to applying fertilizers at inappropriate rates that do not match well with the nutrient requirement of certain crops. Therefore, this study explores the contribution of selected factors that influence farmers' work performance and determine the highest contributing factors on farmers' work performance towards fertilizer application in rice. This research used a multistage simple random sampling method to select 355 farmers from twenty-one rice production areas of Bangladesh. Data, collected using a structured questionnaire, were subjected to multiple linear regression analysis to explore the contribution of selected factors and identify the highest contributing factors towards farmers' work performance. Results revealed that all the factors explained 56.1% of the variance in farmers' work performance. Motivation of farmers was found to be the highest contributing factor, followed by knowledge that influences farmers' work performance. The study concludes that farmers need to be equipped with essential knowledge and motivation crucial to strengthening their work performance as this will subsequently increase rice production.

Keywords: rice farmers; fertilizer; knowledge; attitude; ease of use; motivation; work performance

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1. Introduction

Food security of Bangladesh largely depends on rice production. Rice plays the leading role in all crops by contributing 92% of the total food grain production [1]. Moreover, the country's agro-climatic conditions are perfect for cultivating rice all year [2]. However, the national average rice yield (2.60 t/ha) is much lower than the potential national yield (5.40 t/ha) and compared to other rice-growing countries [3]. A gap, ranging from 1 to 3 t/ha, still exists in between yields currently obtained by farmers and what could be achieved with improved management practices [4]. Apart from this, the population of Bangladesh is currently 162.7 million and projected to be 189.85 million by the year 2030, and thus it would require about 42.50 mt of rice [5]. In addition, the rate of population growth and the level of rice consumption are still relatively high. Simultaneously, rice-growing land needs to be share for cultivating new crops. Therefore, the current rice yield of 2.74 t/ha needs to be increased to 3.74 t/ha [6], to keep the production of rice in line with the growing population of the country.

Balanced fertilization is the key factor in enhancing the production of rice. Fertilizers have the quick capacity to restore depleted soil nutrients, improve soil fertility, and increase the yield of rice [7,8]. Moreover, with appropriate fertilizer management, farmers can potentially increase rice yields [9,10]. The results of long-term experiments also showed that fertilizers can increase output by 40–60% in grain production [11]. Therefore, timely application of fertilizer at the recommended rate is essential for improving rice yield.

However, the current level of applying fertilizer is significantly lower than the recommended levels for almost all food crops. Farmers have resorted to using imbalanced fertilization that does not match nutrient requirements and soil fertility rates [12]. About 51% of farmers applied fertilizer as recommended and the rest were less than the recommended rate [13]. As a result, a substantial gap still exists between the actual and recommended rate of all major fertilizers that are applied in rice cultivation at the farm level [2]. This gap between the recommended rate and the actual amount of fertilizer application is found much higher for TSP and MP than for urea. Farmers' application of fertilizer widely varies from the recommended doses as suggested by the Soil Resource and Development Institute (SRDI) and Department of Agriculture Extension (DAE) [2]. Farmers are habituated to apply imbalanced fertilizers that cannot meet the demand for soil nutrients and rice yield [12]. It implies that farmers' work performance to apply fertilizer is insufficient with the requirement of crops. Therefore, there is a gap between the actual rate and the recommended rate of fertilizer [2,14].

Individuals' performance towards efficient use of fertilizer can close the gap between actual and potential outputs [15]. Peoples' work performance is highly influenced by their ability to use knowledge and skills for a required task [16]. Therefore, farmers' work performance signifies their ability to carry out farm activities that lead to higher production [17]. Rice yields can be increased with the help of the timely applying of fertilizer. Hence, farmers need to apply the recommended dose of fertilizer at the proper time and using the appropriate method for sustainable production [18].

Besides, a wide range of factors such as farmers' demographical, psychological, and economic characteristics influence their performance behavior regarding agricultural practices [19]. Moreover, work performance is linked to the factors such as knowledge, skills, abilities, motivation, and personality traits [20,21]. In addition, identifying the highest contributing factors can facilitate the implication of the study findings in an efficient way. Previous researchers [15,17,22] also found the highest contributing factors on respondents' work performance and recommended guidelines for identifying areas that needed to be intensified for improved work performance of people concerned. Therefore, it is crucial to explore the factors that influence strengthening the work performance of farmers towards fertilizer application.

Several studies were conducted in Bangladesh on fertilizer issues [2,23]; however, research is very rare to study how various factors impact farmers' work performance towards fertilizer application in rice. Given this lack of research, this study, therefore, formulated the following objectives:

1. To explore the contribution of selected factors that influence farmers' work performance towards fertilizer application in rice;
2. To determine the highest contributing factors on farmers' work performance towards fertilizer application in rice.

The current study makes a unique contribution to the existing literature by providing a comprehensive analysis of the factors influencing the work performance of farmers towards fertilizer application in rice in Bangladesh.

The remaining sections of this paper are organized as follows: Section 2 reviews the existing literature on factors that influence farmers' work performance while Section 3 describes the methodology. Section 4 explains the results and discussion. Finally, the conclusions are presented in Section 5.

2. Review of Literature

Fertilizer is a kind of production input whose demand cannot be circumvented to obtain maximum yield and ensure sustainable crop production. Despite there were many empirical studies conducted nationally and internationally on the importance of using fertilizer for crop production, very few studies focused on farmers' work performance, especially on fertilizer application in rice.

Work performance is regarded as one of the most important dependent variables in several studies [24]. In general, work performance refers to an individual's quantifiable behaviors and outcomes that contribute to a specific goal [25]. Ufuophu-Biri and Iwu [26] described work performance as an instrument used to propel productivity while factors like motivation and skill serve as the processes of attaining productivity. According to Armstrong and Taylor [27], performance is the behavior that achieves results. Individual performance is a key variable in organizational behavior studies. In this study, the farmers' work performance is measured based on their objectives and the actual activities to achieve higher production.

Several interventions such as training, goal setting, feedback, incentives, and supervision may enhance work performance by improving individuals' knowledge, skill, and motivation [28]. Individuals' knowledge and attitude are treated as important determinants of performance [21,29]. In addition, adequate motivation is a crucial factor for higher performance [30]. Concerning the technological characteristics, the factor like perceived ease of use of technology is an important determinant for work performance [31]. Moreover, the quality of work performance is also related to specifications to fit when a person works. Knowledge, abilities, motivation, and other attributes are defined as specifications of work requirement [20].

2.1. Research Gap

Prior studies have identified a number of factors that might influence the performance of the concerned respondents. A brief list of empirical studies on respondents' performance has been mentioned in the following Table 1.

Table 1. List of empirical studies on respondents' performance.

Authors	Dependent Variable	Independent Variables	Major Findings
Demba [17]	Work Performance of Paddy Farmers	Decision making, investment, discipline, information seeker, risk taking, networking and problem solving	Discipline identified as the most contributing personality traits of farmers and regression model explained 58% of the total variance of paddy farmers' work performance.
Oluwatoyin [22]	Extension Agents' Work Performance	Technical skill, technology delivery skill, technology evaluation skill, leadership skill, decision making support skill and social skill	Technical skill, technology delivery skill, leadership skill, decision making support skill and social skill were found to be the significant predictors which jointly explained 59% of the total variance of extension agents' work performance.
Bagum [15]	Farmers' Performance	age, educational level, household size, farm size, annual income, extension media contact, training received, knowledge and attitudes	Farmers' age, household size, farm size, training received, extension media contact, knowledge and attitudes were identified as the most significant predictors that explained 45.3% of the variance of their fertilizer application performance
Nkari and Kibera [32]	Performance of commercial fruit and vegetable farmers	Farmer characteristics	Farmer characteristics accounted for 5.5% of the variation of the performance of commercial fruit and vegetable farmers.
Djomo et al. [33]	Performance of smallholder rice farmers	Farming experience, farm size, rice variety, extension visit, credit received, and rice output	Rice variety; extension visit; rice output; farming experience; farm size and credit received were found positive and significantly influenced the performance of smallholder rice farmers, explained 97.8% of the variation of their performance.
Maican et al. [34]	Farm economic performance	Farmers' motivation and job satisfaction	Farm's economic performance was influenced more by farmers' motivation than job satisfaction.

Table 1 summarizes personality traits, individual's skill, organizational commitment, job involvement, motivation, knowledge, job satisfaction, farm management practices,

socio-economic characteristics of the respondents as the predictors of individuals' work performance. However, prior studies did not consider farmers' cognitive (i.e., knowledge) and affective (i.e., attitude and motivation) responses and technological characteristics (i.e., ease of use) in a single study rather examined their roles in separate studies, especially in the context of farmers. Therefore, the combined effect of those determinants was quite unknown. Nonetheless, farmers' knowledge, attitude, ease of use of technology, and motivation are crucial factors that need emphasis for the application agricultural technologies by the farming community. Farmers' knowledge and attitude are essential for assessing their technology using behavior [35]. Motivation plays a vital factor in the decision-making process at the farm level [36], while perceived attributes of certain practices such as being easy to apply had the greatest influence on their technology application decisions [37]. Moreover, in the context of Bangladesh, the influences of knowledge, attitude, ease of use of technology, and motivation of farmers on their work performance regarding fertilizer application have not been study before. Therefore, to fulfill this research gap, the researcher selected knowledge, attitude, ease of use of technology, and motivation as influential factors for determining farmers' work performance towards fertilizer application in rice.

2.2. Development of Hypotheses

The efficiency of knowledge in any process positively affects the individuals' performance [38]. Concerning farm management, agricultural knowledge is the main asset for farmers. With good knowledge, farmers would know what information they need, who to look for, and what to do in their tasks [39]. Empirical research executed by Chi et al. [40] on the effect of knowledge on performance showed that effective management of knowledge positively and significantly affected overall performance. Elsewhere, Masa'deh et al. [41] mentioned that knowledge is the enabler of firm performance. All these results extend the current understanding of knowledge as a predictor of performance. Based on the above discussion the following hypothesis has been developed:

Hypothesis 1 (H1). *Knowledge has a significant contribution to farmers' work performance towards fertilizer application in rice.*

Peoples' attitude towards certain objects or technology determines their behavioral intention and actual behavior performance [42]. Attitudes can be a strong predictor of behavior, i.e., performance [43]. Peoples' positive attitude influences their decision to adopt certain practices for their farming [44]. Moreover, the University of Minnesota Libraries Publishing [45] illustrates attitudes towards work as one of the major predictors of performance. The following hypothesis has been formed in light of the preceding discussion:

Hypothesis 2 (H2). *Attitude has a significant contribution to farmers' work performance towards fertilizer application in rice.*

Perceived ease of use (PEU) is one of the most important factors affecting technology use intention and a proxy to actual user behavior [46,47]. Farmers' decision to adopt technologies is dependent on how they perceive those technologies. Reimer et al. [48] informed that farmers' intention to perform certain practice in the United States Midwest region was found to be impacted by their subjective evaluation about the complexity of those practices. Bahramzadeh and Shokati [49] concluded that perceived ease of use is the most powerful factor in behavioral intention to perform a certain technology. Hence, it is clear that ease of use of technology is an important predictor of actual use of technology. Consistent with the previous discussion the following hypothesis has been formed:

Hypothesis 3 (H3). *Ease of use of technology has a significant contribution to farmers' work performance towards fertilizer application in rice.*

Motivation is a drive that stimulates people into action, direction to behavior and thus, their productivity [50]. An enormous impact of workers' motivation is visible on productivity and performance [51]. Previous studies provide evidence that motivation positively affects individual performance [52]. Hence, it is clear that workers' high motivation at work plays an important role in their satisfaction which ultimately reflects their higher work performance. In accordance with the preceding discussion, the following hypothesis has been developed:

Hypothesis 4 (H4). *Motivation has a significant contribution to farmers' work performance towards fertilizer application in rice.*

3. Methodology

The quantitative approaches seem to be the best when the focus of the study is to identify the factors that determine a certain behavior [53]. Hence, the researchers employed a quantitative approach to administering this study. A cross-sectional survey method was to collect data that helped the researchers to collects a larger set of data in relatively a shorter period of time [54,55]. In order to collect relevant data from a pre-determined sample, a structured questionnaire was carefully prepared, including open and closed form questions.

3.1. Location, Population, and Sample

A purposive and multistage random sampling technique was adopted to locate and select the respondents for the survey. This sampling technique was found to be successful in several cases [56,57]. This study chose a multistage sampling technique to minimize random errors and sample bias [57].

Gaibandha is considered one of the important districts in Bangladesh for rice production [58]. So, Gaibandha district was purposively selected as the study area. Then, considering the research cost, size of the area covered, time, human resources, accessibility, and availability of transportation, three Upazilas under the Gaibandha district, namely Gobindaganj, Palashbari, and Sadullapur, and seven villages from each Upazila were selected purposively. There were 3762 rice farmers identified in the 21 villages from three upazilas. Out of which, 355 farmers were randomly selected using Morgan recommendations [59]. A proportionate random sampling technique was used to determine the number of respondents from each selected village using the following formula:

$$n_1/N \times n_2 = s$$

where, N = selected total population of the study; n_1 = proportion population in respected village; n_2 = determined the total sample size of the study; and, s = sample size from respected village [60].

3.2. Measurement of Variables

In this study, all the quantitative data were coded into a numerical value. The suitable scoring procedures were applied to convert data to make them easier. Farmers' work performance towards fertilizer application in rice was the dependent variable while farmers' knowledge, attitude, ease of use of technology and motivation were the independent variables in the current study. All the independent variables were measured by using five-point Likert scale. Though the Likert scale is ordinal; however, Likert with five or more categories can often be used as continuous without any harm to the analysis that has been planned to apply [61,62]. In previous studies, scholars have treated their Likert scale questionnaire as interval scale [15,17,22]; hence researchers also follow the same in this study.

Fourteen statement items (I am able to apply recommended dose of all fertilizers to achieve targeted production, I am able to apply recommended dose of urea to increase plant growth and number of panicle in rice, I am able to apply recommended dose of Triple

Super Phosphate (TSP) fertilizer efficiently to improve yield of rice, I am able to apply recommended dose of Muriate of Potash (MP) efficiently to increase yield of rice, I am able to apply recommended dose of Gypsum (Sulphur fertilizer) efficiently to increase yield of rice, I am able to apply recommended dose of Zinc fertilizer ($ZnSO_4$) efficiently to increase yield of rice, I am able to apply urea in three equal splits to rice, I am able to apply first split of urea to rice as basal method, I am able to apply second and third split of urea to rice as topdressing method, I am able to apply Triple Super Phosphate (TSP), Muriate of Potash (MP), Gypsum (Sulphur fertilizer) and Zinc fertilizer ($ZnSO_4$) as basal method to rice, I am able to increase rice yield by improving the timing of fertilizer application, I am able to apply first split of urea final land preparation, I am able to apply second and third split of urea early tillering stage and just before panicle initiation stage of rice, I am able to apply Triple Super Phosphate (TSP), Muriate of Potash (MP) Gypsum (Sulphur fertilizer) and Zinc fertilizer ($ZnSO_4$) during final land preparation) were adapted from Demba [17] to measure the level of farmers' work performance. Farmers were asked to report their views with corresponding statements based on five-point Likert scale and specified five possible responses range from 1 to 5 (1 = Strongly Disagree, up to 5 = Strongly Agree) [15,63].

For the measurement of knowledge, respondents were requested to specify their opinion against 10 statement items (I know that first split of urea should be applied as basal dose and rest of two split as topdressing, I know that the recommended doses of fertilizer are important to optimal rice yield, I understand that using appropriate method of fertilization application is important to extend rice yield, I understand that rice plants require urea at the early and mid-tillering stage to maximize rice yield, I know that urea fertilizer increase plant growth of rice, I know that Triple Super Phosphate (TSP) fertilizer is useful for flowering and panicle initiation in rice, I know that Muriate of Potash (MP) fertilizer is responsible for grain size and weight of rice, I understand that urea should be applied in three equal splits in rice field for higher yield and I know that Triple Super Phosphate (TSP) and Muriate of Potash (MP) should be applied during final land preparation) that were adapted from Ntawuruhunga [64]. A five-point Likert scale was also used to specify respondents' responses range from 1 to 5 (1 = Very Low, to 5 = Very high).

Attitude also measured by adapting 11 statements items (I know the recommended dose of fertilizer and follow it in rice farming, I will get lower yield due to fail applying recommended rate of urea, Triple Super Phosphate (TSP) and Muriate of Potash (MP) in rice, I know the timing of fertilizer applications can increase the yield of rice and follow it in rice farming, I think fertilizer application method is important yield and follow appropriate method in rice, I know urea should apply in three equal splits to rice and follow it, I think timing of urea application is difficult for me to apply in rice, I think I can reduce fertilizer cost by improving the timing of urea application in rice field, I know urea application at once in rice field just before transplanting is easier and follow it in rice, I know organic manure (cow dung) is less important for higher yield and do not use it in rice, It is good to apply fertilizers based on own experienced rather than external advice and I know excessive use of fertilizer is bad for rice production and follow recommended doses of fertilizer) from Ghosh and Hasan [48]. Respondents were asked to respond based on five-point Likert scale ranging from 1 to 5, where 1 indicates strongly disagree and 5 indicates strongly agree.

In case of ease of use of technology, 10 statements items (Use of recommended dose of urea for rice, Use of recommended dose of Triple Super Phosphate (TSP) for rice, Use of recommended dose of Muriate of Potash (MP) for rice, Use of recommended dose of Gypsum (Sulphur fertilizer) for rice, Use of recommended dose of Zinc fertilizer ($ZnSO_4$) for Boro rice, Use of urea in three equal splits in rice field, Use of the first split of urea as basal after seedling establishment of rice, Use of the second split of urea at early tillering stage of rice, Use of the third split of urea at 5–7 days before panicle initiation of rice, and Use of all Triple Super Phosphate (TSP), Muriate of Potash (MoP), Gypsum (Sulphur fertilizer) and Zinc fertilizer as basal during final land preparation) were adapted from

Adrian [65]. Five-point Likert scale ranging from very difficult (1) to very easy (5) was used to measure farmers' ease of use of technology.

Finally, respondents were requested to specify their opinion against seven statements items (I apply fertilizer in my rice field as it gives higher yield, I use fertilizer in my rice field as it is easy to apply, Using fertilizer in my rice field gives me higher status in farming community, I apply fertilizer in my rice field because it's readily available, I use fertilizer in my rice field as I have received training on fertilizer application, I apply fertilizer in rice cultivation because my peers think I should use it, and I use fertilizer in my rice field as I have received sufficient extension support) in order to measure their motivation using a five-point scale ranging from "strongly disagree" (1) to "strongly agree" (5). Items of motivation were mostly adapted from Ryan et al. [66].

3.3. Validity and Reliability Analysis

In this study, the researcher adopted construct validity by measuring the content validation of the instruments. Content validity can be measured by seeking experts' opinions from the respected field of study to conform to the concept and measurements were clear and represented the concerned subject matter. In this procedure, experts' opinions were sought for all the items in the questionnaire and then validated by the supervisory committee. The questionnaire was finalized and sent to 35 non-sampled rice farmers who were randomly selected for pre-testing. Cronbach's Alpha test is used to measure the reliability of all the items under each construct in the questionnaire. Cronbach's Alpha of work performance, knowledge, attitude, ease of use of technology, and motivation was 0.862, 0.830, 0.770, 0.785, and 0.770, respectively. The value of Cronbach's alpha coefficient should be equal to or greater than 0.7 which means that the data is reliable and the internal consistency of the items in the scale is satisfactory [67]. Hence, the Cronbach's Alpha values of the items were found reliable.

3.4. Data Collection and Statistical Analysis

Data were collected by the first author of the paper in a face-to-face situation, given respondents' level of literacy and other factors like their preparedness for this type of study. Data were collected from March to May 2018. The collected data were coded, entered, and analyzed using SPSS v23 according to the objectives and hypothesis of the study. Multiple linear regression with 0.05 and 0.01 levels of probabilities were used to explore the contribution of the selected factors on farmers' work performance and determine the highest contributing factors on farmers' work performance towards fertilizer application in rice. In the current study, multiple regression works with the following formula:

$$Y = b_0 + b_1 (x_1) + b_2 (x_2) + \cdots\cdots + b_k (x_k) + \varepsilon_i \quad (1)$$

Here, Y is the dependent variable (farmers' work performance towards fertilizer application). $X_1, X_2 \ldots X_k$ indicates the independent variables (knowledge, attitude, ease of use of technology, and motivation of farmers); $b_1, b_2 \ldots b_k$ are the regression coefficients of independent variables and b_0 constant. Besides, ε_i indicates the error term.

4. Results and Discussion

This section is organized into two sub-sections. The first sub-section deals with the findings of the study and the second sub-section present the test of hypotheses. While the third and last sub-sections discusses the findings related to the contribution of independent variables (i.e., knowledge, attitude, ease of use of technology, and motivation of farmers) on the dependent variable (farmers' work performance towards fertilizer application in rice).

Multiple linear regression analysis was executed to explore the contribution of selected factors that influence farmers' work performance towards fertilizer application in rice and finds out the factor that has the highest contribution to farmers' work performance towards fertilizer application in rice. There were four independent variables that influence farmers' work performance, were selected as predictors of the mentioned dependent variable. These

four independent variables—knowledge (X_1), attitude (X_2), ease of use of technology (X_3), and motivation (X_4) of farmers are expected to formulate a multiple linear regression model that could be explained the variation of work performance among farmers. Thus, the multiple linear regression equation of this study has been written as follows:

$$Y = b_0 + b_1 (X_1) + b_2 (X_2) + b_3 (X_3) + b_4 (X_4) + \varepsilon_i \quad (2)$$

where, Y = Work performance of farmers; b_0 = Constant; $b_{1–4}$ = Regression coefficient; X_1 = Knowledge; X_2 = Attitude; X_3 = Ease of use of technology; X_4 = Motivation and ε_i = Error term.

4.1. Contribution of Selected Factors on Farmers' Work Performance

Table 2 represents the model summary of multiple linear regression analysis. It showed the first statistics R known as the multiple correlation coefficients between all predictor variables and farmers' work performance and obtained 0.749. The next statistic is R^2, the coefficient of determination that indicates the percentage of the total variance in a dependent variable explained by all the predictor variables. The value of R^2 is 0.561 indicated that all the independent variables were simultaneously explained 56.1% of the total variance of the dependent variable. The next statistic is Adjusted R^2, a modified version of R^2 that calculates R^2 using only those independent variables, which was significant for predicting the dependent variable. Here, the adjusted R^2 value (0.556) indicated that the significant predictor variables were simultaneously explained 55.6% of the total variance of farmers' work performance. In other words, the rest of 44.6% of the total variation of farmers' work performance has not been explained in the current study.

Table 2. Table of multiple linear regression model summary.

Multiple R	R^2	Adjusted R^2	Std. Error of the Estimate	F	df	*p*
0.749	0.561	0.556	0.49122	111.783	4	0.000 *

Significant: * $p < 0.05$.

In addition, the value of the F-test was 111.783 which is significant at $p < 0.05$. It implies that the multiple linear regression model has a significant influence over the dependent variable of the study. In other words, it could be said that the combination of independent variables as a predictor has a significant contribution to farmers' work performance. Thus, the regression model was good or fit to predict the contributions of independent variables.

4.2. Highest Contributing Factors on Farmers' Work Performance towards Fertilizer Application in Rice

Table 3 recognized the independent variables that have a significant value of $p < 0.05$. It implies those respected variables have a statistically significant and distinctive contribution to predict the dependent variable of the study. However, the variables, which do not have a significant value of $p < 0.05$, are not considered a significant predictor of the mentioned dependent variable [68].

Table 3 shows the unstandardized regression coefficient (b) and standardized regression coefficients (β) taken to examine the contributions of selected independent variables on farmers' work performance. The strength of the contribution of the respected independent variables was compared to each other based on their standardized coefficient (β). Standardize coefficient (β) was estimated in units of standard deviation and not in a unit of the respected independent variables. The standardized coefficient (β) was calculated by multiplying the unstandardized coefficient (b) with the standard deviation of the independent and dependent variables. Thus, standardized coefficient (β) becomes normalized as a unit-less coefficient, also known as z-score. According to Table 3, the motivation of farmers had the largest standardized coefficient (β) value of 0.478. It implies that the motivation of farmers showed the highest contribution to predict the work performance of

farmers towards fertilizer application. The second highest β value was found for knowledge (0.265), followed by ease of use of technology (0.122), while attitude (0.073) had an insignificant contribution.

Table 3. Coefficients of multiple linear regression for farmers' work performance towards fertilizer application in rice.

(Y) Farmers' Work Performance					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**		
Independent Variable	**b**	**Std. Error**	**Beta (β)**	***t***	***p***
(Constant)	−0.088	0.183		−0.481	0.631
(X_1) Knowledge	0.281	0.044	0.265	6.315	0.000 *
(X_2) Attitude	0.084	0.043	0.073	1.943	0.053
(X_3) Ease to use of technology	0.146	0.050	0.122	2.905	0.004 *
(X_4) Motivation	0.544	0.051	0.478	10.760	0.000 *

Significant: * $p < 0.05$.

The values of the unstandardized coefficients values for knowledge, attitude, ease of use of technology, and motivation of farmers were 0.281, 0.084, 0.146, and 0.544, respectively (Table 2). The unstandardized coefficients (b) value of the respected variables indicated the change amount in the dependent variable (Y) in accordance with the change of one unit of an independent variable (X). Thus, based on the estimated unstandardized coefficients (b), the multiple linear regression model has been obtained as follows:

$$Y = -0.088 + 0.281\ (X_1) + 0.084\ (X_2) + 0.146\ (X_3) + 0.544\ (X_4) + \varepsilon_i$$

Table 2 also revealed that knowledge ($t = 6.315$, $p = 0.000$), ease of use of technology ($t = 2.905$, $p = 0.004$) and motivation ($t = 10.760$, $p = 0.000$) significantly provide explanation of farmers' work performance towards fertilizer application in rice. In contrast, the contribution of attitude is insignificant to predict farmers' work performance as significant value (p) of attitude ($t = 1.943$, $p = 0.053$) is not <0.05.

4.3. Test of Hypotheses

Hypothesis 1 (H1). *Knowledge has a significant contribution to farmers' work performance towards fertilizer application in rice.*

According to the multiple linear regression analysis, the standardized coefficient (β) value for farmers' knowledge was 0.265 with a t value of 6.315 which was significant at $p < 0.05$. Therefore, the hypothesis (H1) of the study has been failed to reject and the null hypothesis (H0) has been rejected (Table 4).

Table 4. Summary of testifying the research hypotheses of the study.

Hypothesis	Value of Regression Coefficient (β)	*p*-Value	Result
Hypothesis 1	0.265	<0.05	Accepted
Hypothesis 2	0.073	>0.05	Rejected
Hypothesis 3	0.122	<0.05	Accepted
Hypothesis 4	0.478	<0.05	Accepted

Hypothesis 2 (H2). *Attitude has a significant contribution to farmers' work performance towards fertilizer application in rice.*

The value of standardized coefficient (β) for farmers' attitude towards fertilizer application was 0.073 with a t value of 1.943 which was significant at $p < 0.05$ ($p = 0.053$).

Therefore, the hypothesis (H2) of the study has been rejected (Table 4) and the null hypothesis (H0) has been failed to reject.

Hypothesis 3 (H3). *Ease of use of technology has a significant contribution to farmers' work performance towards fertilizer application on rice.*

The value of standardized coefficient (β) for ease of use of technology was 0.122 with a t value of 2.905 was significant at $p < 0.05$ ($p = 0.004$). Therefore, the hypothesis (H3) of the study has been failed to reject and the null hypothesis (H0) has been rejected (Table 4).

Hypothesis 4 (H4). *Motivation has a significant contribution to farmers' work performance towards fertilizer application in rice.*

The value of the β for farmers' motivation towards fertilizer application in rice was 0.478 with a t value of 10.760 was significant at $p < 0.05$ ($p = 0.000$). Therefore, the hypothesis (H4) of the study has been failed to reject and the null hypothesis (H0) has been rejected (Table 4).

4.4. Discussion

According to the regression model, R^2 (coefficient of determination) and adjusted R^2 are 0.561 and 0.556 respectively. Moreover, the F-value 111.783 was significant at $p < 0.05$. According to these findings, the regression model is a good fit. That means, the regression model's estimated result is satisfactory as 56.1% of the total variance of farmers' work performance has been explained by motivation, knowledge, ease of use of technology, and attitude of farmers simultaneously. Hence, it can be assumed that these independent variables have adequate power for the explanation. The adjusted R^2 (0.556) value also interpreted that only significant predictor variables have explained 55.6% of the total variance of farmers' work performance: motivation, knowledge, and ease of use of technology simultaneously. Therefore, it can be assumed that the regression model of the current study has explained a significant percentage of total variation that occurs in the work performance of the farmers towards fertilizer application in rice.

This finding is in line with Demba [17] executed a study on personality traits and work performance for paddy farmers and stated that coefficients for farmers' work performance model explained 59.5% of total variation on farmers' work performance in rice cultivation in the Gambia. Bagum et al. [15] also revealed that the regression model explained 49.2% of the total variance of farmers' performance regarding fertilizer application in Bangladesh. A similar trend is also found from the study conducted by Shah [63] and stated that the regression model explained 44.8% of the total variance of farmers' work performance in rice cultivation in Malaysia.

In this study, motivation was one of the significant predictors identified as the highest contributing factors to explain farmers' work performance towards fertilizer application. The value of β-coefficient for motivation suggests that with one standard deviation change in farmers' motivation, their work performance will be increased by 0.478 standard deviation. It indicates that the motivation of farmers mainly regulates their work performance towards fertilizer application. Motivation is the most important reason that influences farmers to practice a particular agricultural technology to achieve higher productivity [69]. Moreover, factors like education, experience, extension contract, and training help motivate farmers to improve work performance and increase output [70]. Since farmers are important for agricultural production, it is crucial to continually keep farmers' stimulation level up to perform the farming activity, especially fertilizer application.

Prior literature also mentioned that motivation is a significant predictor and the highest contributor to respondents' performance [71]. Ngima and Kyongo [72] also noticed a similar finding that motivation had a strong statistically significant influence on individuals' performance.

Knowledge the second-highest contributing factor was predicting farmers' work performance towards fertilizer application in rice. It indicates that the enhancement of knowledge can guide farmers to realize the appropriateness of using certain technology. Therefore, agriculture knowledge is vital for farmers to improve their performance to apply essential technologies and increase their productivity levels.

With references to knowledge, Bagum et al. [15] identified farmers' knowledge as an important predictor that significantly contributed to farmers' performance. Moreover, Campbell and Wiernik [28] argued that role-specific knowledge is one of the leading determinants of respondents' performance.

Farmers' attitude displayed an insignificant contribution to predicting farmers' work performance (p = 0.053) However, despite having found insignificant contribution, one should not ignore the importance of a favorable attitude in determining farmers' adoption decision of any farming practice [73]. Other studies provided evidence that attitude has a significant contribution to the performance of respondents [43,71]. However, sometimes, individuals' positive attitudes are not enough for performing a given behavior due to their different socio-economic circumstances. As per the researchers' observation, differences might be existed among the farmers according to knowledge, ability, attitudes, and these differences can influence their behavioral decision [74,75]. Such inconsistency might be prevailing among the respondent farmers in the study area. Thus, a farmer might possess a favorable attitude towards fertilizer application for higher yield yet not apply fertilizer at the recommended rate due to other factors like the high input cost or unavailability of fertilizers.

5. Conclusions

The overall findings of the multiple regression analysis explored the combination of significant predictors such as viz. knowledge, ease of use of technology, and motivation of farmers explained 55.6% of the total variance of farmers' work performance towards fertilizer application in rice. The rest of the variance of farmers' work performance may be explained by other factors that were not being considered in the current study. However, the estimated multiple linear regression model was good or fit to predict the contributions of independent variables. Therefore, the study concluded that the estimated regression model of farmers' work performance is suitable to predict the contributions of selected factors like knowledge, ease of use of technology and motivation of farmers in the current study.

Additionally, the motivation of farmers was recognized as the highest contributing factor followed by knowledge. Hence, it can be suggested that greater emphasis should be given to farmers' motivation and knowledge level to solve their problems and provide maximum effort for higher work performance.

Theoretically, this study will enhance the opportunity to execute new studies in the field of performance through providing critical literature support based on the significant contribution of knowledge, ease of use of technology, and motivation of farmers to their work performance. Besides, the current study's findings are significant to farmers as it focuses on the present level of farmers' work performance for establishing an effective working environment for them to ensure higher performance in applying agricultural practices and getting higher production of rice. Moreover, study findings will provide support as a basis of the national and local motivational campaign including training and technical support ought to be provided by the Department of Agricultural Extension (DAE) of Bangladesh, other GOs, and NGOs extension service providers to equip farmers with essential knowledge, high motivational level, and skill for strengthening their work performance.

Apart from this, the present study highlights only four variables: knowledge, attitude, ease of use of technology, and motivation of farmers that leads to better work performance of farmers towards fertilizer application in rice. Therefore, it is suggested that further research should be undertaken with other potential variables to explore the work performance of farmers. Moreover, other factors of rice cultivation such as irrigation, weed

management, pest and disease management, and intercultural operations can be taken under consideration for future research on farmers' work performance.

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