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Assessing the Effectiveness of Department of Agricultural Extension (DAE) Services to Increase Farmers' Skill

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Authors' contributions

This work was carried out in collaboration among all authors. Author PSM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author MHK managed the analyses of the study. Author MMA managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The Department of Agricultural Extension (DAE) is considered as the most prominent public organization in Bangladesh for disseminating agricultural information to the farmers. In this line, the objectives of this study were to determine the extent of effectiveness of DAE regarding their services for improving farming skill and to determine the factors affecting the effectiveness of DAE services. Data were collected from two villages of Nawabganj Upazila (sub-district) in Dinajpur district using structured interview schedule. Descriptive statistics and linear regression analysis were done to explain the data. The findings revealed that majority (70.2 %) of the farmers think that the DAE services are moderately effective for improving farmer's skill. Among the rest of the respondents, 7.7% and 22.1 % were commented as less and high effective category respectively. The inferential analysis revealed that farmers' education, organizational participation, cosmopolitanism and time spent in farming had positive and significant contribution with effectiveness of DAE services. This

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means that the initiative for higher these factors would increase the effectiveness of DAE services. The extension personnel, development practitioners and other researchers may be benefited from the findings. The policy makers should also consider these important factors to increase the effectiveness of DAE regarding agricultural advisory services.

Keywords: Effectiveness; DAE; extension services; farming skill.

1. INTRODUCTION

The agriculture sector has a glorious history in the socio-economic development of Bangladesh. The contribution of this sector continues to uplift of the country's economy. Agriculture belongs to the third position next to employment and industry about the GDP contribution [1]. Despite a comparatively low contribution to the national income, the agriculture sector plays a vital role in the context of employment generation and poverty reduction. From the scenario of the last two decades of crop production, from observation, food production has been increased significantly [1]. Recently the government has declared self-sufficiency in food production, especially in rice production. The agricultural scientist, extension system and the farmers are the prime credit owner for this success.

The agricultural extension system is the information exchange system that shows the interactions and communication networks between the actors, people and institutions to coordinate the information related processes [2]. The extension system or service mainly creates a link between the scientist and the farmers, especially for technology transfer to support agricultural and rural development [3]. The purpose is to improve farmers' skill regarding the use of modern technology.

The agricultural production is subject to the quality of extension services [4,5]. As a largest public agricultural information dissemination organization, the Department Agricultural Extension (DAE) has a reflective character in the welfare of the rural people's livelihood. However, sometimes, the DAE got criticism for delivering an old and always depend on project based extension services [6,7].

Thereupon, the Department of Agricultural Extension (DAE) provides necessary information for the farmers to help them change their way of cultivation from traditional to modern one. Increase of per unit yield of any crop cannot be attained without a sound effective

communication system. So, the DAE plays an important role especially in the awareness and interest stages to create a channel with the farmers.

Now-a-days, in Bangladesh, various organizations are working on the area of education agriculture, sustainable agriculture, forestry and environment, farm management, public health, adult learning, family planning etc. Moreover, The DAE provides efforts only for the betterment of farmers. In view of the effectiveness of the DAE services, very few research work has so far been undertaken; the researchers undertook a study entitled "Effectiveness of Department of Agricultural Extension (DAE) regarding Agricultural advisory services " to achieve the following objectives.

- a. To describe the selected socio-economic characteristics of the farmers.
- b. To describe the extent of effectiveness of Department of Agricultural Extension services for improving farmers skill.
- c. To assess the contributions of the selected characteristics of the farmers on the effectiveness of Department of Agricultural Extension services.

2. METHODOLOGY

2.1 Study Location

The study was conducted at Nawabganj upazila under Dinajpur district. Nawabganj is located at 25°25'N and 89°5'E. It has 32999 units of household and a total area of 314.68km². It is bounded by Parbatipur and Badarganj upazilas on the north, Ghoraghat and Hakimpur upazila on the south, Mithapukur and Pirganj of Rangpur on the east and Birampur and Phulbari upazilas on the west. The Dinajpur district was purposively (based on agricultural production and availability of the extension services) selected as locale of the study. There are 13 upazilas (sub-district) in the district. Among those upazilas, Nawabganj was selected randomly for this study. Two villages from this upazila namely

Binodnagar and Kushdaha were also selected randomly as study location (Fig. 1).

2.2 Sampling Design

A list of all farmers who lived in the selected two villages for long was prepared by the researcher with the help of the Sub-Assistant Agriculture Officer (SAAO) of Upazila Agriculture Office (UAO), Nawabganj. The list comprised a total of 525 farmers of which 320 were from Binodnagar village and 205 from Kushdaha village (Table 1).

Considering time, fund and other constraints, a sample of 105 farmers which accounts to 20% of the population (525 farmers), were selected as respondent of the study. These farmers were selected randomly to avoid biasness. Beside selection of sample size, a reserve list of 10 farmers considering 10% of the sample size was arranged. This was done due to the fact that if a respondent of the sample size is not available for data provider then the reserve list can be utilized.

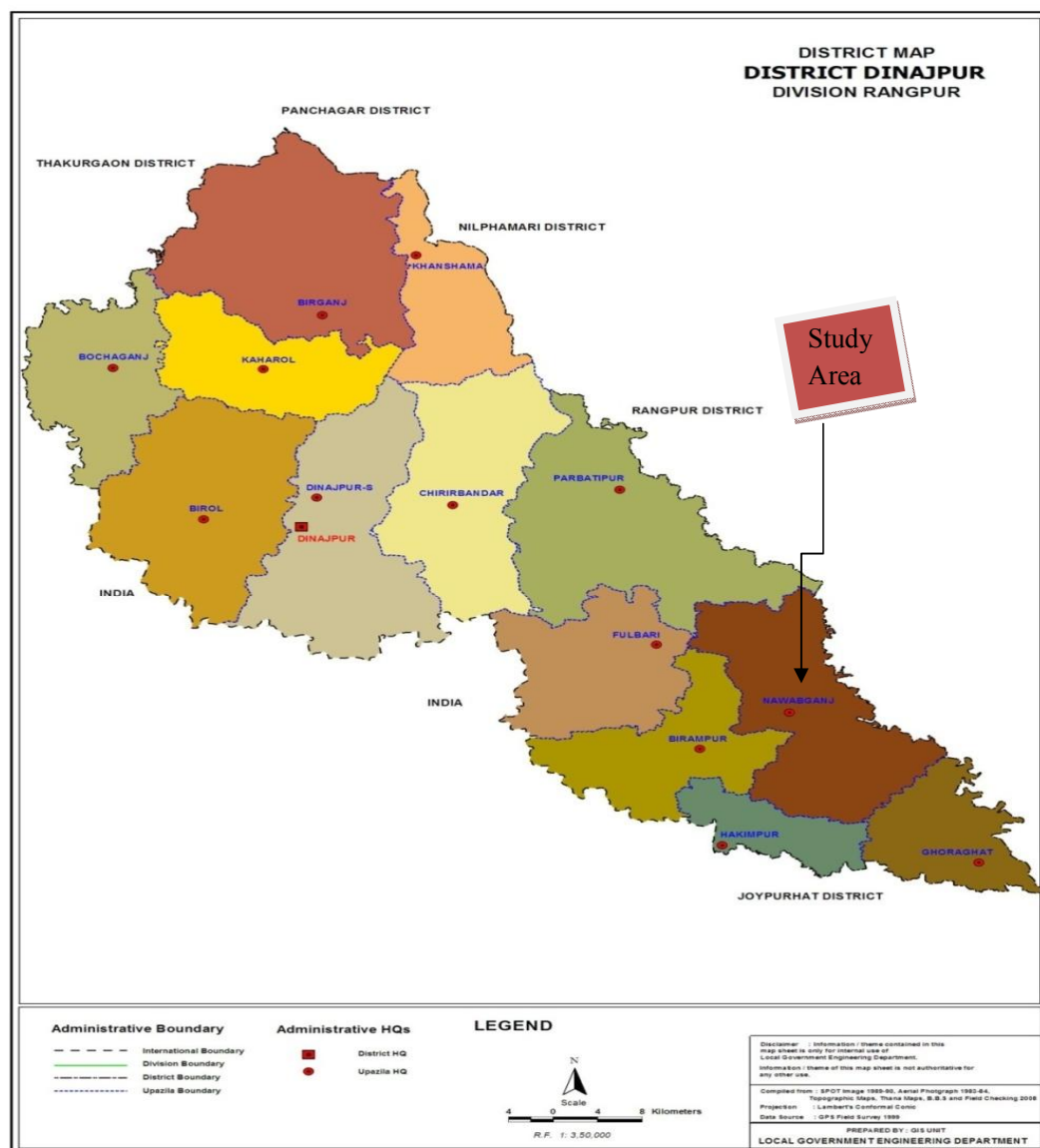


Fig. 1. Map of Dinajpur district showing the study area (Nawabganj upazila)

Table 1. Distribution of the population and sample of the respondents with reserve list in the two selected villages of Nawabganj

Name of villages	Population/Total farmers	Sample size	Reserve list
Binodnagar	320	64	6
Kushdha	205	41	4
Total	525	105	10

2.3 Collection of Data

The present study also applied face to face interview with the farmers to collect data. To prepare the schedule, objectives of the study were carefully considered. There were two section of the schedule. The first section comprised the socio-economic characteristics of the farmers and the second section focus on the effectiveness of DAE services. The draft schedule was checked through a pre-survey with 15 farmers. Based on pre-survey experience, the schedule was finalized.

Data were collected by the researcher supported with the local leaders, model farmers and SSAO of the concern block. Before going to start data collection process, these personnel were informed about the purpose of the survey. To make availability of the respondents to sit for the interview, they were informed earlier. Some of them were interviewed in their house while others in the farm field. The researcher tries his level best to establish rapport with the respondents so that they can't hesitate to provide data. The data collection period was 30 days from 9th November to 9th December, 2019.

2.4 Selection and Measurement of Variables

The study considered two types of variables such as independent and dependent variables. For selection of variables the researcher went through the past related literature as far as possible and had discussion with the faculty members, experts and researchers in the related fields. Effectiveness of DAE services for improving farming skill was considered as the dependent variable of the study. The researcher selected ten characteristics of the respondent as the independent variables. The characteristics includes age, education, family size, time spent in farming ,distance from home to upazila agricultural office, experience in farming, farm size, annual family income, organizational participation and cosmopolitaness. The

measuring unit for the independent variables are mentioned in the Table 2.

Effectiveness of DAE services was the dependent variable of the study. To measure the dependent variable, nine extension services were selected through three stages. Firstly, a number of extension services were collected through literature review. Secondly, the collected services were cross checked with the services of respective Upazila agriculture office. Finally, the services were selected by pilot survey for interview. The final selected extension services were measured with four points likert scale. A score of 0, 1, 2 and 3 for the responses for not effective, less effective, moderate and high effective of DAE extension services respectively [8].

2.5 Analysis of Data

The collected data were compiled, tabulated and analyzed. Both the descriptive and inferential analysis was performed. To describe the first and second objectives, various descriptive statistical measuring items such as mean, range, standard deviation, percentage, frequency was used. Linear regressions analysis was run to determine the factors influencing farmers on the effectiveness of DAE services (last objective of the study).

The formula for regression analysis is presented below:

$$Y = B_0 + B_1X_1 + B_2X_2 + \dots + B_nX_n$$

Where Y = dependent variable (effectiveness of DAE services), B_0 = intercept, B_1 -n = coefficient of the explanatory variables, X_1 -n = explanatory variables (farmers' age, education, family size, time spent in farming, distance from home to upazila agricultural office, experience in farming, farm size, annual family income, organizational participation and cosmopolitaness). SPSS (Statistical Package for Social Science) computer program, version 20 was used for analysis of data.

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Profile of the Study Farmers

Ten characteristics of farmers were selected which were assumed to be associated with the effectiveness of DAE regarding agricultural advisory services. The summary profile of those characteristics is presented in the Table 2. Age is a very common farmers' characteristic that was considered by numerous previous studies in social research. The youngest and oldest farmer's age was 24 and 72 respectively. The mean value (47) indicates majority of the farmers were in middle aged group. Both the literate and illiterate farmers existed in the study area and the average value indicates that the representative part of the farmers had secondary level education. On an average the farmer's household size was 5 which are consistent with the national average (BBS, 2019). The figure regarding time spent in farming per week indicates agriculture was their main profession for maintain livelihood. Most of the farmers were owner of small farm size but with long farming experience. Upazila Agriculture office was considered as a major source of information for the rural farmers. The farmers lived a variety of distances from the upazila agriculture office. On average, farmers are located about 5 km from the agriculture office. On average, the farmers had annual household income of 284,000 BDT (US\$ 3341). They gained this income from both agriculture and non-agriculture source. The range of organizational involvement score indicates some farmers were not involved with any organization and the mean value indicate moderate level of farmers involvement with organization. Though a varied extent but all farmers had cosmopolitanism behaviour that means more or less they had movement outside of their own locality for agricultural purpose (Table 2).

3.2 Effectiveness of DAE Services for Improving Farming Skill

The effectiveness of DAE services to increase farmers' skill was measured based on score. The score was given based on farmers' responses. The scores of effectiveness of DAE ranged from 9 to 23 against the possible range of 0 to 27 with an average of 18.61 and standard deviation of 2.63 (Table 3). Based on the observed scores (by dividing the observed score into 3 equal parts) of effectiveness of DAE services, the

respondents were classified into three categories i.e. less effective, moderate effective and high effective [9].

The Table 3 shows the highest number of farmers (70.2 %) think that the DAE services are moderately effective for improving farming skill. A few farmers (22.1%) commented as high effective and very few (7.7 %) commented as less effective of DAE services. In the aftermath of the analysis, most of the farmers (92.3 %) have avouched to moderate to high effective level in view of effectiveness of DAE services. The findings indicate that still there have scope to take steps for increasing DAE services [8].

3.3 Factors Affecting the Effectiveness of DAE Regarding Agricultural Services

In order to identify the significant factors influence the effectiveness of DAE services, linear regression analysis was used. The output of the analysis is shown in the Table 4. The Table shows that level of education, organizational participation, cosmopolitanism (people extend of movement beyond their own locality) and time spent in farming of the respondents had significant positive contribution with the effectiveness of DAE services. Of these, organizational participation and cosmopolitanism were the most important contributing factors (significant at the 1% level of significance) and level of education and time spent in farming were less important contributing factors (significant at 5% level of significance). Coefficients of other selected variables don't have any significant contribution on the effectiveness of DAE services.

The R^2 is a measure of how of the variability in the dependent variable is accounted by the independent variables. So, the value of $R^2=0.553$ means that independent variables accounts for 55% of the variation with the effectiveness of DAE services. Alternatively it can be said that the variation in the respondents changed the probability of use of DAE regarding Agricultural advisory services in receiving agricultural information can be attributed 55% to the respondents' level of education, organizational participation, cosmopolitanism and time spent in farming. The F ratio is 11.631 which is highly significant ($p < 0$). These two aspects (R^2 and F value) indicate that the analysis is valid. Here it is notable that before run the analysis multicollinearity was checked and no extreme collinearity among the variables was found.

Table 2. Characteristics profile of the respondents (N = 105)

Characteristics (with measuring unit)	Range	Mean	SD
Age (years)	24–72	46.86	11.685
Level of education (schooling years)	0.0 – 16	6.0762	5.355
Family size (total members)	02–11	4.88	1.95
Time spent in farming (Hours/week)	10–50	30.8	9.2
Distance from home to upazila agricultural office (km)	0.25–10	4.993	2.011
Experience in farming (years)	04–45	18.31	9.021
Farm size (hectare)	0.02–0.80	0.2184	0.174
Annual family income ('000'BDT)	105–705	283.7	119.85
Organizational Participation (score)	0–12	4.9	2.55
Cosmopoliteness (score)	4–18	9.32	3.11

Table 3. Distribution of the farmers according to the effectiveness of DAE services (N= 105)

Categories of farmers	Frequency	Percentage
Less effective	23	7.7
Moderate effective	71	70.2
High effective	11	22.1

Table 4. Regression coefficients of the farmers' characteristics to the effectiveness of DAE advisory services

Dependent variable	Independent Variables	B	P	R ²	Adj. R ²	F
Effectiveness of DAE services	Age	0.050	0.569	0.553	0.505	11.63
	Educational level	0.176	0.039*			
	Household size	0.043	0.582			
	Time spent in farming	0.182	0.046*			
	Distance of home to Upazila Ag. office	-0.030	0.689			
	Experience in farming	0.043	0.675			
	Farm size	0.005	0.956			
	Annual household income	0.182	0.412			
	Organizational participation	0.265	0.000**			
	Cosmopoliteness	0.224	0.001**			

** Significant at $p < 0.01$; * Significant at $p < 0.05$

Organizational participation of the farmers was one of the most important contributors to the effectiveness of DAE services. From the analysis, it can be said that higher the organizational participation higher the effectiveness of DAE services. The b-value of farmers in organizational participation was (0.265). So, it can be stated that as farmers organizational participation increased by one unit, farmers' effectiveness of DAE regarding agricultural advisory services increased by 0.265 units considering the effects of all other predictors were held constant.

Organizational participation helped farmers to gather more knowledge on the use of DAE regarding agricultural services which ultimately acted their capacity building in this sector. And so, due to organizational involvement the farmers got a change in their horizon of understanding by sharing ideas and views with other persons. Thus steps should be arranged to increase farmers' participation in different organizations. Khan et al. [10] and Paul [11] found the similar result.

Cosmopolite behaviour of the farmers was also another important factor that has influence on the effectiveness of DAE services. The finding is consistent with the finding of Rahman [12] and Islam et al. [13]. From the Table it can be said that the farmers who had more cosmopoliteness behaviour that is extent of movement beyond once own location thought more effectiveness of DAE services. More clearly the effectiveness of DAE services was found more among those farmers who were more cosmopolite than the farmers with low cosmopolite trait. Higher level of cosmopoliteness farmers enabled to form positive attitude, gather knowledge and prompt them to adopt new practices .As such, the DAE regarding Agricultural advisory services were more effective among those farmers having more cosmopoliteness.

The contribution of education of the farmers on the effectiveness of using DAE services for improving their farming skill was significant. The direction between education of the farmers and the effectiveness of DAE services was positive. This means the higher the education the higher the probability of thinking the effectiveness of DAE services for improving farming skill. The b-value of level education indicates the educational level increased by one unit, farmers' effectiveness of DAE regarding agricultural advisory services increased by 0.284 units. Education plays an important role to gain more effectiveness using of the services. Education enhances knowledge on many aspects such as training, extension contact and so on .Thus the farmers get the chance to build capacity in different part of Agriculture. Sarker [14] and Kabir and Alam [15] found similar result.

The direction between times spent on the farm by the farmers and the effectiveness of the Department of Agricultural extension regarding agricultural advisory services was positive. Based on the above finding, it can be said that farmers had more time spent in farming thinking more about the effectiveness of DAE regarding agricultural services. This may be due to the fact that much time spent in farming is safe to maintain their livelihood. As the farmers who devoted more time to farming activities think positive about the DAE services effectiveness, therefore, the extension agent should communicate more with the farmers who spent less time in farming.

4. CONCLUSIONS AND RECOMMENDATIONS

DAE, the largest public agro-based organization is mainly responsible for disseminating agricultural information to the farmers. The purpose is to increase farmers farming capacity so that they can increase their skill for crop production. The study assessed the effectiveness of DAE services as perceived by the farmers. The survey revealed that majority of the farmers commented as moderate effectiveness of DAE services for improving their skill. Their comment was also influenced by their four characteristics such as organizational participation, cosmopoliteness, educational level and time spent in farming. Due to organizational involvement and more cosmopoliteness, the farmers get a change to expand their understanding by sharing ideas and views with others. A farmer who involved in organization and travel more his development activities always would be exceptional from others. Likewise, the farmers who had higher educational level and spent more time in farming had positive thinking regarding the effectiveness of DAE services. Based on the finding some recommendations are made below for increasing the effectiveness of DAE services.

1. Arrangement should be made by the DAE to provide non-formal education to the farmers. This will help to change knowledge, skill and general abilities, attitude as well as outlook of the farmers. The Bureau of Non-formal Education and NGOs can take necessary steps to increase farmers' primary level of education through adult education program.
2. In order to increase farmer's cosmopoliteness, more cultural activities, agricultural fair, new monetary facility, internet accessibility, interest on newly release innovations etc. should be organized by the DAE.
3. The extension agent specially the Sub Assistant Agriculture Officer (SAAO) should contact more with the farmers having no organizational involvement. And at the same time, the DAE should establish more organizations in the rural area for the betterment of the farmers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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