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Farmers' Attitude towards Farm Mechanization

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ABSTRACT

The study aimed at exploring farmers' attitude towards farm mechanization and finding out its relationships with the selected characteristics of the farmers. Problems faced by the farmers in farm mechanization and their corresponding solutions were also explored. Data were collected by using a pre-tested interview schedule at Phulbari upazila of Dinajpur district from randomly selected 93 respondents from the population of 931 farmers by using simple random sampling method during 25 September to 20 October 2019. Farmers' attitude towards farm mechanization was the focus issue of the study and was measured by Likert scale. The observed score of farmers' attitudes towards farm mechanization ranged from 13 to 59 with the mean score of 33.16 and a standard deviation of 8.78. Among the farmers, 63.4 percent belonged to neutral attitude category while 23.7 percent belonged to unfavorable and 12.9 percent to the favorable attitude category. Three out of nine selected characteristics of the farmers viz, educational qualification, training experience and extension media contact had significant positive relationships and annual income had negative significant relationship with their attitude towards farm mechanization. Rests of the characteristics had no significant relationship with the focus issue. Based on Problem Facing Indices (PFIs) the top ranked problem in relation to farm mechanization is machinery use is not profitable (PFI 223) and the top ranked solution suggested by the farmers in relation to farm mechanization is government subsidy in heavy farm machineries. Different agricultural development organizations should recognize the existing problems of farm mechanization and step forward for solving these problems.

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Introduction

The farm mechanization is an agricultural exertion in Bangladesh with the potential to transform the lives and economies of millions of farm families. It may improve livelihoods for farmers through increased access to input supply chains and integration in modern production systems, resulting in improved incomes, numerous and renewed business

opportunities, and further value addition (Sims *et al*., 2016). The main reasons for transformation to the power source for crop production are: potential to expand the cultivation area, ability to maximize production potential, multi-functionality of power applications, compensation for seasonal labor shortages and reduction of the drudgery (FAO, 2014). IFPRI (2016) concurs by concluding that increased accessibility of agricultural mechanization can contribute to Bangladesh's agricultural and economic transformation.

Farming systems through farm mechanization and production intensification offer a range of productivity, socio-economic, and environmental benefits to producers, food value chain sectors, and society in general. Mechanization enables farm family members not only to increase farm productivity via production intensification in some cases expansion, but also to seek off-farm employment opportunities (Houmy *et al*., 2013). The International Food Policy Research Institute (IFPRI, 2016) enriches the debate on the social factors associated with mechanization by pointing out that in the past, forced mechanization was associated with the displacement of tenant farmers and rural labor. However, in Bangladesh, mechanization is more likely to decrease labor demand when it enables more land to be cultivated because of potential production cost savings and reduction in drudgery by substituting manual labor and traditional tools with efficient machineries (Mottaleb *et al*., 2016). However, mechanization is just one component in the agricultural intensification process and mechanization should not actually initiate intensification where it is not already driven by population pressure and market demand (FAO, 2011, 2016). In summary, agricultural mechanization needs to be simultaneously: environmentally compatible, economically viable, affordable, adapted to local conditions, in view of current developments in weather patterns, and climatic condition. In practice, it involves the wide-scale application of conservation agriculture practices (FAO, 2016).

Emphasizing on above discussed necessity, farmers' attitude towards farm mechanization is very important for its adoption. The Government of Bangladesh is giving much emphasis for agricultural development of the country through farm mechanization in recent time (Fuad & Flora, 2019). Department of Agricultural Extension (DAE) encourages and supports planning and implementation of all agricultural extension activities emphasizing farm mechanization at the grass-root level (DAE, 2016). For appropriate farm mechanization the farmers need enough supervising, demonstration programs and training for farm mechanization. Different characteristics of the farmers might influence this phenomenon, which might be needed to be investigated for clear representation of their attitude towards farm mechanization. Farmers' problems regarding farm mechanization and their suggested solutions also might help to this comprehensiveness of understanding. Thus, the general objective of this research is to determine farmers' attitude towards farm mechanization. The specific objectives are: to determine the farmers' attitude towards farm mechanization, to explore the relationship between the selected characteristics of the farmer and their attitude towards farm mechanization, and to determine the problems faced by the farmers in farm mechanization and their suggested solution to solve these problems.

Methodology

Ex-post-facto explanatory cross-sectional research design (Hasan *et al*., 2018) was used for this study. Face-to-face interview method was used for data collection. A pre-tested interview schedule was used during the interview for data collection. The interview schedule contained both open and closed form questions. The Phulbari upazila of Dinajpur district was selected purposively as the socio-cultural situation of the locale is familiar as well as the upazila is convenient for conducting the study by the researchers. Two unions of the upazila namely Aladipur and Shibnagar were then selected randomly among the seven unions of the upazila. An updated list of all farmers who receives extension services provided by Department of Agricultural Extension (DAE) was collected from the Upazila Agriculture Office. There were 489 farmers in Aladipur union and 442 farmers in Shibnagar union thus, a total of 931 farmers under these two unions who were enlisted farmers receiving agricultural extension services from Upazila Agriculture Office. Ten percent of these farmers were selected randomly for data collection. Therefore, a total of 93 farmers were selected as the sample of the study. A reserve list containing 10 farmers were also selected from the two unions also.

Farmers' attitude towards farm mechanization was the focus issue of the study. This variable was measured by using Likert scale (Likert, 1932). Twelve statements (6 positive and 6 negative) on various aspects of farm mechanization were asked to the farmers. The positive and negative statements were arranged randomly in the schedule in order to avoid acquiescence response bias i.e., the common tendency to agree with all statements/questions asked. A neutral midpoint, balanced questions, and the appropriate amount of positive and negative scale points ensure the bias does not compromise the data and represent the real picture of attitude of the farmers. There were five options to response a statement, namely 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree' with a corresponding score of 5, 4, 3, 2, and 1, respectively for the positive statements and the scoring was reversed for the negative statements. A respondent was asked to indicate his or her attitude regarding a statement by selecting the appropriate option. The attitude score of a respondent was computed by summing the scores for his/her responses to all the statements. Hence, scores of a respondent could range from 12 to 60; while 12 indicating highly unfavorable attitude and 60 highly favorable attitudes towards farm mechanization. In addition, nine characteristics of the farmers were selected to describe the profile of the farmers following review of literature (Sarmin & Hasan, 2020; Hasan *et al*., 2019; Hanif *et al*., 2018; Rashid *et al*., 2015; Islam *et al*., 2007; and Hasan *et al*., 2005) were: age, educational qualification, household size, earning members, farming experience, training experience, farm size, annual income and extension media contact. The selected characteristics were considered to have relationship with the farmers' attitude towards farm mechanization.

Farmers faced many problems in farm mechanization. To determine the problems, the researcher made discussion with the farmers of the study area during pre-testing of the questionnaire. Eight problems were identified following Sarmin and Hasan (2020) for this purpose. Each farmer was asked to indicate his or her option regarding each problem. Farmers had option to indicate each problem as 'high', 'medium', 'low' or 'not at all'. To get

score of each problem four options 'high', 'medium', 'low' or 'not at all' were assigned by score of 3, 2, l and 0, respectively. For getting total score of the eight problems of the farmers, each problem along with rank order was computed by using the following formula:

Problem Facing Index (PFI) = $P_h \times 3 + P_m \times 2 + P_l \times 1 + P_n \times 0$

Where, P_h = Number of respondents with 'high' response

P_m = Number of respondents with 'medium' response

P_l = Number of respondents with 'low' response

P_n = Number of respondents with 'not at all' response

The problem facing score could range from 0 to 279 (3×93), where 0 indicates not faced the problem at all of that specific problem and 279 indicates the highest extent of problem faced for that specific problem.

The suggestions offered by the respondents to their problems faced in farm mechanization were ranked by content analysis through counting citations and ranked order of the suggestions was also constructed based on the citations.

Data collection was done from 25 September to 20 October 2019. The collected data were coded, compiled, tabulated and analyzed. The local units were converted into standard units e.g., for farm size bigha was converted to hectare. The qualitative data were transferred into quantitative data by appropriate scoring techniques. Data were analyzed in accordance with the objectives of the study by using SPSS (Statistical Package for Social Sciences) computer program (Version 23). Various statistical measures such as range, mean, number, percentage, standard deviations and rank order were used to describe the selected characteristics of the respondents of the study area. In order to find out the relationship between the selected characteristics of the farmers and their attitude, Pearson's Product Moment Correlations Co-efficient (r) was computed.

Results & Discussion

Farmers' attitude towards farm mechanization

The observed overall score of attitudes towards farm mechanization ranged from 13 to 59 with the possible range of 12 to 60 (Table 1). The mean score of farmers' attitudes towards farm mechanization is 33.16 with standard deviation of 8.78. Based on the possible range of farmers' attitude towards farm mechanization, they were classified into three categories namely 'unfavorable' (up to 28), 'neutral' (29-44) and 'favorable' (above 44). It was found that among the respondents' 63.4 percent belonged to neutral attitude category while 23.7 percent had unfavorable attitude and 12.9 percent had favorable attitude towards farm mechanization. The findings implied that most of the respondents were clustered around the neutral attitude towards farm mechanization category. This indicates that attitude towards farm mechanization is not at satisfactory level. It is required to bring the favorable attitude of the farmers towards farm mechanization because only 12.9 percent of the farmers had favorable attitude towards farm mechanization. This can be done by supporting farmers with

their demand led farm mechanization related information by different agricultural extension organizations.

Table 1 Distribution of different categories of farmers based on their attitude towards farm mechanization score (N = 93)

Range		Categories	Frequency	Percentage	Mean	Std. deviation
Possible	Observed					
12-60	13-59	Unfavorable (up to 28)	22	23.7	33.16	8.78
		Neutral (29-44)	59	63.4		
		Favorable (above 44)	12	12.9		
		Total	93	100.0		

Selected characteristics of the farmers

The findings of the selected characteristics are presented in Table 2. The respondents were classified in suitable categories for describing their selected characteristics as per the standard of the discipline.

Age of the farmers was found to vary from 22 to 60 years with a mean of 39.88 years with standard deviation of 9.52. It was found that 61.3 percent of the farmers fell in the middle-aged category, while 33.3 percent of the farmers fell in the young-aged category, and 5.4 percent in the old-aged category. Findings also indicated that an overwhelming majority of the farmers were middle and young aged. Exposure to formal education is very important for shaping-up the behavior of an individual (La Belle, 1982). The educational scores of the farmers ranged from 0.5 to 10 years, the mean is 3.46 years and standard deviation is 3.72. Results indicated that 55.9 percent of the farmers can sign their name only, 31.2 percent had secondary and 12.9 percent of the farmers had primary level of education. Literacy rate in Bangladesh is 73.2 percent (BBS, 2019). But in the study area, the literacy rate is 44.1 percent which is much lower than the national average. The household size of the respondents ranged from 3 to 9 persons with a mean of 4.80 and a standard deviation of 1.31. Findings indicate that majority of the farmers (47.3 percent) have small sized household. On the other hand, 41.9 percent had medium household and 10.8 percent had large household. The findings indicate that about over-whelming majority of the respondents had small to medium sized household. The number of earning member of the household of the respondents ranged from 2 to 7 persons. The mean is 3.98 and standard deviation is 1.32. It was also found that 53.8 percent of the respondents had moderate number of earning members while 32.3 percent had large and 14.0 percent had low number of earning member.

It was also found that 86.1 percent of the respondents had moderate to high number of earning members in their family. Earning member expresses how many family members are earning and higher earning member of the household indicates that more earning of the household. Medium to large number of earning members might influence high earning of the family and high earning might help in adopting farm mechanization at high rate.

Table 2 Distribution of the farmers based on their selected characteristics (N = 93)

Characteristics	Scoring method	Range (score)		Categories	Respondents		Mean	SD
		Possible	Observed		Freq.	%		
Age	No. of year	Unknown	22-60	Young (≤ 35)	31	33.3	39.88	9.52
				Middle (36-55)	57	61.3		
				Old (> 55)	5	5.4		
Educational qualification	Year of schooling	Unknown	0.5-10	Can sign name only (0.5)	52	55.9	3.46	3.72
				Primary (1-5)	12	12.9		
				Secondary (6-10)	29	31.2		
Household size	No. of members	Unknown	3-9	Small (1-4)	44	47.3	4.80	1.31
				Medium (5-6)	39	41.9		
				Large (>6)	10	10.8		
Earning member	No. of members	Unknown	2-7	Low (up to 2)	13	14.0	3.98	1.32
				Medium (3-4)	50	53.8		
				Large (>4)	30	32.3		
Farming experience	Years	Unknown	1-30	Fair (1-10)	32	34.4	15.13	8.29
				Good (11-20)	43	46.2		
				High (>20)	18	19.4		
Training experience	Days	Unknown	1-6	Single day (1)	58	62.4	1.61	1.15
				Two to four days (2-4)	30	32.3		
				Above four days (>4)	5	5.4		
Farm size	Hectare	Unknown	0.21-4.08	Marginal (0.02-0.20)	23	24.7	0.44	0.48
				Small (0.21-1.0)	66	71.0		
				Medium (1.01-3.0)	3	3.2		
				Large (above 3)	1	1.1		
Annual income	('000' Tk.)	Unknown	88-530	Low (≤ 100.00)	9	9.7	155.40	63.86
				Medium (100.01-200.00)	68	73.1		
				High (>200.00)	16	17.2		
Extension media contact	Score	0-33	6-31	Low (1 to 11)	12	12.9	16.88	5.52
				Medium (12-22)	64	68.8		
				High (23-33)	17	18.3		

Findings of Table 2 also indicate that farming experience of the respondents ranged from 1 to 30 years. The mean farming experience is 15.13 years with standard deviation of 8.29. It was found that the majority of the respondents had good farming experience (46.2 percent),

while 34.4 percent had fair farming experience and 19.4 percent had high farming experience. The training experience score of the respondents ranged from 1 to 6 days with a mean of 1.61 days and standard deviation of 1.15 days. Results of Table 2 show that the highest proportion (62.4 percent) of the respondents have single day long training experience while 32.3 percent have two to four days training experience and only 5.4 percent have above four days training experience. Farm size of the respondents ranged from 0.21 to 4.08 hectare. The mean of farm size is 0.44 hectare with standard deviation of 0.48. Following the classification provided by Department of Agricultural Extension (DAE, 2016) it was found that the majority of the respondents have small farm size (71.0 percent) followed by 24.7 percent are marginal farmer, 3.2 percent operate medium farm and 1.1 percent operate large farm. This means that majority of the sample farmers were marginal to small farmers. The annual income of the farmers ranged from 88 to 530 thousand taka with a mean of 155.40 and standard deviation of 63.86. Results of Table 2 show that the highest proportion (73.1 percent) of the respondents has medium income, while 9.7 percent have low, and another 17.2 percent have high annual income. Thus, majority of the respondents (90.3) belong to medium to high income category. The extension media contact scores of the respondents ranged from 6 to 31 with a mean score of 16.88 and standard deviation of 5.52. It was found that most of the respondent (68.8 percent) had medium extension media contact as compared to 18.3 percent had high contact and 12.9 percent had low contact of extension media. The findings of the study reveal that an overwhelming majority of the respondents (87.1 percent) had medium to high extension media contact.

Relationships between farmers' attitude towards farm mechanization and their selected characteristics

Karl Pearson's Product Moment Correlation co-efficient (r) was used to determine the relationships between the selected characteristics and the focus issue. A summary of the correlation analysis is presented in Table 3.

Out of nine selected characteristics of the farmers three characteristics, educational qualification, training experience and extension media contact showed positive significant relationship with their attitude towards farm mechanization. In contrast, annual income of the farmers showed negative significant relationship with their attitude towards farm mechanization. Rests of the characteristics such as age, household size, earning members, farming experience and farm size of the farmers had no significant relationship with their attitude towards farm mechanization. Similar findings regarding educational qualification and training experience were observed by Hasan (2016) and Hasan *et al*. (2019). Also, similar results reported by Rahman (2017) regarding relationship between extension media contact and respondents' attitude. But the result is dissimilar of Hasan *et al*. (2019) and Choudhury *et al*. (2019) regarding farmers' attitude and its relation with annual income.

Education might broaden the horizon of outlook of an individual as well improve the cognitive content. Again, training experience and extension media contact provide non-formal education to the farmer which also strengthens their capacity of outlook and analytics as well. All these might contribute to form favorable attitude of the farmers towards farm

mechanization. However, farmers having high income might not be interested to invest more for sole use of their machineries at their own field. But the farmers having low or moderate income might hire farm machineries or might invest more to buy farm machineries for not only the sole use in their own field but also to earn money by lending the machineries. All these might explain the negative correlation between farmers' attitude towards farm mechanization and annual income.

Table 3 Correlation coefficients of the selected characteristics of the farmers and their attitude towards farm mechanization (N = 93)

Focus issue	Selected characteristics	Computed values of 'r' with 91 d.f.	Tabulated value of 'r'	
			0.05 level	0.01 level
Attitude towards farm mechanization	Age	0.004	±0.204	±0.266
	Education qualification	0.237*		
	Household size	0.025		
	Earning members	-0.016		
	Farming experience	0.007		
	Training experience	0.208*		
	Farm size	0.080		
	Annual income	-0.265*		
	Extension media contact	0.383**		

*Correlation is significant at the 0.05 level; ** Correlation is significant at the 0.01 level

Problems faced by the farmers in farm mechanization

Frequency distribution of the farmers according to their problems faced in each of the eight problems related to farm mechanization has been showed in the Table 4 along with Problem Facing Index (PFI) and their rank order. Problem Facing Index (PFI) for each of the problems ranged from 63 to 223 with a possible range of 0 to 279.

Results of Table 4 show that based on PFIs the first ranked problem is 'machinery use is not profitable' (PFI 223). This might be due to the fact that the initial investment and maintenance cost is high for the farm machineries. The second ranked problem is 'low quality of machinery' (PFI 196). Quality of farm machinery is very much important for brining positive attitude and adoption of farm mechanization by the farmers as the initial cost of the machineries is very high. Without satisfaction regarding the quality of the machinery, the development of favorable attitude of the farmers towards farm mechanization will not be possible. The third ranked problem is 'repair and maintenance cost are high' (PFI 189). The local workshops for maintenance of the farm machineries are not well established in rural areas. Farmers need to bring their farm machineries in Upazila headquarter for repair and maintenance. This is time consuming and cumbersome work for them. The least three problems faced by the farmers in farm mechanization are: 'need to go to upazila or zila to buy spare parts' (PFI 155), 'working quality is not good' (PFI 153) and 'Spare parts are not available' (PFI 63).

Table 4 Rank order of problems faced by the farmers in farm mechanization

Sl. No.	Problems	Not at all (0)	Low (1)	Medium (2)	High (3)	PFI	Rank
1.	Low quality of machinery	0	17	49	27	196	2nd
2.	Working quality is not good	1	40	43	9	153	7th
3.	Repair and maintenance cost are high	0	18	54	21	189	3rd
4.	Shortage of qualified operator and maker	0	18	69	6	174	4th
5.	Spare parts are not available	50	24	18	1	63	8th
6.	Need to go to upazila or zila to buy spare parts	3	25	65	0	155	6th
7.	Machinery use is not profitable	2	6	38	47	223	1st
8.	High price of machinery to afford	1	19	69	4	169	5th

PFI: Problem Facing Index

Suggested solutions of the problems

The ranked order of the suggested solutions given by the farmers in relation to their problems in farm mechanization is given in Table 5.

Table 5 Ranked order of the solutions suggested by the farmers in relation to problems in farm mechanization

Suggested solutions	Frequencies	Rank order
Government should provide subsidy in heavy farm machineries	77	1
The terms and conditions for getting subsidized farm machineries should be soft and easy	73	2
Subsidies on fuel of the farm machineries need to be ensured and monitored strictly	69	3
Necessary credit support should be provided as and when necessary as easy terms to buy farm machineries	52	4
Market price of the farm machineries should be monitored regularly by the concerned government authority	47	5

Table 5 indicates that the top three solutions farmers demanded in relation to the problems they faced in farm mechanization are: government subsidy in heavy farm machineries followed by softened and easy terms and conditions for getting subsidized farm machineries and assurance of subsidized fuel for operating farm machineries with strict monitoring system. These suggestions indicate farmers are concerned about monetary and administrative burdens regarding farm mechanization, which are needed to be softened. The lowest ranked

solutions they demanded are: 'necessary credit support should be provided as and when necessary, as easy terms to buy farm machineries' and 'market price of the farm machineries should be monitored regularly by the concerned government authority'. Agricultural financial institutes are needed to be more softened to provide credit for farm mechanization and the markets of farm machineries should be regularly watched for price stabilization by DAE.

Conclusion

The majority of the farmers had neutral attitude towards farm mechanization. So, for bringing favorable attitude of the farmers it could be concluded that different agricultural extension organizations should provide necessary support (like motivational tour, field day, campaign etc.) and subsidy to farm machineries. In addition, user friendly farm machineries are also needed to be developed so that farmers can use them easily which might help to form favorable attitude of the farmers. The issues are needed to be considered for development of user-friendly farm machineries are: land size, soil type, availability of repairing facility or service center, resale value etc. There is positive relationship between educational qualification and farmers' attitude towards farm mechanization. In addition, findings indicate that more than half of the respondents have no institutional education. So, it could be concluded that more non-formal education like mass-education needs in the study area. The training experience of the farmers is not satisfactory in the study area but the variable showed positive significant relation with attitude towards farm mechanization. Thus, arrangement of proper training for the farmers by different agricultural development organizations is needed to be arranged on updated farm machineries to bring more favorable attitude towards farm mechanization. The overwhelming majority of the respondents had low to medium extension contact, but the variable is positively related with attitude towards farm mechanization, extension efforts are needed to be strengthened in the study area. Farmers having high annual income are needed to be strategically dealt (like field tour, presentation of operational efficiency etc. for their motivation) for bringing their favorable attitude towards farm mechanization. In addition, Department of Agricultural Extension and other agricultural development organizations should realize the existing problems of the farmers in relation to farm mechanization and necessary steps should be taken to minimize those problems like, government subsidy in heavy farm machineries followed by softened and easy terms and conditions for getting subsidized farm machineries and assurance of subsidized fuel for operating farm machineries with strict monitoring system.

References

BBS. 2019. Bangladesh Statistics 2019. Bangladesh Bureau of Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

Choudhury, F.H., M.R. Amin, M.A. Islam and S.D. Baishakhy. 2019. Attitude of Farmers towards Television Programmes in Perceiving Agricultural Information. *Bangladesh Journal of Extension Education*, 31(1&2): 171-176.

DAE. 2016. *Agricultural Extension Manual*. Department of Agricultural Extension, Ministry of Agriculture, Government of the People's Republic of Bangladesh, Dhaka.

FAO. 2011. Save and grow. A policymaker's guide to the sustainable intensification of smallholder crop production. Rome, Italy, (pp. 102). Retrieved from http://www.fao.org/docrep/014/i2215e/i2215e.pdf).

FAO. 2014. A regional strategy for sustainable agricultural mechanization: Sustainable mechanization across agri-food chains in Asia and the Pacific region. G. Mrema, P. Soni and R. Rolle. FAO Regional Office for Asia and the Pacific Publication 2014/24, (pp. 74).

FAO. 2016. Save and grow in practice: Maize, rice, wheat. A guide to sustainable cereal production. Rome, (pp. 110). Retrieved from http://www.fao.org/publications/ save-and-grow/maize-rice-wheat/en

Fuad, M.A.F. and U.M.A. Flora. 2019. Farm Mechanization in Bangladesh: A Review. *International Journal of Research in Business Studies and Management*, 6(9): 15-29.

Hanif, M.A., R.M. Roy, M.S. Bari, P.C. Ray, M.S. Rahman and M.F. Hasan. 2018. Livelihood Improvements through Agroforestry: Evidence from Norther Bangladesh. *Small-scale Forestry*, 17(4): 505-522.

Hasan, M.F. 2016. Factors Affecting Fish-Farmers' Attitude towards Community Managed Fisheries in Dinajpur District. *Journal of Innovation and Development Strategy*, 10(1): 40-46.

Hasan, M.F., H. Begum and F. Khatun. 2018. *Research Methodology in Social Sciences*. Dhaka: Borna Prokashoni.

Hasan, M.F., M.A. Kashem and M.A. Hossain. 2005. Attitude of Program Participants on Partnership Extension Approach in Two Regions of RDRS. *Bangladesh Journal of Extension Education*, 17(1&2): 39-46.

Hasan, M.F., M.F. Hossain, M.S. Rahman and S. Sarmin. 2019. Factors Contributing to Farmers' Attitude towards Practicing Aquaculture in Dinajpur District of Bangladesh. *Bangladesh Journal of Extension Education*, 31(1&2): 77-85.

Houmy, K., L.J. Clarke, J.E. Ashburner and J. Kienzle. 2013. Agricultural Mechanization in Sub-Saharan Africa Guidelines for Preparing a Strategy. Integrated Crop Management Series, Vol. 22-2013, Food and Agriculture Organization of the United Nations, Rome.

IFPRI. 2016. Agricultural Mechanization and Agricultural Transformation. International Food Policy Research Unit, Discussion paper 01527. Washington, D.C., (pp. 56) Retrieved from https://www.ifpri.org/publication/agricultural-mechanization-and-agricultural-transformation

Islam, M.O., M.R. Islam, M.K. Uddin and M.F. Hasan. 2007. Poverty Alleviation of Rural Women through Participation in Selected Grameen Bank Development Activities. *Journal of Socioeconomic Research and Development*, 4(4): 181-186.

La Belle, T.J. 1982. Formal, Nonformal and Informal Education: A Holistic Perspective on Lifelong Learning. *International Review of Education / Internationale Zeitschrift Für Erziehungswissenschaft / Revue Internationale De L'Education*, 28(2): 159-175.

Likert, R. 1932. A Technique for the Measurement of Attitudes. *Archives of Psychology*, 140: 1-55.

Mottaleb, K.A., T.J. Krupnik and O. Erenstein. 2016. Factors Associated with Small-Scale Agricultural Machinery Adoption in Bangladesh: Census Findings. *Journal of Rural Studies*, 46: 155-168.

Rahman, M.S., S.K. Chawdhury, M.F. Hasan, M.R. Karim and M.H.A. Amin. 2017. Farmers' Attitude towards Pariza Rice Cultivation in Nilphamari District. *Journal of Science and Technology*, 15(June 2017): 20-24.

Rashid, M.M., M.F. Hasan and M.A.S. Mondol. 2015. Farmers' Attitude towards Use of Dolochun for Crop Production. *Journal of Innovation and Development Strategy*, 9(2): 5-8.

Sarmin, S. and M.F. Hasan. 2020. Constraints Faced by the Small-Scale Farmers in Achieving Household Food Security: A Case from Dinajpur District, Bangladesh. *Bangladesh Journal of Extension Education*, 32(1): 63-72.

Sims, B., M. Hilmi and J. Kienzle. 2016. Agricultural Mechanization: A Key Input for Sub-Saharan African Smallholders. Integrated Crop Management Series, Vol. 23-2016, Food and Agriculture Organization of the United Nations, Rome.