Original Research Article

Impact of Rice Seed Production, Processing, and Distribution Training on the Stakeholders in Bangladesh

Abstract

The study examined the impact of rice seed production, processing, and distribution training on the rice seed stakeholders. Ten one-day training events were conducted by Bangladesh Agricultural Development Corporation (BADC) and funded by the International Rice Research Institute (IRRI). Sample size of trainees included 199 rice seed dealers, 62 rice growers, and 29 dealers cum growers across four divisions of Bangladesh. The perceived impact of training was determined by employing a t-test. Almost all of the stakeholders indicated improvement in their learning of the subjects designed. Dealers expressed their views of moderate use of the training outcomes in determining seed demand, storage, and sale, whereas growers and dealer cum growers were highly optimistic about using their knowledge and skills obtained in seed production, processing, storing, and marketing in a better way. Significant changes in knowledge and skills and favorable perceptions were observed among all the stakeholders for better production, processing, and utilization of rice seed.

Keywords: Growers, dealer cum growers, dealers, training, impact, utilization

1. Introduction

Training is a systematic and organized effort to modify or enhance knowledge, skills, or attitudes through learning experiences to attain efficient performance in a particular task or set of activities (Huang, 2019). Its goal in the workplace is to help an individual develop skills that will allow them to perform well in a specific activity or job and reach their full potential (Buckley and Caple, 2009). Agricultural training is an informal education; it is a practical use of science, economic and social development in the principles of preparation for agricultural production. Noor (2011) has summarized the impact of training among farmers into six major benefits according to priority: (i) increase in work quality; (ii) increase in farm products; (iii) cost savings; (iv) time savings; (v) increase in income, and finally (vi) increase in networking. He found in his study that, the farmers' training has not only increased their skills and abilities, but it has also boosted their morale and motivation, which has contributed to their better performance level. Training is one of many ways to spread agricultural education among farmers. Continuous learning in agriculture is important as agricultural technology is developing day by day. To introduce farmers to these new technologies, trainings play a vital role.

With a clear picture of how the participants are using the information after training in place of local practices and what they have adopted for future use, one can determine the effectiveness of training. The pre and post-test is a common form of evaluating training programs in terms of improving the knowledge of the participants. Even though the modern economy is mostly reliant on industrialization, agriculture remains the lifeblood of Bangladesh's economy. Agriculture has traditionally been used in Bangladesh as a catalyst for the country's long-term development and progress (Rahman, 2017). Many governmental and non-governmental institutions arrange agricultural training programs every year in Bangladesh to ensure development in agricultural

sectors, but many of these trainings are not capable of bringing about the expected behavioral change in the participants. One of the reasons is that the participants don't go through any assessment tests.

Training assessment is important to determine the impact of training. This paper will show the result of training through assessment. Training assessment is not a very popular topic in Bangladesh and there are not many studies that have shown the impact of training among farmers through assessment. Gautam et al. (2017) showed the impact of training on vegetable farmers in Bangladesh in integrated pest management through observation, but they didn't go with the assessment. Hossain et al. (2021) also showed the impact of training on livestock technology transfer for poor farmers' livelihood improvement in Bangladesh. The study was conducted through a questionnaire but no pre and post-tests were done to assess the impact. Therefore, the main concerns of the study were to i) describe the socio-demographic characteristics of the rice seed stakeholders; ii) assess the perceived impact of rice seed production, processing, and distribution training on the stakeholders; and iii) investigate the utilization of the knowledge gained from the training by the rice seed stakeholders.

2. Methodology

Based on the selected objectives, mixed research methods were used for the study. The growers, dealers, and dealer cum growers trained by the BADC in ten seed zones of Bangladesh (Sylhet, Cumilla, Chittagong, Jessore, Kushtia, Mymensingh, Dhaka, Rajshahi, Rangpur and Barishal districts) and monitored by IRRI were the sample of this study. Out of 870 respondents, a total of 290 trainees including 199 dealers, 62 growers and 29 dealer-cum-growers were interviewed in face-to-face situations before and after each training session using a pre-designed interview schedule that included fifteen relevant questions. The answers to the questions were accentuated in the discussions at each training session. The questions were on rice seed production, processing, and distribution training for the stakeholders. Socio-demographic characteristics of the rice seed stakeholders were assessed following standard techniques. The dependent variables of the study were the impact of training on rice seed dealers, growers and dealer cum growers and the independent variables included age, education, family members, earning members, farming experience, farm size, commercial seed harvesting experience, seed dealership experience, net income, seed dealer committee membership and their training experience. All the variables related to age, education, membership and experiences were measured in years, while farm size was considered in hectares of total land. R software was employed to demonstrate correlation of coefficient matrix of the selected characteristics of the respondent stakeholders. F-test was performed to calculate the variance in the knowledge of all the groups of respondents both before and after training. The impact of training was measured by evaluating the differences between the pre and post-test scores by employing a t-test. The perceived utilization of training outcomes was measured by using a five-point rating scale.

3. Results and Discussion

The findings of the study are shown below in accordance with the objectives.

3.1 Socio-demographic characteristics

The socio-demographic characteristics of the respondents are presented in Table 1. The majority of dealers (82.9%), growers (87.1%), and dealer cum growers (94.7%) were middle old-aged which is akin to those of Uddin et al. (2015). All 29 dealer-cum-growers and more than four-fifths (80.6 and 95.0%, respectively) of solo growers and dealers were highly educated and the

majority had a high number of attended training programs (31.6, 51.6 and 41.7%, respectively) (Bhattacharjee et al., 2020; Sakib & Afrad, 2014; Yasmin et al., 2014). The majority of the dealers (87.9%) and dealers cum growers (84.2%) had small to medium-sized families whereas growers (77.4%) had medium to large-sized families (Afrad & Barau 2018). More than half respondents of different stakeholders were the only earning person in their families. Dealers (74.1%) mostly had low to medium farming experience, but the farming experience of growers and dealer cum growers (69.4 and 73.7%, respectively) was quite noticeable (Sakib & Afrad 2014; Yasmin et al., 2014).

Table1. Selected variables of the respondents along with dominant categories

Sl#	Socio-demographic characteristics	Respondents					
		Dealers	**Percent**	**Growers**	**Percent**	***DCG**	**Percent**
i.	Age	Middle to old	82.9	Middle to old	87.1	Middle to old	94.7
ii.	Education	Secondary to above secondary	95.0	Secondary to above secondary	80.6	Secondary to above secondary	100.0
iii.	Family size	Small to medium	87.90	Medium to large	77.4	Small to medium	84.2
iv.	Earning members	Only respondent	63.8	Only respondent	58.1	Only respondent	63.8
v.	Farming experience	Low to medium	74.1	Medium to high	69.4	Medium to high	73.7
vi.	Commercia-lization of harvested seed	-	-	Low to medium	91.9	Low to medium	89.5
vii.	Net income	-	-	Low	58.1	Low	42.1
viii.	Dealership experience	Short to medium	89.9	-	-	Medium to long	82.7
ix.	Training experience	High	41.7	High	51.6	High	31.6
x.	Seed dealership experience	Short to medium	81.9	-	-	Short to medium	86.2

***DCG= Dealer cum grower**

Results also show that the growers and dealer cum growers (91.9 and 89.5%, respectively) grew and harvested more seeds in 2020, thus low-level net income from seed production was earned by growers (58.1%) and dealer cum growers (42.1%). The dealership experience of the dealers (89.9%) was short to medium whereas 82.7 percent of dealer cum growers (83.4%) had medium to long experience in the dealership. Both dealers (81.9%) and dealer cum growers (86.2%) had short to medium length of seed dealership experience.

3.2 Rank order of knowledge statements

Knowledge of the respondent dealers, growers and dealer cum growers was evaluated based on a knowledge scale constituting 15 questions. Each question was in equal weave length weighing

2.0 marks. The knowledge of each respondent was evaluated on each knowledge question both before and after a training program.

Table 2. Analysis of knowledge scale based on mean values of answers given by the respondents before and after training

Sl.	Knowledge statements	Dealers		Growers		*DCG	
		Before	After	Before	After	Before	After
i.	Food security risks of Bangladesh	0.40	1.05	0.50	1.08	0.58	0.96
ii.	Activities undertaken for popularization of a rice variety	0.60	1.02	0.70	1.27	0.62	0.82
iii.	Nutrient enriched rice varieties released by BRRI	0.27	0.49	0.31	0.68	0.45	0.66
iv.	Aromatic rice varieties developed by BRRI	0.74	0.91	0.38	0.61	0.65	0.89
v.	Recommendation gave by the dealers along with seed selling	0.45	0.76	0.23	0.47	0.38	0.61
vi.	Means of determining quality rice seed	0.41	0.88	0.67	1.12	0.64	1.13
vii.	Important activities of rice seed production	0.48	0.82	0.74	1.12	0.86	1.02
viii.	Essential information printed on the rice seed packet	0.74	1.09	1.04	1.36	0.89	1.24
ix.	Optimum moisture level of rice seed for storage	0.48	1.30	1.22	1.70	1.03	1.51
x.	Needful processing activities of rice seed	0.33	0.60	0.71	1.10	0.56	0.71
xi.	Means of ripened rice seed identification	0.28	1.03	0.59	1.17	0.86	1.24
xii.	Preferable stages rice seed production field visit	0.24	0.58	0.58	1.03	0.52	0.95
xiii.	Storage activities performed by the dealers to keep rice seed healthy	0.40	0.71	0.33	0.57	0.45	0.81
xiv.	Need for branding	0.20	0.49	0.16	0.52	0.17	0.60
xv.	Activities to be taken for determination of seed demand	0.19	0.35	0.10	0.32	0.20	0.37

***DCG= Dealer cum Grower**

The mean knowledge score on each knowledge question was calculated both before and after a training program. Any change in mean values for every question after the training program indicates that the respondents were paying attention and received the information instantly, which helped them to respond better in post-evaluation.

Results shown in Table 2 indicate that before training, a reasonable part of the respondent dealers answered the question on naming aromatic rice varieties developed by BRRI and essential information printed on the rice seed packets. After training, most of the respondent dealers answered the questions on the optimum moisture level of rice seed for storage. Here both the respondent growers and dealer cum growers obtained higher marks before and after the training on answering the question about the optimum moisture level of rice seed for storage. It is

observed from Table 2 that the mean value of after-training evaluation for both of the respondent groups increased.

A higher mean value obtained from the after-training evaluation of any knowledge question than that of the pre-training evaluation indicates the achievement of the training program. If there is no change in the mean value of any knowledge question after training evaluation then it can be said that the respondent might not be attentive or the trainer would not be able to make them understand the answer to the knowledge question. Interestingly, in all the cases, the mean post-evaluation values were higher than those of pre-evaluation values. It means that there were some achievements in the training participants. The findings of Tayade and Chinchmaltpure (2016) identified that farmers' overall knowledge level increased from low (84%) to medium (64%) after attaining training and training has a significant and positive impact on the knowledge level of respondents.

3.3 Variation of knowledge

To determine the significance of the variation in knowledge, F-test was conducted. An insignificant variation in knowledge was observed for the pre-training period, but post-training, the variation of knowledge was significant at 0.01 level. This indicates that the majority of the respondents were not able to answer the questions, i.e., there was little or minimum variation among their answers. After the training, most of the respondents received the actual information and their answers differed widely because of their different learning capacities.

Table 3. Knowledge variation of the stakeholder respondents before and after participation in the training

Group	Knowledge before			Knowledge after		
	Mean	SD	F-statistics	Mean	SD	F-statistics
Dealers	6.1792	4.82461	2.032^{ns} (P=0.134)	10.9627	5.01454	4.085^{**} (P=0.018)
Growers	7.6962	4.40445		13.4019	4.18065	
Dealer cum Growers	7.8986	6.33412		12.5586	6.39261	

^{ns}Non-significant, ** significant at 0.01 level

Correlation coefficient among independent variables of the respondents

The information displayed in Figure 1 show the correlation between selected variables for a dealer. Positive correlations are displayed in blue and negative correlations in red color. The color intensity and the size of the circle are proportional to the correlation coefficients. A positive correlation exists when two variables move in the same direction. When one variable tends to decline as the other decreases, or when one variable tends to rise as the other increases, there is a positive connection. The negative correlation is vice versa. A strong positive correlation was observed between knowledge before and knowledge after the training (0.6). It means that the respondents having high-level knowledge of rice seed production, processing, preservation and marketing had more improvement in their level of knowledge on the same. Pratiwi and Suzuki (2018) also found a positive correlation between the two variables. In addition, dealers' knowledge before training (0.2) was positively correlated with training and seed dealership experience, which indicates that dealers with an increasing number of obtained training and years of seed dealership experience had better knowledge prior to training. Also,

dealers with higher experience tend to attain more training programs and the number of training programs positively influenced getting membership of the seed dealers' committee.

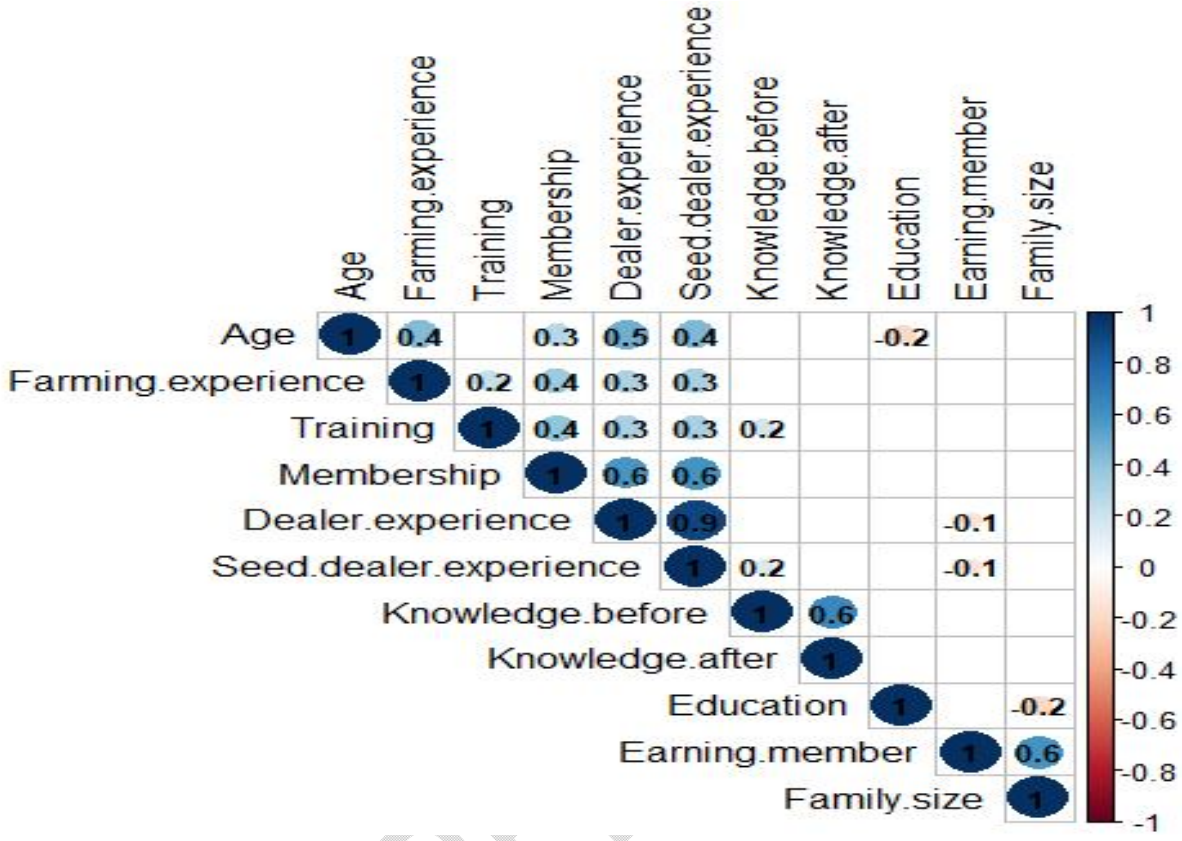

Figure 1. Correlation coefficient matrix of the selected characteristics of the respondent dealers

There is also a noticeable positive correlation between dealership experience, seed dealership experience and farming experience with age (0.43). Reichardt et al. (2009) corroborate that work experience (0.92**) has a significant positive correlation with age, which indicates that work experience such as; dealership experience, seed dealership experience and farming experience changes with age. Moreover, dealership experience and seed dealership experience had a positive correlation with the membership of the seed dealers' committee, which means experienced dealers have a better chance to be in the seed dealers' committee than the armatures'. There was a strong correlation (0.9) between dealership experience and seed dealership experience, while both kinds of experiences had a negative correlation with the number of earning members of families (-0.1). Education (-0.2) also had a negative correlation with age and family size, which states that with increasing age and family members, the dealers showed a declining trend in education level.

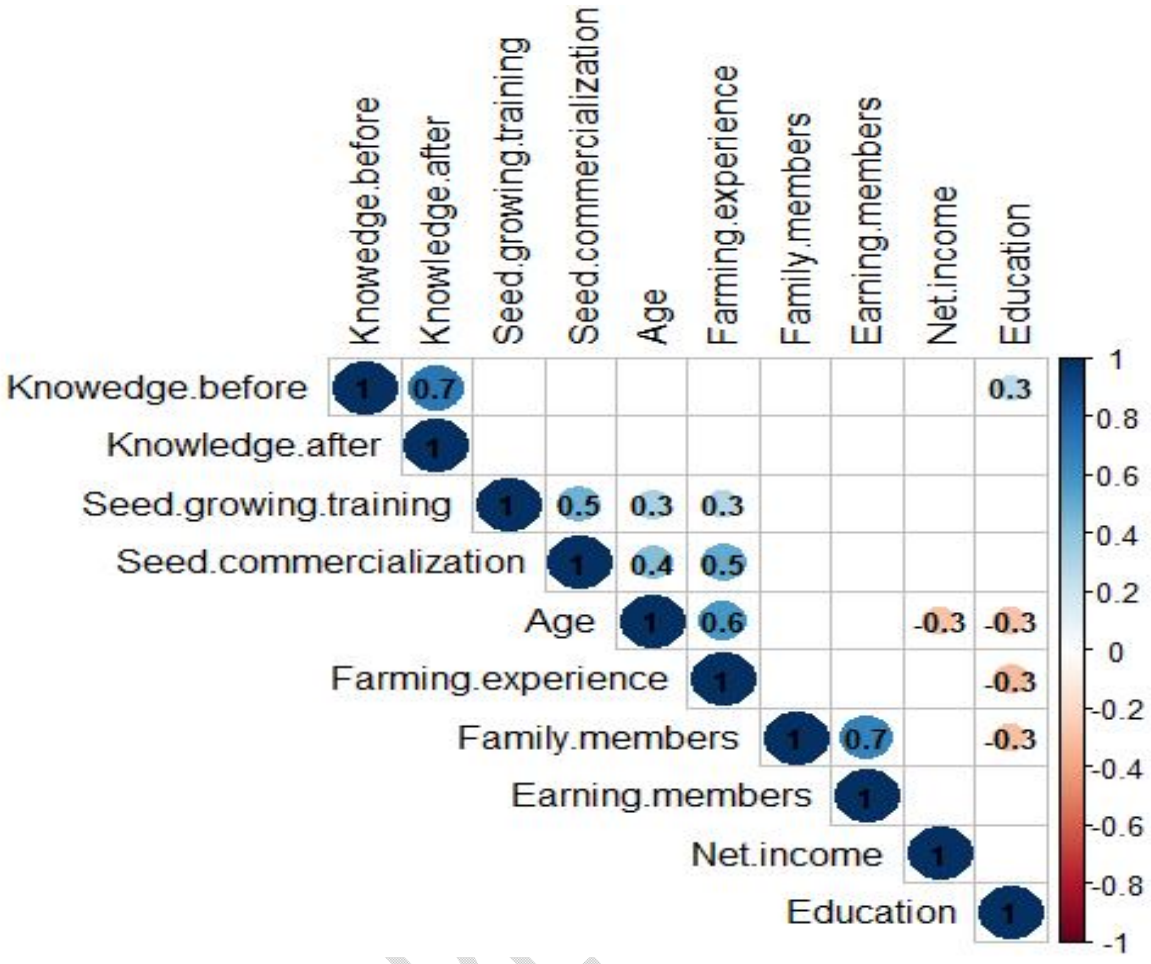

Figure 2. Correlation coefficient matrix of the selected characteristics of the respondent growers

Results shown in Figure 2 mean the correlation among selected variables for growers. A positive correlation between knowledge before and knowledge after is visible with a value of 0.7. It means that the higher the before-knowledge level of the respondents, the higher their after-knowledge. Training on seed production activities has a positive correlation with growers' seed commercialization ability (0.5) which means an increasing number of training increase farmers' ability to market their products. Opolot et al. (2018) reported the same result that training had a positive influence on the farmers' entrepreneurial and organizational competencies such as; agronomic practices, business planning, and value addition. There is also a positive relationship between commercialization with age (0.4) and farming experience (0.5). It means that the longer the farming experience, the better the commercialization of harvested rice seed. This might be due to the fact that the respondents with long experience, knew the loopholes of rice seed production and they might have profited from rice seed production. Education (0.3) was found to be an influential factor for the dissimilation of growers' knowledge level before being trained. Farming experience had a significant influence on the access to agro-processing training for small-scale farmers and their coefficient was positive, which means that small-scale crop farmers with higher farming experience were more likely to receive a greater number of agro-processing training (Mthombeni et al., 2022) and Figure 2 reveals similar positive correlation of coefficient (0.3) result between growers farming experience and training on seed production. Though

earning members increased with larger family sizes, growers' net income (-0.3) declined with increasing age. But grower's level of education was found to have a negative correlation with age, farming experience and the number of family members. It means that the older farmers with higher farming experience and a larger number of family members tend to have less chance to be educated. This is true because the country is going ahead along with the national literacy level. Therefore, the younger respondents showed a higher level of education.

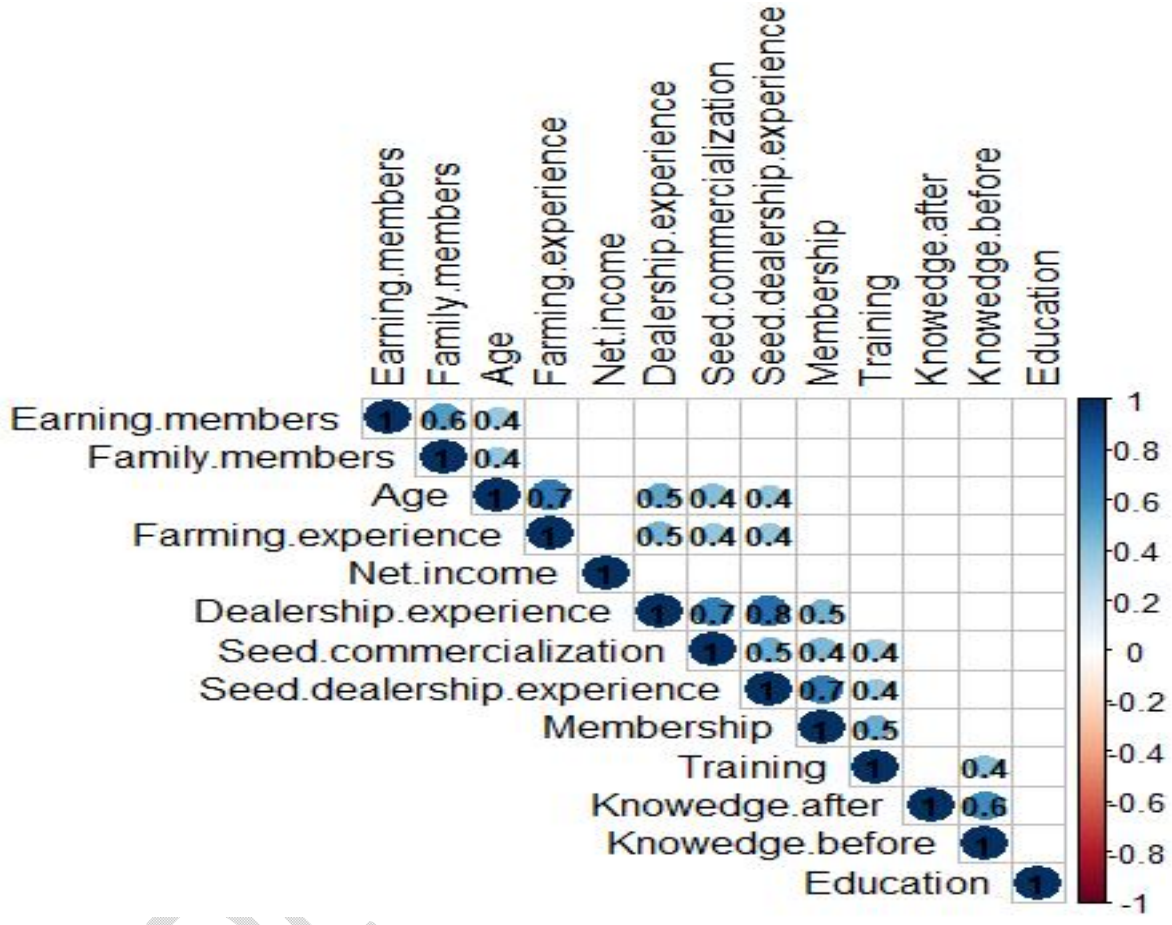

Figure 3. Correlation coefficient matrix of the selected characteristics of the respondent dealer cum growers

Information contained in Figure 3 present the correlations among selected variables for dealers cum growers. Dealer cum growers' number of attained training had a positive correlation with knowledge prior to training (0.4), while knowledge before and after training had a significant correlation value (0.6) indicating that training programs influence the level of knowledge, as training made a positive difference in knowledge level before and after being trained. Strong positive relationships were observed among age and different kinds of experiences such as; farming experience, dealership experience and seed dealership experience, which was found similar to the independent rice seed dealers and growers. In addition, the age of the respondents was highly related to their farming experience because a dealer cum grower becomes mature with his/her profession based on his/her attachment to the same. A big farmer or dealer has options to get involved with multiple farming entrepreneurship. They are very careful about their input and output association. Moreover, organizational membership is very closely related to

agro-product dealership and seed dealership experience. This might be due to the fact that the experienced dealers cum growers are benefitted because of their involvement with the different organizations. Furthermore, dealer cum growers' organizational membership also positively correlated with training (0.5) and harvested seed commercialization (0.4). Experienced dealers cum growers can be more efficient about their investment at the same time efficient use of input and output in seed production. Again, seed dealership experience was significantly related to the commercialization of harvested rice seed, which means dealer-cum-growers having long experience in seed dealership maximize the sale of their portion of products. The number of earning members in dealer cum grower's families was moderately related to age and number of family members.

3.4 Impact of training on the respondent stakeholders

A t-test was done to identify the significance of the difference between pre and post-training evaluations. The results indicate that the differences are significant for all three groups of respondents. That means all three groups gained knowledge from the training and improved upon it. As a result, it can be inferred that the majority of the respondents had low knowledge prior to the training, whereas most of them demonstrated moderate knowledge after the training, and a few of them indicated high knowledge.

Table 4. Difference in the knowledge of respondent dealers, growers, and dealer cum growers during pre and post-training evaluation

Respondent	t-values	Significance (2-tailed)
Dealers	19.67	.000
Growers	14.80	.000
Dealer cum growers	4.82	.000

This clearly demonstrates that training has a large and favorable impact on responders' knowledge levels. The results of the study were in line with the findings of Tayade and Chinchmaltpure (2016). A study by Gautam et al. (2017) also found that vegetable growers showed better knowledge of insect pests, and the proper use of pesticides adopted more IPM practices and reduced the frequency of spraying after getting training on Integrated Pest Management (IPM). Moreover, goat farmers who participated in different training programs had significant positive t- values, which means after attending these training programs made some difference in the knowledge of the farmers (Dixit et al., 2016). Average knowledge scores of all different stakeholders for pre and post-training evaluation were increased significantly which indicates to the effectiveness of training programs. The findings of Mrinila et al. (2016) resulted that training is a crucial factor in knowledge generation and information dissemination among farmers, also taking an additional training program could increase the likelihood of organic farming by 13% and reduce the prevalence of inorganic farming by 11%.

3.5 Perceived utilization of the training

This table shows the perceived use of knowledge acquired from the training. Around 45.0 to 70.0 percent of the dealers cum growers shared that they would use the knowledge acquired from the training to a very high extent. The opinion was recorded against a five-point rating scale that was designed to measure the utilization of the training by the respondents. A major portion (41.2 and 38.2%, respectively) of dealers mentioned that they would use the knowledge gained moderately

for seed demand assessment and seed marketing; whereas 46.8 percent of growers expressed that they would use the knowledge to a very high extent for advising other farmers. Among the dealers cum growers, 51.7 percent shared that they would use the knowledge to a very high extent for seed marketing.

Staudacher et al. (2021) found that more than half of the dealers used their knowledge for advising on product choice. They also advise on product application, handling, storage, health effect, disposal, environmental effect, and labeling. According to Karim et al. (2011) more than three-fourths (85.0%) of the farmers had low to medium knowledge and they used their knowledge for quality seed production. Lipi et al. (2017) also found that dealers cum growers assume the responsibility to maintain the market demand for the rice varieties by using their knowledge.

Table 5. Perceived future utilization of knowledge by the respondent dealers, growers, and dealer cum growers acquired from the training

Respondents	Subject	Extend of use	Percent
Dealers	Advising farmers about using seed	Very high	44.7
	Advising about seed production	Moderate	32.7
	Seed storing	Moderate	36.7
	Seed demand identification	Moderate	41.2
	Seed marketing	Moderate	38.2
Growers	Seed production	Very high	45.2
	Seed processing	Moderate	37.1
	Seed storing	High	40.3
	Advising other growers	Very high	46.8
	Seed marketing	Moderate	37.1
Dealer cum growers	Advising farmers about using seed	Very high	69.0
	Advising about seed production	Very high	51.7
	Seed storing	Very high	51.7
	Seed demand identification	Very high	44.8
	Seed marketing	Very high	51.7

4. Conclusion

Regular training is important to improve the skills and adoption ability of seed systems stakeholders with respect to new innovations. Most of the stakeholders do not want to switch to new technologies or new varieties of seeds. This is because of the lack of awareness about new products or their lack of interest in new things, and that is a major reason why Bangladesh lags in agricultural income. Proper training among the seed stakeholders can improve this situation. As seen in this study, most of the stakeholders responded positively to the training and their responses towards the utilization of the knowledge were really up to the mark. This indicates an expected change in their adoption ability for new innovations. Post-training assessment gives an idea about the extent of knowledge gained by the respondents. There is a huge scope for government and private organizations in Bangladesh to provide proper training to people in the agriculture sector. Such organizations should conduct need-based training and also evaluate the impact of training for further information.

6. References

Bhattacharjee D, Barau AA, Haque ME, Haque ME & Afrad MSI 2020, 'Knowledge of Chakma women on shifting cultivation: a comparative study between Bangladesh and India', *Asian Journal of Agricultural Extension, Economics & Sociology*, 38(3), 57-66.

Afrad MSI & Barau AA 2018, 'Performance of vulnerable group development towards food security', *Annals of Bangladesh Agriculture*, 22(2), 21-28.

Buckley R & Caple J 2009, 'The theory and practice of training'. Kogan Page Publishers.

Dixit AK Mohan B Singh K & Kumar V 2016, 'Impact of training program on goat farmers and stakeholders: A study of CIRG Training programs', *Indian Research Journal of Extension Education*, 14(3), 112-114.

Gautam S Schreinemachers P Uddin MN & Srinivasan R 2017, 'Impact of training on vegetable farmers in Bangladesh in integrated pest management (IPM)', *Crop Protection*, 102, 161-169.

Hossain MA, Islam MS, Akhter A & Rashiduzzaman M, 2021, 'Impact of training on livestock technology transfer for rural poor farmers livelihood improvement in Bangladesh', *SAARC Journal of Agriculture*, vol. 19, no. 1, pp.223-235.

Huang WR 2020, 'Job training satisfaction, job satisfaction, and job performance', In: Fahed-Sreih J (Ed.). Career Development and Job Satisfaction. InterTech Open, doi: 10.5772/intechopen.82999

Karim M R, Rahman M Z & Kashem M A 2011, 'Technological knowledge of farmers on quality seed production as means to bridging the gaps in food crisis', *Bangladesh Research Publications Journal*, vol. 6, no. 2, pp. 198-204.

Lipi D, Sharma SG, Samal P, Patnaik SSC, Sahu RK, Rath PC & Mukherjee A K 2017, 'Rice value chain in PPP mode for increasing farm income and entrepreneurship'.

Mrinila, S., Keshav, L.M. and Bijan, M., 2015. Factors impacting adoption of organic farming in Chitwan district of Nepal. *Asian Journal of Agriculture and Rural Development*, *5*(393-2016-24015), pp.1-12.

Mthombeni DL Antwi MA & Oduniyi OS 2022, 'Factors influencing access to agro-processing training for small-scale crop farmers in Gauteng province of South Africa', *Agriculture & Food Security*, 11(1), 1-7.

Noor KBM & Dola K 2011,'Investigating training impact on farmers' perception and performance', *International Journal of Humanities and Social Science*, vol. 1, no. 6, pp.145-152.

Opolot HN Isubikalu P Obaa BB & Ebanyat P 2018, 'Influence of university entrepreneurship training on farmers' competences for improved productivity and market access in Uganda', *Cogent Food & Agriculture*, 4(1), 1469211.

Pratiwi A & Suzuki A 2017, 'Effects of farmers' social networks on knowledge acquisition: Lessons from agricultural training in rural Indonesia', *Journal of Economic Structures*, 6(1), 1-23.

Rahman M 2017, 'Role of agriculture in Bangladesh economy: uncovering the problems and challenges', *International Journal of Business and Management Invention'*, 6(7), 36-46.

Reichardt M Jürgens C Klöble U Hüter J and Moser K 2009, 'Dissemination of precision farming in Germany: acceptance, adoption, obstacles, knowledge transfer and training activities', *Precision Agriculture, 10*, 525-545.

Staudacher P Brugger C Winkler MS Stamm C Farnham A Mubeezi R & Günther I 2021, 'What agro-input dealers know, sell and say to smallholder farmers about pesticides: a mystery shopping and KAP analysis in Uganda', *Environmental Health*, 20(1), 1-19.

Sakib H & Afrad MSI 2014, 'Adoption of modern aquaculture technologies by the fish farmers in Bogra district of Bangladesh', *International Journal of Agriculture Innovations and Research*, 3(2), 414-421.

Tayade AM & Chinchmaltpure UR 2016, 'Impact of training on knowledge level of farmers about use of bio-pesticide and its mass multiplication on agriculture wastage', *Agricultural Science Digest-A Research Journal*, 36(3), 212-215.

Uddin MR Miah MGU Afrad MSI Mehraj H & Mandal MSH 2015, 'Land use change and its impact on ecosystem services, livelihood in Tanguar haor wetland of Bangladesh', *Sci. Agric*, 12(2), 78-88.

Yasmin S, Afrad MSI & Prodhan FA 2014, 'Socio-economic impact of liming on vegetable production in acid soils of Belabo upozilla under Norshindi district', Annals of Bangladesh Agriculture, 18(1), 87-98.