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A COMPARATIVE STUDY OF THE AGRICULTURAL PRACTICES OF MEMBERS AND NON-MEMBER FARMING COMMUNITY OF MODEL FARM SERVICES CENTER IN KHYBER PAKHTUNKHWA PAKISTAN

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ABSTRACT

The transformation of traditional agriculture into knowledge-based agriculture and shift from cereal to high value agriculture predominantly depends on extension work. So far, many extension programs have been launched to close the existing gap. Model farm service center (MFSC) is a public-private partnership program established in Khyber Pakhtunkhwa (KP) province of Pakistan with the aim to promote agricultural activity and bring progressive changes in the farming communities. The main focus of this study is to investigate the impact of MFSCs on farming and evaluate the farmers' activities under this program. This study further compares the knowledge, skills, linkages and available facilities of the members and non-member respondents. For data collection four districts namely Swat, Mardan, Abbottabad and Dera Ismail Khan (D.I Khan) were purposely selected. From each of these four districts 120 respondents i.e. 60 member and 60 non-member farmers were randomly selected for data collection. SPSS statistical software was used for data analysis. Results of the study show that most of the farmers are of about 45 years of age or below and their main source of income is from agriculture. Most of these respondents stay in direct contact with the agriculture office for improving their skills and knowledge regarding agriculture. Results of the study further reveal that agricultural agents regularly visit their areas/farms. Most of the respondents use their own agricultural machinery during farming and cultivate their own or fellow farmer seed instead of buying it from MFSC or other input dealers. It is also found that the yield of member respondent is more than that of non- member respondents.

Key words: Agriculture; Extension services; Farm inputs; Crop yield.

INTRODUCTION

The increasing demand for agricultural production due to growth in population is the imperative challenge for agricultural entrepreneur within limited impact on environment (Robertson and Swinton, 2005). To combat this challenge some countries have launched their own agricultural extension system to assure production goals (Ruifa *et al*., 2009). According to (Swanson, 2006), many countries especially Asian developing countries through combine efforts of national and international governments have successfully improved their agricultural production since 1980s.

Agriculture being a dominant sector of Pakistan's economy contributes a major portion to the GDP. Since independence of the country in 1947 it has launched different developmental programs under the umbrella of community-cum-rural development for example Village Agricultural and Industrial Development (V-AID) program in 1952, Basic Democracies System (BDS) in 1959 and later on Training and Visit (T&V) system. Although these extension programs received great popularity in farming communities in initial stages, these could not maintain this popularity in long term because of their inflexibility, top down nature, unidirectional flow of information and unavailability of financial resources (Haq *et al*., 2009).

With the emergence of new ideas and approaches in extension system, modern phenomena like decentralization, privatization and especially public-private partnership got more success in agriculture (Anderson, 2008). Various public and private sector organizations started working together and shared the resources of one another to obtain individual and mutual benefits (Ojha, 1999). In this regard the government of KP in some of its districts developed a platform during the year 2000 in the shape of MFSC with the aim to help the farming community by strengthening them through establishment of these centres and assist them in identification, prioritization and solution of the problems faced by the farmers within the existing resources. These service centers focus to enhance farmer hidden capabilities and potential in the environment and to develop their linkages with government and non-

government organizations. In fact it is the first of its type attempt made only in KP province of the country with the aim to provide physical and financial resources, technical support along with provision of farm machineries and inputs to the farmers.

These MFSCs were established for technology transfer to farming communities with the priority to provide services at their doorsteps. The farmers need to register their names as general body (GB), along with a nominal fee and are then considered as a permanent member of the MFSC. Extension agents facilitate these member farmers through conducting training and different inputs management activities. These MFSCs use different sorts of agricultural extension approaches in according to the demand of the situation. In some places they arrange training or demonstration methods while in some places they establish farmer field school (FFS) in the farming communities. Generally, FFS approach is considered as one of the best and latest approaches all over the world. Through this FFS, the extension workers select some farmers in farming communities and facilitate them in their fields usually once a week during the crop seasons. FFS uses problem based approach involving field observations, the interaction of these observations with ecosystem, sharing of previous experience of the members through group discussions and making sure the availability of new information about crop or livestock managements decisions (Friis-Hansen & Duveskog, 2012).

In addition to technology transfer of the masses of farming community, MFSCs also need to access small and rural poor farmers, located at distances from the urban centers, to non-formal education and information services. This will also provide them with an opportunity of active participation in designing and developing appropriate technologies/innovations for up scaling intensively as well as extensively depending upon the nature of the technology. The primary objectives of this study are; 1) to evaluate the agricultural extension services of MFSC in the project areas; 2) to compare the activities of member farmers of MFSC to those of non-member farmers; 3) to identify the main factors affecting yield of crops grown by the members and non-member farmers and 4) to determine the overall impact of MFSC on agriculture and their strengths and weaknesses. Moreover this study will help in establishing a baseline for future challenges and extension programs for development of agriculture.

MATERIALS AND METHOD

A comprehensive survey of member and non-member respondents of the MFSCs in KP province was carried out. It is still the leading province of the country based on the number and activities of established MFSCs in different districts. Within KP province a dual sampling procedure was used in which, four districts were purposively selected, namely Swat, Mardan, Abbottabad and DI Khan. The geographical locations of these districts are shown in figure 1. These four districts are relatively developed; having all types of necessary facilities including food, health, education, transportation and market availability. Then, we randomly selected equal number 120 respondents in total i.e. 60 member farmers of the MFSC and 60 non-member farmers of the MFSC in each district. In this way total sample size consisted of 480 respondents keeping the same ratio 50% of members as well of non-member farmers with the assumption to represent the whole population of the province.

For data collection we used a planned structured questionnaire, including general demographic characteristics and socio-economic status of the respondents as well as details about the cropping pattern, their sowing methods, input use and output of some crops and their livestock. In order to capture the overall objectives of the study with respect to determination of the difference in performance of the member and non-member respondents the collected data were fed in computer using SPSS package and the results were interpreted. At first step of analysis descriptive statistics like frequencies and cross tabulation were used to express the data results. Secondly, independent sample t-test was applied to determine the differences in their general characteristic as well as farming methods of members and non-member farmers of the MFSC. Thirdly, a multiple Linear-regression model was used to determine the effect of some factors on the crop/livestock yield of both types of respondents.

$$\mathbf{Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 D + \varepsilon}$$

Where

Y_i= yield of the crop/milk

(i=wheat, maize open pollinated, maize hybrid, rice, sugarcane, cow, buffalo and goat)

α = Constant

X_1 = Age of the respondent

X_2 = Education level

X_3 = Farming experience

X_4 = Land holding size

X_5 = Irrigation source

X_6 = Family member involved in farming

X_7 = Hired labor

D = Dummy representing status of the respondent (1= member and 0 otherwise)

ε = Random error

The study has measured crop yield in mounds (1mound is equal to 40 kg), age, education level and farming experience in years, land holding size in acres (1 hectare equals 2.471 acres), irrigation source (canal, tube well, rainfed), family member and hired labors in

numbers and the status of respondents in member and non-member.

RESULTS AND DISCUSSION

Data presented in table 1 comprise of the general information about both types of respondents, which compare the age, educational level, income and type of farming. These characteristics are shown in the form of their mean values, mean differences and significance difference (if p-value is equal or < 0.05) as determined by t-statistic for equality of means at 95% level of significance. Age and education of a person are important factors for any social intent and affect the performance of individuals. It has been reported that age dominantly associates to personal behaviors (Siddiqui *et al*., 2003). Similarly, according to (Braun *et al*., 2000) age is positively correlated to adaptation of new technology and diffusion of any innovation. It is believed that younger people are more exposed to adopt innovations as compared to aged ones. It is evident from table1 that ages of member respondents are comparatively less and their educational level is higher than of non-member respondents. The data about education represent the number of years spent on getting formal education at any institute. The overall educational level of both respondents is quite low as like other provinces of Pakistan, KP has also low literacy rate when compared with other parts of the world. Earlier similar results were reported by (Pervaiz *et al*., 2013), that 90% of the farmers are illiterate in KP Province. Part time and full time involvement of family members of the member respondents in the farming practices is relatively high (1.67) and (1.59) than of family member of the non-member respondents (1.59) and (1.53) respectively. Our finding (p-value) shows that there are significant differences in educational level (0.00), permanently hired labors (0.01) and casually hired labors (0.00) involvement in the farming and off-farm income per month (0.05) between the member and non-member respondents.

Mechanization is the tool used for shifting the traditional agriculture to profit base agriculture. Proper use of agricultural machineries and inputs by farmers not only improve the productivity but also simultaneously reduce the environmental impacts (Berry *et al*., 2003). Tractor plays a major role in mechanized farming instead of conventional way of ploughing lands. The proper use of tractor can attain far-reaching results in agriculture (Rehaman *et al*., 2012). The total number of tractors in KP is 22071 in which more than 98% are private. In district Swat, Mardan, Abbottabad and D.I Khan the number of tractors are 2393, 1604,445 and 3538, respectively (KPBS, 2014). The main sources of providing agriculture implements/machineries to farmers are their own machineries or MFSC provide some implements. The farmers sometime rent these implements from the fellow farmers or from the agricultural inputs dealers. Data in the table 2 show the frequency of respondents who hire agricultural implements/machineries from the available sources. Frequencies of the both types of respondents in the given table show that most of them use their own agricultural machineries or they rent it from agricultural inputs dealers or from fellow farmers or MFSC.

The precise machinery application in agriculture reduces input use in several ways (Stombaugh *et al*., 2005). The most important one is to reduce time consumption and enhance productivity especially during the planting and fertilizer application. The figure 3 indicates the district-wise number of some agriculture related machinery in KP province during the year 2012-13. The total number of wheat threshers in district Swat, Mardan, Abbottabad and D.I Khan is 296, 789, 65 and 446 respectively. The total number of rice husking machine in district Swat, Mardan and D.I Khan is 235, 45 and 40 respectively, while rice husking machine is unavailable in district Abbottabad. The total number of maize shellers in district swat, Mardan, Abbottabad and D.I Khan is 529, 90, 9 and 6 respectively. Similarly the total number of wheat harvesters in district Swat and D.I Khan is 6 and 59 respectively while there is no availability of this machine in district Mardan and Abbottabad. It has been reported by (Shockley *et al*., 2011) that the better use of agricultural equipments during the fertilizer application and planting reduced input use and saved the expenditure by approximately 2.2, 2.4 and 10.4% for fertilizer, seed and tractor fuel respectively.

The basic perception of MFSC is to establish a favorable and suitable environment for farmers to enhance their production and provide agricultural inputs at their doorsteps. One of the key factors that boost agricultural productivity of any cropping system is the availability of seeds with improved genetics. Seed is one of the most vital and crucial elements for increasing yield of a crop. In the study areas of this project the available sources of purchasing agricultural seeds are MFSCs, agriculture research or extension departments and agriculture inputs dealers. Sometimes NGOs or fellow farmers also sell seeds to their fellow farmers. Table 3 comprises of data regarding the different purchasing sources of different crop seeds from where both types of the respondents can buy their seeds. Our data show that majority of the respondents are buying their crop seeds from other sources rather than MFSC. This area can be thus considered as a window of opportunity where significant success can be easily achieved if seed of improved varieties of commonly grown crops including hybrid maize, wheat, rice, sugarcane and different kind of vegetables are made available to the farming community at reasonable price.

The total number of extension employees in the existing setup of the province is 2654 (GOKP, 2013) for 1.54 million farms with a ratio of extension staff to farms of 1:580 in KP. Besides, the less number of extension staff in this province is also limiting the capacity of supporting staff to provide the particular services broadly, especially in fruits and vegetable crops. In this study the respondents were also asked some questions to assess their general knowledge about the awareness and their contacts with the agricultural extension offices. The results table 4 reveals that majority of the member respondents know the extension agents by face or by name as compared to non-members. Understandably the member respondents are more aware about the role of MFSC and their activities in their areas as compared to non-member respondents. It is also clear from the data that member respondents more frequently contact the extension personnel than non-member respondents for seeking guidance and help to cope with problems related agriculture. The extension agents also frequently visit the member respondents' farms as compared to non-member farmers. The member respondents possess relatively more clear perception and know how about agriculture extension programs of MFSC than the non-member respondents.

Table 5 compares the area and yield of major crops grown by the members and non-member farmers of the MFSC using the same statistics tools. It is evident from the data that for wheat the yield difference of both types of respondents was not significantly different although on the average member farmers were obtaining more yield (25.27 Monds acre^{-1}) than the non-member farmers (23.80 Monds acre^{-1}) with a mean difference of 1.47 Monds acre^{-1}. Data in the table further show that the yields of all crops of member farmers are higher than those of non-member respondents. Among all compared crops the yield gap is more in rice than any other. The reason for this yield differences may be the knowledge of the farmers regarding land preparation, seed varieties, type of fertilizer usage, proper sowing time and other cultivating practices. The reason could be that member farmers have more access to advisory services through these MFSC compared to non-member farmers. As a continuous increasing demand for agricultural yield is expected in the future (Rosegrant & Cline, 2003) these farm advisory services need to be extended to those non-members who are mostly living in remote areas. Earlier several researchers have analyzed and compared the yields and the profitability of latest technology of adopters to non-adopters for instance (Gonzales *et al*., 2007) and (Manalili *et al*., 2008). These studies have also analyzed the adaptation levels of the certified inbred and hybrid seed technologies of these two groups. Still a lot needs to be done to identify and evaluate the factors that are influencing farmer's choice regarding adaptation of improved cropping technology and selection of high quality farm inputs.

Agriculture in KP province is predominantly dependant on small land holding in nature. Common crops of the province are wheat, maize rice, sugarcane, cotton, onion, potato, shaftal, sorghum, mung, sunflower and apples. Maize and rice are foremost important crops of the province, covering about 475342 and 50081 hectares with production of 887787 and 94695 tonnes, respectively during 2011-12 (GOKP, 2013). Table 6 contains data regarding the cropping methods of maize, rice and sugarcane adapted by the respondents. Maize is one of the most important cereal crop grown for grain and forage for human and animal consumption. (Kimani *et al*., 2007) reported that the combination of organic and inorganic mineral source significantly increases the maize grain yield. Maize is quite responsive to fertilizer as the application of nitrogen at the rate 20 kg ha^{-1}, 40 kg ha^{-1} and 60 kg ha^{-1} increased maize grain yield by 101, 111.9 and 196 percent respectively (Kimani, *et al*., 2004). Even though the educational level of the respondents is low, majority of the respondent were usually well aware of the nature of the maize crop variety they cultivate and fertilizer they provide. The member farmers of the MFSC use less fertilizer than non-member farmers. The p-value (0.04) of urea fertilizer in maize crop shows significance difference in both types of respondents. Similarly, in case of rice crop the member respondents are technically sounder than non-member respondent. The seed rate of the member respondents is significantly (0.05) less than non-member respondents while their yield is significantly higher than non-member respondents. In KP sugarcane is grown in the areas where sufficient water is available for irrigation. D I Khan, Mardan and Charsadda are the best places for sugarcane cultivation (Rehaman *et al*., 2012). The data clearly suggest that yield of sugarcane of the member respondent is higher than of non-member respondent.

Table 7 contains data regarding different factors affecting the yield of the hybrid maize and rice crop. Information in the table indicates that farming experience (0.54) exhibited a significantly positive effect on the hybrid maize yield while irrigation source (-2.56) and number of family member involved in farming (-2.68) significantly negative relationship with the yield hybrid maize. The main irrigation sources of farmers are canal system, tube wells and rainfall while some respondents use combination of these sources. For rice production the farming experience (0.45) and status of the respondents (21.56) depicted significantly positive relation with rice yield of the farmers in the study areas. Unexpectedly some variable such as age, education level, land holding size, hired casual labor did not affect yield of both crops.

Similarly for other crops such as wheat, open pollinated maize and sugarcane, and for livestock such as cow, buffalo and goat milk yield the same linear

regression was used and expressed in table 8. Age indicated significantly negative effect on sugarcane yield while it showed significantly positive effect on the goat milk yield. The values of farming experience (0.54), (0.45) and (5.84) indicate significantly positive effect on the yield of hybrid maize, rice and sugarcane, respectively. The value of land holding size (0.01) shows significantly positive effect on the goat milk yield. Irrigation sources revealed significantly negative effect on yield of wheat, open pollinated maize and hybrid maize respectively while it showed significantly positive effect on sugarcane yield of the farmers. Similarly the number of family members involved in agricultural practices showed significantly negative effect on hybrid maize and goat milk yield while hiring casual labors for agricultural purposes (0.17) represented significantly positive effect on the cow milk yield. Respondent's status also exhibited significantly positive effects on the rice yield while it showed negative effect on goat milk yield. Unexpectedly certain factors did not significantly affect the yield of crops and milk such as education except that of the sugarcane yield, land holding size except the goat milk yield and hiring casual labor except cow milk yield. Our results are consistent with study conducted by (Ullah *et al*., 2015) who found that MFSC contributed towards the improvement in yield of wheat, maize, rice and sugarcane.

So far, several studies have determined the yield difference among the crops in term of, with and without the utilizing of the extension services. Data in table 9 consists of the detail of dummy variable regression used for various crops/ milk yield of the both types of respondents. The yield of every crop of member respondent is higher than of non-member respondents except that of open-pollinated maize crop and goat milk yield. Among all compared yields the p-values of hybrid maize (0.04), rice (0.00) and cow milk (0.03) show significant differences. These results confirm the findings of (Ullah *et al*., 2015), who observed average increases of about 13.087 mounds/acre,1.588 mounds/acre, 0.52 mounds/acre and 0.628 mounds/acre in sugarcane, wheat, maize and rice yield respectively after registration with MFSC.

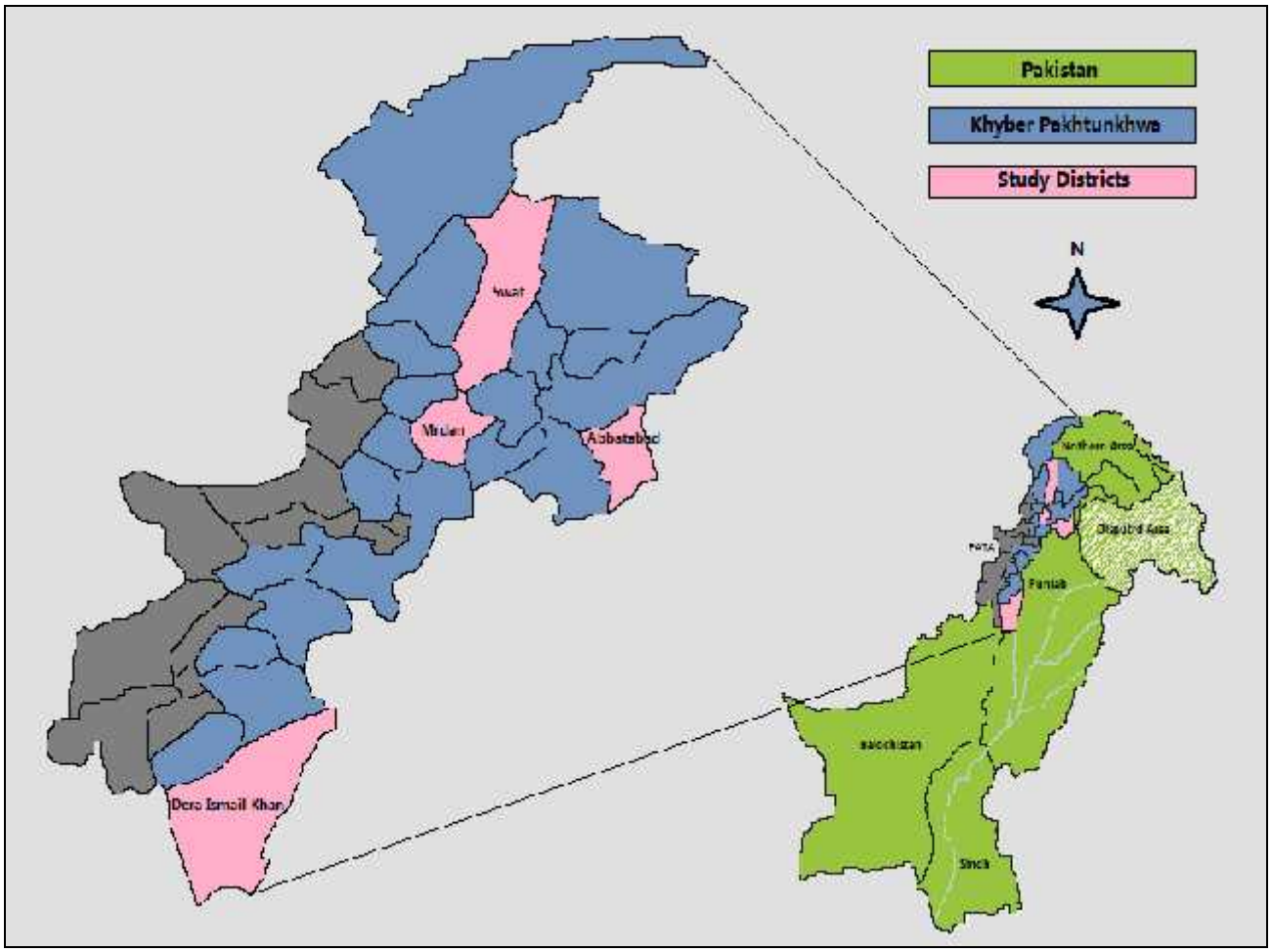

Figure 1. Study areas of the Khyber Pakhtunkhwa province of Pakistan.

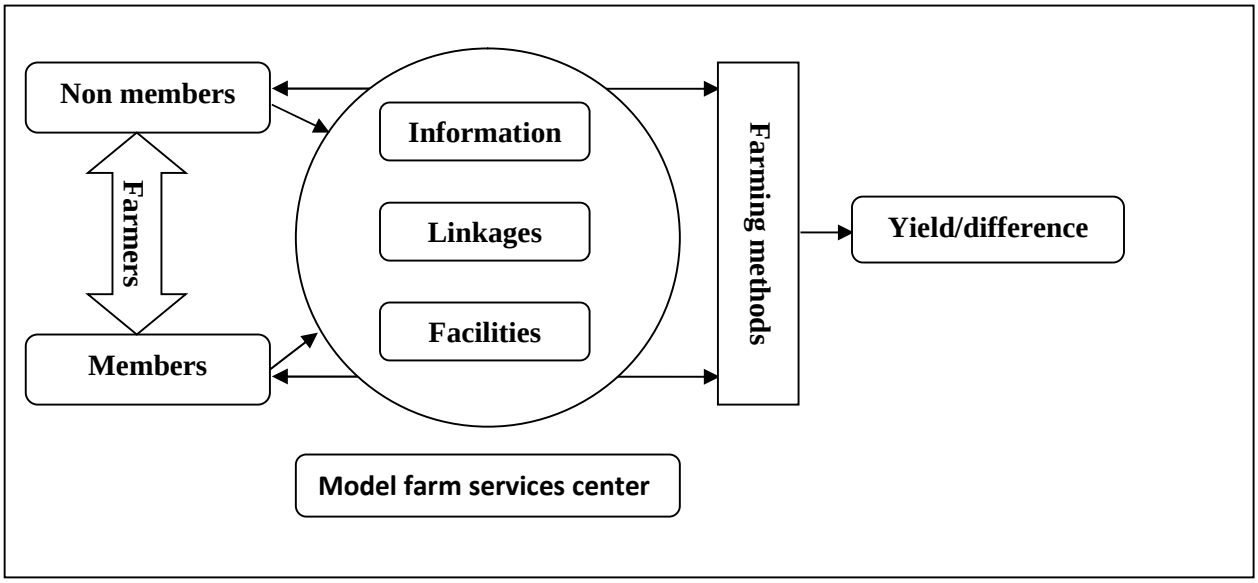

Figure 2 Conceptual framework of the study

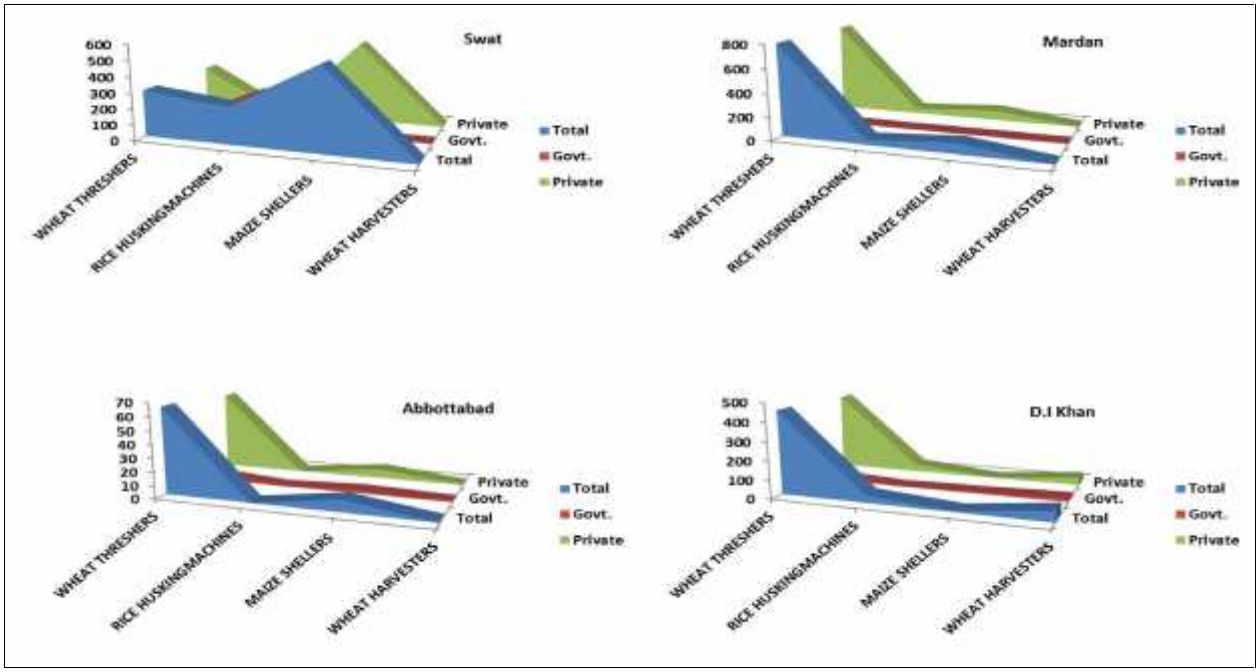

Figure 3. Availability of agriculture machineries in the study districts

Table 1. Distribution of the respondents regarding general characteristics.

Respondent Status	Non--member	Member	Mean diff.	P-value
Age of the respondents (years)	45.43	45.00	0.43	0.71
Education level (years)	6.03	8.61	-2.58	0.00
Part time farming	1.59	1.67	-0.08	0.51
Full time farming	1.53	1.59	-0.05	0.51
Permanent labor	1.42	2.65	-1.23	0.01
Casual labor	3.97	6.43	-2.46	0.00
On farm income /year (Rs)	193538.46	575408.74	-381870.00	0.09
Off farm income/month (Rs)	20906.98	25355.53	-4448.56	0.05

Table 2. Distribution of the respondents regarding use of agricultural machineries.

Respondents status	**Non-members**			**Members**		
Source	**own**	**MFSC**	**rented**	**own**	**MFSC**	**Rented**
Tractor	24	-	216	50	10	180
Cultivar	22	-	2	52	6	4
Disk plough/MB plough	16	-	-	28	2	-
Munna plough (single furrow)/maize Sheller	8	-	-	14	-	-
Line sowing cultivator/ridge maker	14	-	-	34	-	-
Thresher	6	9	2	12	4	4
Hand spray machine	82	-	110	122	-	76
Bullock	36	-	10	28	-	4
Tractor trolleys/other machinery	24	-	-	34	2	-

Table 3. Distribution of the respondents regarding source of seed purchase.

Description	**MFSC**	**Ext/Res. Deptt.**	**Own or Fellow**	**Dealers**	**NGO**
Source of wheat seed purchase Nonmember	2	40	110	56	4
Member	58	54	74	24	8
Source of hybrid maize seed					
Non-member	2	16	78	78	2
Member of	28	24	58	60	2
Source of rice seed purchase					
Non-m-ember	0	4	28	2	
Member	6	0	18	8	
Source of sugarcane seed purchase					
Nonmember		4	78		
Member		6	82		

Table 4. Distribution of the respondents regarding awareness/linkages.

Awareness/ linkages	**Response**	
Contact with agriculture office for improved agriculture technology	yes	No
Non-member of MFSC	114	126
Members of MFSC	218	22
Knowledge about MFSC working in your area/district	yes	No
Non-member of MFSC	74	166
Member of MFSC	180	60
Visit of agricultural extension agent to area/farm for improved technology	yes	No
Non-member of MFSC	82	158
Members of MFSC	180	60
Familiarity with agriculture extension agent by name or by face	yes	No
Non-member of MFSC	114	126
Members of MFSC	214	26
Knowledge about the address of agricultural extension office	yes	No
Non-member of MFSC	202	38
Members of MFSC	238	2
Attendance in any agricultural program?	yes	No
Non-member of MFSC	30	210
Members of MFSC	182	58

Table 5. Comparison of the respondents regarding crop area and yield.

	Area (acre)				Yield (Monds)			
Crops	**Non-members**	**Members**	**Mean diff**	**p-value**	**Non-members**	**Members**	**Mean diff**	**p-value**
Wheat	5.42	7.01	-1.60	0.16	23.80	25.27	-1.47	0.14
Maize(hybrid)	2.45	2.73	-0.28	0.31	17.60	19.67	-2.07	0.12
Gram	9.79	21.46	-11.67	0.01	11.80	18.45	-6.65	0.29
Rice	6.94	16.76	-9.81	0.07	26.44	39.05	-12.61	0.00
Sugarcane	15.24	14.76	0.47	0.92	555.77	574.61	-18.83	0.67
Onion	1.67	0.36	1.31	0	160.83	192.86	-32.02	0.51

Table 6. Comparison of the respondents regarding crop husbandry of different crops.

Description	**Non-member**	**Member**	**Mean diff**	**p-value**
Maize crop (open pollinated)				
Open pollinated maize seed rate used per acre (Kgs)	28.33	32.19	-3.86	0.10
Years after which open pollinated maize seed is replaced	2.19	2.10	0.09	0.67
DAP bags used per acre for open pollinated maize crop (No.)	0.87	0.79	0.08	0.35
Urea bags used per acre for open pollinated maize crop (No.)	1.33	1.11	0.22	0.04
Open pollinated maize yield per acre (kgs)	14.27	13.79	0.48	0.65
Rice crop				
Rice seed rate used per acre (kgs)	21.34	15.46	5.88	0.05
Years after which rice seed is replaced	1.91	2.71	-0.81	0.05
DAP bags used per acre for rice crop (No.)	0.90	1.13	-0.23	0.25
Urea bags used per acre for rice crop (No.)	1.44	1.61	-0.23	0.26
Rice yield per acre (kgs)	24.83	39.64	-14.81	0.00
Sugarcane crop				
Sugarcane seed rate used per acre (kgs)	70.39	76.37	-5.98	0.16
Sugarcane yield per acre (kgs)	306.05	400.33	-94.27	0.10

Table 7. Regression results of influencing factors of maize (hybrid) and rice yield.

Variable/Maize	**Coefficient**	**T-value**	**Probability**
Constant	40.03	5.31	0.00
Age	-0.27	-1.40	0.17
Education level	0.43	1.35	0.18
Farming experience	0.54***	2.90	0.01
Land holding size	-0.13	-0.39	0.70
Irrigation source	-2.56**	-2.45	0.02
Family member number	-2.68**	-2.16	0.04
Rent casual labor	-0.06	-0.26	0.79
Status	-0.13	-0.05	0.96
Variable/Rice	**Coefficient**	**T-value**	**Probability**
Constant	31.85	2.76	0.01
Age	-0.20	-0.80	0.43
Education level	0.84	1.46	0.15
Farming experience	0.45*	1.67	0.10
Land holding size	0.03	1.20	0.24
Irrigation source	-0.84	-0.47	0.64
Family member number	-2.03	-1.55	0.13
Rent casual labor	-1.56	-1.57	0.12
Status	21.56***	3.87	0.00

Note: ***, **, *stands for significant level of 1%, 5%, and 10% respectively.

Table 8. Regression results of yield influencing factors of various crops/livestock milk.

Crop/milk	Age	Edu	Exp	Land	Irrigation	F. member	Labor	Status
Wheat	-0.07	0.06	0.06	0.02	-2.05***	-0.26	0.13	0.96
Maize (O)	-0.07	0.28	0.13	0.14	-3.10***	0.24	-0.08	2.24
Maize (H)	-0.27	0.43	0.54***	-0.13	-2.56**	-2.86**	0.79	-0.13
Rice	-0.20	0.84	0.45*	0.03	-0.84	-2.03	-1.56	21.56***
Sugarcane	-8.31***	-0.98	5.84**	0.49	113.56***	-10.18	0.85	9.69
Cow	-0.02	0.00	0.02	0.00	0.40	0.02	0.17***	-0.23
Buffalo	-0.03	-0.19***	-0.02	0.01	0.02	-0.08	0.00	-0.29
Goat	0.06***	0.03	-0.01	0.01**	-0.09	-0.27**	-0.14	-0.76**

Note: ***, **, *stands for significant level of 1%, 5%, and 10% respectively.

Table 9 Dummy variable regression of yield difference of the respondents.

Crops/Livestock yield	Constant	dummy	p-value
Wheat(mound/acre)	24.14	1.10	0.00
	(-0.72)	(-1.00)	0.27
Hybrid Maize (mound/acre)	26.98	5.27	0.00
	(-1.97)	(-2.55)	0.04
Open pollinated Maize (mound/acre)	14.27	-0.48	0.00
	(-0.69)	(-1.05)	0.65
Gram (mound/acre)	11.80	6.65	0.01
	(4.17)	(6.03)	0.29
Rice (mound/acre)	24.83	14.81	0.00
	(-2.63)	(-3.65)	0.00
Sugarcane(mound/acre)	306.05	94.27	0.00
	(-40.88)	(-57.44)	-0.10
Onion (mound/acre)	160.83	32.02	0.00
	(39.69)	(47.44)	0.51
Goat milk (kg/day)	1.25	-0.17	0.00
	(0.13)	(0.18)	0.34
Buffalo milk (kg/day)	7.70	0.28	0.00
	(0.31)	(0.41)	0.49
Cow milk (kg/day)	5.80	0.30	0.00
	(0.30)	(0.42)	0.03

Standard errors in parentheses

Conclusion: To keep pace with the galloping food demand it is important for agriculture to incorporate innovation. MFSCs thrive to provide advisory services and transfer technology to the farmer at the most appropriate way. Still there is scope for further improvement through identifying even better and more suitable approaches that not only finance these extension services but also best fit to the local farming especially focusing small farmers, as most of these farmers in the project targeted area are small farmers with poor economic conditions. In addition to technology transfer, MFSCs also need to make available the improved farm inputs such as approved seed, fertilizer and farm machinery on need base along with other essential farm inputs to make this extension program more meaningful.

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