Perceptions of wheat farmers toward agricultural extension services for realizing sustainable biological yields

Khodran Hamdan Al-Zahrani, Abdul Qader Khan, Mirza Barjees Baig*, Muhammad Mubushar, Ahmed Hasan Herab

Department of Agricultural Extension and Rural Society, College of Food and Agriculture Sciences, King Saud University, Saudi Arabia

Abstract

Introduction: Agriculture plays an important role in the economy of Pakistan and it is not possible to realize sustainable biological yields without following sustainable agricultural extension. However, these extension activities are not making significant impacts on crop yields and have not been able to help farmers realize sustainable biological yields and elevated rural livelihoods. The purpose of this study is to ascertain the perceptions of the farmers about the extension service.

Materials and methods: A survey study was conducted in the Peshawar district of Khyber Pakhtunkhwa (KP) province - Northern Pakistan. Twenty villages out of 236 villages were selected randomly and 10% of farmers from the population were drawn by systematic random sampling that comprised a total of 120 wheat growers. Data collected through an interview schedule were analyzed using descriptive statistics such as Frequency Counts, Percentages, Means Standard Deviation and Spearman Correlation Coefficient test.

Results: The study revealed that 40.8% of the respondents are economically active and fall in the age group of 31–40 years. Literacy level depicts that (58.3%) of the respondents were illiterate while the remaining were literate, having primary, middle, matric or above matric education. About 81.7% of the respondents had landholdings less than 10 acres and about 60.8% were tenants. Most of the respondents (76.7%) had farming experience from 11–20 years. A large portion (80.8%) of the sample earns their livelihoods primarily from agriculture in the study area. Results of the 5 point Likert scale analysis revealed that the farmers have negative perceptions about agricultural extension services. Moreover, a Spearman correlation coefficient test was run to identify the relationship between socio-economic features of the respondents and their perceptions about agricultural extension services.

Conclusion: Education ($r_s = 0.179$, $p < 0.05$), and income source ($r_s = 0.193$, $p < 0.05$) are positively correlated with the perception of the farmers. However, education negatively influenced the statement “Agricultural extension department promotes modern wheat production technologies to realize higher biological yields before the start of the season through extension educational programs”.

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1. Introduction

In Pakistan, agriculture is one of the largest sectors in which the ways of life and business enterprise are joined together. The agricultural sector plays a vital role in the economy, contributing 19.8% towards the national Gross Domestic Products (GDP) of the country. Nearly 70% of Pakistan's total population resides in rural areas. Almost 42.3% of the work force is involved in the agricultural sector. Agriculture is a foremost sector providing raw material to the agricultural industry sector (Usman, 2016) (see Fig. 1).

Agricultural extension is a system that focuses on empowering and equipping the farmers with the abilities to help them making sound decisions, solving their problems themselves and managing their farming business (Vanclay and Leach, 2011). In developing countries, like Pakistan, the main objective of agricultural extension is to solve crop production and management problems (Shah et al., 2010). Extension activities convey the latest technologies to the clients and educate them on alternative practices, thus...
reducing the information irregularity often related with the latest technologies (Ghimire and Huang, 2015). Yet, not all farmers have access to such activities and information (Ghimire and Huang, 2016) and governments have failed to provide effective agricultural extension services (Feder et al., 2010).

Rehman et al. (2007) stated that the perception of farmers plays an important role in their behavior intent, which usually leads to actual adoption behavior (adoption of improved agricultural technologies). Numerous developing countries, including Pakistan, have adopted conventional agricultural extension systems, employing top-down directional approach. These systems have not been successful in working with diversified situations as the farmers need extension service and guidance along with the immediate facilities in the marketing process of their produce (Baloch and Thapa, 2017). In many cases, extension services are brought to the farmers by the extension department but they reject them because they are responsive to their needs. The farmers believe that the extension advice does not consider their specific conditions (Siddiqui and Mirani, 2012). The present study was conducted in order to address this issue and assess the perceptions of wheat farmers about agricultural extension services. The specific objective was to identify the relationship between socio-economic characteristics of the farmers and their perception about agricultural extension services.

2. Methodology

2.1. Study area

Approximately 160 km away from the federal capital Islamabad, the city of Peshawar is the capital of Khyber Pakhtunkhwa (KP) province located at the north-west corner of Pakistan. The district with its coordinates lies between 33°, 44 and 34°, 15 North latitudes and 71°, 22 and 71°, 42 East longitudes covers an area of 1257 square kilometers. Agriculture is considered the cornerstone of district’s economy for growing a wide range of crops and a variety of food commodities due to its fertile lands, topography and climatic conditions (Alhasan Systems Private Limited, 2015).

2.2. Study population and sampling procedure

Bless et al., (2006) explains the target population as a set of elements that the researcher concentrates upon and which the consequences gained by testing the sample should be generalized to. Peshawar district has been divided into 279 mouzas (Revenue Villages) out of which 236 are rural, 15 are urban and 28 are partly urban. Twenty villages out of 236 villages were selected randomly for the study. Due to limitation of time and financial resources, 10% of farmers from the population were drawn by systematic random sampling. Therefore, the total number in the study sample was 120 wheat growers.

2.3. Data collection and analysis

Data were collected through interviews; all respondents were asked the same questions. Primary data were collected on the socio-economic features of the farmers and the prevailing types of the agricultural extension services. Statistical Package for the Social Sciences (SPSS) software was employed to analyze the data (George & Mallery, 2001). Descriptive statistics are presented...
through Frequency Counts, Percentages, Means, Standard Deviation and Spearman Correlation Coefficient test.

2.4. Measurement of variables

In attaining the study objectives, it was important to get information on exact perceptions about agricultural extension services. Therefore, the mean value of the farmer’s perception regarding agricultural extension services was measured on a 5 point Likert with categories of ‘strongly disagree’, ‘disagree’, ‘undecided’, ‘agree’ and ‘strongly agree’ which were assigned scores of 1, 2, 3, 4 and 5, respectively.

3. Results and discussion

The results for the study are presented in Tables 1–3. Information in Table 1 shows that 66% of respondents engaged in the farming business fall in the age group between 31 and 50 years. It is anticipated that farmers within this group are physically strong and mentally mature enough to readily accept new and useful information. Present research revealed that socio-economic characteristics of respondents were positively correlated with innovations uptake and hence enhancing knowledge transfer. That is why the farmers with higher socio-economic status were seen to adopt technologies faster and hence had improved knowledge transfer from extension agents. This implies that mature people tend to seek agricultural information more efficiently and are more open to change.

Table 1 further presents the data regarding the literacy level of sampled respondents. Those who had completed school education were categorized as literate and those who had no formal school education were deemed as illiterate. It was observed that out of 120 respondents, 58.3% were illiterate while the remaining respondents (41.7%) were literate. This indicates that farmers are lacking formal education in the study area which invariably affects adoption of improved agricultural technologies. The education level of the respondents could influence their attitude to extension services, thereby reducing their readiness to adopt a new idea.

Table 1 shows that the majority (76.7%) respondents had 11–20 years of farming experience. It is hence concluded from these findings that the study respondents had much experience in farming and they could better appreciate the need for extension services. Their accumulated experience over time might help them in adopting the latest technologies regarding wheat production. The size of land holding refers to the area of land cultivated by the farmer and his family. A majority of the respondents (81.7%) fell in the range having <10 acres of land and only 18.3% of the respondents operated between 11 and 20 acres of land. Farmers with small landholdings are mostly unable to facilitate their agricultural extension field officers to perform their duties more in their areas than those with big landholdings. Based on the size of land holding, Pervaiz et al. (2013) also stated that majority of respondents in Peshawar district were small farmers.

Table 1 further shows that 21.67% of the respondents were the owners, 17.5% were owner-cum tenants and 60.8% were purely tenants. These findings show that the tenant’s ratio is higher in the study area because farmers must rent-in land to improve their income and living as they lack other employment opportunities. It was observed during the field survey that these tenants were relatively less efficient and unable to find or had limited access to credit and extension services. Findings by Tagar et al. (2016) also revealed that the degree of land use intensity depends upon the tenure and size of farm; they found that these statistics are the highest in the case of tenants.

As depicted in Table 1, agriculture remains the sole source of income for 80.8 percent of the respondents in the study area; providing them satisfactory produce to meet their needs and enabling them to have a decent living. Income level is especially crucial to the rate in which farmers are willing to adopt new practices and techniques. Non-farm income is also a major factor that affects the production of the farmers. Our results are in agreement with that of Ullah and Ullah (2014), who stated that majority of the respondents (80.5%), had farming as their major profession and source of income.

3.1. Perception of wheat farmers about agricultural extension services

Table 2 shows that the mean value of farmers’ perception regarding agricultural extension services was gauged on a 5 point Likert scale against the 14 statements. The scale consisted of 5 levels, strongly disagree, disagree, undecided, agree and strongly agree, with scores 1, 2, 3, 4 and 5, respectively.

The data presented in Table 2 reveal that out of the total respondents only 5% agreed with the statement “field trials conducted by extension agents are performed on the farmers’ field without any biasness” whereas 6.7% disagreed and 87.6% of the respondents strongly disagreed with this statement. This result actually confirms the well-known biasness of extension agents, who prefer to work with the farmers with whom the cooperation is easier, who are more interested in extension support and who are more influential and have more financial means to apply the advised technology of farm production. The lack of field trials is one of the factors hampering the adoption of farming technologies. It is clear from the study results that most of the farmers in the study area have small landholdings, so this suggests that preference should be given to small farmers for conducting field trials on their farms as well. The table also shows that the majority (80.8%) of the respondents strongly disagreed with the statement “agricultural extension department promote modern wheat production
Table 2
Perception of wheat farmers about agricultural extension services in district Peshawar (N = 120).

| Statements                                                                 | SD (%) | D (%) | UD (%) | A (%) | SA (%) | Mean | S.dev |
|----------------------------------------------------------------------------|--------|-------|--------|-------|--------|------|-------|
| Field trials conducted by extension agents are performed on the randomly   | 87.6   | 6.7   | –      | 5.00  | –      | 2.85 | 1.027 |
| selected fields and the selection of field for trial is not biased         |        |       |        |       |        |      |       |
| Agri-extension Dept. promotes modern wheat production technologies before   | 80.8   | –     | –      | 19.2  | 1.57   | 1.185|       |
| the start of the season through extension education programs               |        |       |        |       |        |      |       |
| Agri-extension agents recommend suitable suggestions to the farmers to     | 80.8   | –     | –      | 19.2  | 1.57   | 1.185|       |
| protect the wheat crop from insects, pests and diseases well on time       |        |       |        |       |        |      |       |
| Information provided by the agri-extension Dept. regarding the modern      | 83.3   | –     | –      | 16.7  | 1.50   | 1.122|       |
| wheat crop production are up to date and satisfactory                      |        |       |        |       |        |      |       |
| Information provided by the extension agents reaches well in time to the   | 83.3   | –     | –      | 16.7  | 1.50   | 1.122|       |
| farmers and meet their needs                                               |        |       |        |       |        |      |       |
| Agri-extension Dept. play role in the timely provision of the production  | 83.3   | –     | 2.5    | 14.2  | 1.47   | 1.076|       |
| inputs for the wheat crop to the farmers                                  |        |       |        |       |        |      |       |
| Whenever you visit Agri. Extension Dept. the staff is available &          | 86.7   | –     | 13.3   | –     | 1.40   | 1.024|       |
| cooperative                                                                |        |       |        |       |        |      |       |
| Extension agents conduct field trials during the wheat growing season     | 87.6   | –     | 4.1    | 7.4   | –      | 1.30 | 0.867 |
| to introduce new improved varieties and production enhancement related   |        |       |        |       |        |      |       |
| technologies                                                                |        |       |        |       |        |      |       |
| Agri-extension agents provide recommendations to the farmers to protect    | 88.3   | –     | 4.2    | 7.5   | –      | 1.27 | 0.869 |
| the wheat crop from insects, pests and diseases well on time               |        |       |        |       |        |      |       |
| Agri-extension agents provide information & recommendations related to     | 94.2   | –     | 5.8    | –     | –      | –    | 1.11  |
| the soil test & soil preparation for sowing wheat and highlight their      |        |       |        |       |        |      |       |
| importance for realizing higher biological yields                           |        |       |        |       |        |      |       |
| Agri-extension agents disseminate information about Pre & Post-harvest     | 95.8   | –     | 4.2    | –     | –      | –    | 1.08  |
| techniques for wheat crop to enhance the production and profits for the    |        |       |        |       |        |      |       |
| farmers                                                                    |        |       |        |       |        |      |       |
| Agri-extension Dept. disseminate modern crop recommendations through the   | 120    | –     | –      | –     | –      | –    | 1.00  |
| print media (newspapers) and electronic media like TV & radio              |        |       |        |       |        |      |       |
| Agri-extension agents provide information related to the marketing         | 120    | –     | –      | –     | –      | –    | 1.00  |
| strategies to the farmers to have more profits of their wheat crop        |        |       |        |       |        |      |       |
| Agri-extension Dept. helps the farmers to sell their produce at the        | 120    | –     | –      | –     | –      | –    | 1.00  |
| designated by the government                                               |        |       |        |       |        |      |       |

SD: Strongly Disagree; D: Disagree; UD: Undecided; A: Agree; SA: Strongly Agree.

Table 3
Relationship between farmers’ perception and their socioeconomic characteristics.

| Statements                                                                 | Age | Education | Landholding Size | Tenure Status | Farming Experience | Income Source |
|----------------------------------------------------------------------------|-----|-----------|------------------|---------------|--------------------|---------------|
| Field trials conducted by extension agents are performed on the randomly   | –0.141 | –0.069   | –0.029           | 0.153         | –0.004             | –0.177        |
| selected fields & the selection of field for trial is not biased           |     |           |                  |               |                    |               |
| Agri-extension Dept. promotes modern wheat production technologies before   | 0.161 | –0.193    | –0.121           | 0.082         | –0.051             | 0.139         |
| the start of the season through extension education programs               |     |           |                  |               |                    |               |
| Agri-extension agents recommend suitable suggestions to the farmers to     | 0.104 | –0.069    | –0.012           | 0.132         | –0.051             | 0.193*        |
| protect the wheat crop from insects, pests and diseases well on time       |     |           |                  |               |                    |               |
| Information provided by the agri-extension Dept. regarding the modern wheat | 0.081 | –0.036    | 0.135            | –0.087        | –0.040             | 0.123         |
| crop production are up to date and satisfactory                             |     |           |                  |               |                    |               |
| Information provided by the extension agents reaches well in time to the    | –0.021 | –0.134   | 0.019            | 0.139         | –0.083             | 0.066         |
| farmers and meet their needs                                               |     |           |                  |               |                    |               |
| Agri-extension Dept. play role in the timely provision of the production   | –0.064 | 0.079     | 0.074            | 0.160         | 0.130              | 0.064         |
| inputs for the wheat crop to the farmers                                  |     |           |                  |               |                    |               |
| Whenever you visit Agri. Extension Dept. the staff is available &          | 0.005 | 0.179*    | –0.059           | 0.000         | 0.041              | –0.066        |
| cooperative                                                                |     |           |                  |               |                    |               |
| Extension agents conduct field trials during the wheat season for the new   | –0.063 | –0.113   | 0.092            | 0.014         | –0.007             | 0.090         |
| improved variety & production enhancement related techniques               |     |           |                  |               |                    |               |
| Agri-extension agents provide recommended instructions to farmers about    | –0.064 | 0.029     | –0.001           | 0.067         | –0.100             | –0.008        |
| the suitable irrigation & fertilizer application regarding wheat crop      |     |           |                  |               |                    |               |
| Agri-extension agents provide information & recommendations related to the | –0.074 | 0.055     | –0.118           | –0.111        | –0.067             | 0.059         |
| soil test & soil preparation for wheat crop sowing & its importance        |     |           |                  |               |                    |               |
| Agri-extension agents disseminate information about Pre & Post-harvest     | –0.034 | 0.099     | –0.099           | –0.097        | 0.028              | –0.102        |
| techniques for wheat crop to enhance the production & profit of the farmers|     |           |                  |               |                    |               |
| Agri-extension Dept. disseminate modern crop recommendations through print |     |           |                  |               |                    |               |
| media (newspaper) & electronic media like TV & radio                       |     |           |                  |               |                    |               |
| Agri-extension agents provide information related to the marketing         |     |           |                  |               |                    |               |
| strategies to the farmers to have more profit of their wheat production    |     |           |                  |               |                    |               |
| Agri-extension Dept. helps the farmers to sell their produce at prescribed |     |           |                  |               |                    |               |
| price by the government                                                    |     |           |                  |               |                    |               |

*Correlation is significant at the 0.05 level (2-tailed).
*Correlation could not calculated as there was only one category of strongly disagree.

Techniques before the start of the season through extension educational programs while only 19.2% of the respondents agreed with it. Moreover, the same percentage of the respondents had the identical response to the statement “agricultural extension agents recommend suitable suggestions to farmers about the wheat crop protection from insects, pests and diseases”. Extension education programs are concerned with development of management strategies and farming skills among farmers for assisting them in making their farms more profitable and competitive. Small-scale farmers often lack the skills of modern crop production technologies. Extension programs and training support are needed to assist farmers to develop their management skills and competencies for improving their farm production. Similar statements have been made by Maoba (2016) and Azumah et al. (2018). Likewise,
extension personnel are required to give recommendations on Integrated Pest Management (IPM) to the farmers as well. 

The data in Table 2 show that 83.3% of the respondents strongly disagreed with the statement that information provided by agricultural extension department regarding modern wheat crop production were up to date and satisfactory whereas only 16.7% of the respondents agreed with this statement. Farmers' satisfaction is a crucial element for the adoption of crop production technologies. The extension service aims at providing the farmers with the services and quality information on the technologies and farming practices to keep them fully satisfied (Maoba, 2016; Azumah et al., 2018). The findings of the study indicate that the quality of information made available to the farmers by the agricultural extension department is unsatisfactory, implying that the department still has a lot of room for improvement. From the table, it is clear that 14.2% of the respondents agreed that the agricultural extension department played a role in providing the production inputs for the wheat crop to the farmers in a timely manner, whereas 83.3% strongly disagreed and 2.5% of the respondents were undecided about this statement. Untimely delivery of inputs coupled with a lack of sound advice and extension services may be a contributing factor to low agricultural productivity. Conceptually, knowledge on good crop management practices and provision of timely, optimal inputs are necessary for increasing crop productivity. Hence, the Extension department is expected to provide production inputs in time to the farmers in the study area. Furthermore, Table 2 affirms that 86.7% of the interviewees strongly disagreed with the statement that agricultural extension staff was available whenever they visited them, while only 13.3% agreed with this statement. Moreover table confirms that all of the interviewed respondents strongly disagreed with the three statements that the agricultural extension department disseminates modern crop recommendations through print and electronic media; agricultural extension agents provide information related to marketing strategies to the farmers; and the agricultural extension department helps the farmers to sell their produce at prescribed prices by the government. The mean value of overall perception of the farmers was recorded 25.7; (SD = 4.6), respectively. The findings of the study revealed that the farmers' perceptions regarding the quality and satisfaction extension performance and services are quite low and unsatisfactory. Farmers who are regarded as customers in the delivery of extension services reported the agricultural extension services as unsatisfactory. When the quality of extension services is perceived as low, then it will perpetually lead to lack of trust and dissatisfaction. Therefore, farmers' satisfaction was based upon the quality of extension advice and service offered by the extension workers. The agricultural extension services are inevitably affected by many factors e.g. biasness of the extension workers, lack of up-to-date and satisfactory information, untimely delivery of production inputs, non-availability of extension staff, non-availability of wheat production technologies, non-provision of literature on wheat crop and non-provision of market oriented agricultural advisory services to the farmers. The extension agents need to be truly responsive to these conditions. Keeping in view the findings of the study, determined efforts would be required to improve the efficiency and enhance the quality of the extension services in the area by providing effective extension services to the farmers. Extension professionals are increasingly required to have well developed technical skills about wheat crop production technologies as well. Agbareafo (2013) presented similar views based on his studies on “Farmers’ perception of effectiveness of agricultural extension delivery in Cross-River State, Nigeria.

The data in Table 3 present the relationship between farmer socio-economic characteristics and answers about the performance of the agricultural extension agents. According to the Spearman’s correlation test, a non-significant correlation between many of the statements and the socioeconomic characteristics was realized. The data in Table 3 depict a positive correlation ($r_s = 0.179$, $p < 0.05$) between the education of the farmers and the statement “Whenever you visit agricultural extension department, the staff are available and cooperative”. It means that more educated farmers cooperate more with extension staff, and they listen to them and adopt new technologies more readily compared to illiterate farmers. Khan and Akram (2012) also reported that usually extension personnel contact illiterate farmers as it is easy to convince them to adopt new agricultural technologies compared to illiterate farmers. The present study also indicated a positive correlation ($r_s = 0.193$, $p < 0.05$) between farmers’ source of income and the statement “Agricultural extension agents come up with the suitable suggestions for the farmers regarding the protection of wheat crop from insects, pests and diseases well on time”. It indicates that farmers with more income tend to apply crop protection measures from different insects, pests and diseases. However, Table 3 presents a negative correlation between the education of the farmers and the statement “Agricultural extension department promotes modern wheat production technologies before the start of the season through their extension educational programs” ($r_s = −0.193$, $p < 0.05$) to realize higher biological yields. Education is linked to increased exposure, awareness and knowledge. Therefore, it is possible that with increased awareness, farmers are more knowledgeable about what to expect from agricultural extension agents. The study revealed that extension services remained poor in the study area. This situation calls for an immediate attention to make improvements; otherwise, poor information could pose a serious threat to the enhancement and productivity of the wheat crop in the study area and the overall agricultural sector in the Province.

4. Conclusions

According to the results of this study, the highest numbers of respondents (40.83%) engaged in farming activities were from the 31–40 years of age group. Literacy level of the respondents was not encouraging as more than half were illiterate with no formal education. The majority of respondents possessed small landholdings and tenant farmers were reported as the highest of all tenancy categories. More than half of the respondents were well experienced in farming. Moreover, agriculture was the sole income for a large proportion of the respondents. The study has clearly shown that farmers’ perception was mostly low about agricultural extension services as majority respondents come under the category of strongly disagree when asked their awareness of extension. Extension services were not able to effectively satisfy the farmers’ needs to improve their farming methods. The great majority of the respondents (87.6%) strongly disagreed with the statement that “field trials conducted by extension agent are performed on the farmers field without biasness” with a mean value of 2.85; (SD = 1.027). The second highest mean value 1.57; (SD = 1.185) was obtained with the statement “agricultural extension promotes modern wheat production technologies before the start of the season” as a majority respondents (80.8%) strongly disagreed with the statement. The third highest mean value was recorded at the same 1.57; (SD = 1.185) with the statement “extension agents give suitable suggestions to the farmers about crop protection measures on time” with a total of (80.8%) respondents strongly disagreeing to the statement. In addition, the overall perception was obtained with a mean of 25.7; (SD = 4.6) which clearly shows the low perception of the respondents toward extension services. Education was positively correlated with the statement “whenever you visit agricultural extension department, the staff are available and cooperative”. Income source also indicated positive
correlation with the statement “Agricultural extension agents come up with suitable suggestions regarding the protection of wheat crop from insects, pest and diseases well on time”. However, education negatively influenced the statement “Agricultural extension department promotes modern wheat production technologies before the start of the season through their extension educational programs” (rs = −0.193, p < 0.05) to realize higher biological yields.

Present research opens new avenues for further research on the development of new extension programs that match with the farmers’ needs and perceptions to realize higher economic biological crops yields.

5. Recommendations

1. As farmers’ perception about the extension services was mostly low, the Agricultural Extension Department needs to focus on their extension services in general and make them more efficient and effective to suit the specific needs of the farmers. Beside this, extension agents should ensure that services and trainings are the best available, and suitable and satisfactory concerning wheat production technology.

2. Extension workers’ cooperation with all farmers regardless their education is of great significance. Therefore, the literate farmers should be provided with the literature on modern practices of wheat production in order to utilize their educational talent for improvement in the wheat production.

3. Advice and recommendations on Integrated Pest Management (IPM) should be given to all the farmers especially those with higher incomes. Practices with IPM could have a positive impact on the production of wheat crop.

4. Agricultural inputs should be provided to the farmers by the extension department. If there is a lack of such resources in the extension department, arrangements should be made by coordinating with other relevant departments and NGOs for the delivery of inputs to poor and deserving small farmers.

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