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COMPARATIVE EFFECTIVENESS OF AGRICULTURAL ADVISORY SERVICES RENDERED BY PUBLIC AND PRIVATE SECTORS IN THE PUNJAB, PAKISTAN

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ABSTRACT

Public and private extension sectors are meant to effectively disseminate agricultural technologies among farmers in order to improve the living standards of farmers through adoption of site specific and improved technologies. This study was conducted in 2018 to explore the effectiveness of Agricultural Advisory Service rendered by the public and private sectors in the Punjab province of Pakistan. Total 400 farmers selected from the two tehsils (sub-districts) of Multan District were interviewed through the face-to-face interview technique on a structured and pre-tested interview schedule. Statistical Package for Social Sciences (SPSS) was used to analyse the collected data. T-test was the key technique used to compare the two sectors. The results show that one-fourth (25.5%) of respondents had acquaintance with the Extension Field Staff (EFS) of the private sector as compared to 15.5% of respondents knowing about the public sector EFS by face only. Regarding contact, one-fifth (19.9%) of the respondents made a contact with the EFS of public sector twice a month while in contrast, more than half (53.1%) of respondents contacted EFS of private sector twice a month. The performance of the public sector ($\bar{x}$=2.50±1.902) regarding the safe use of pesticides was comparatively better than private sector ($\bar{x}$=2.08±1.824). Farmers were more satisfied with the private sector in context of getting advisory services about harvesting of crops ($\bar{x}$=1.88±1.604) as compared to the public sector ($\bar{x}$=1.62±1.597). Study concluded that services provided by private EFS were comparatively effective as compared to public sector for many reasons. The study urges more development and institutionalization to the public sector in order to improve the performance of the public sector in best interest of farming communities.

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INTRODUCTION

Agriculture is one of the key sources of poverty alleviation in developing countries (Agbarevo, 2013) especially in Pakistan (Azam and Shafique, 2017; Anwer et al., 2015). This sector not only fulfils the food requirements of the country but also creates the employment opportunities for majority of the peoples (Mengal et al., 2017; Muhammad et al., 2020). Farmers are the key pillars of the agriculture system. They cultivate crops, manage livestock, produce food for the enormous population and offer economic support to the country enabling export of food and its by-products. In order to develop the agriculture sector to reap its multiple benefits, each country in the world plans to

facilitate their farming communities. In the context of facilitation, extension advisory services are augmented obligatory, effective and ever needs for the farmers (Hayat *et al.*, 2019).

There are various case studies round the world where countries have gone through the transitions in extension services to develop the farming and farmers. In developed countries like USA, where the county-based extension system persists since 1903 and extension services are rendered through the county agents and its role in increasing agricultural production through strong farmers and extension workers linkages is well addressed (Wang, 2014; Al-Kaisi *et al.*, 2015). Similarly, at the end of 1970, China introduced reforms and replaced "Household Responsibility System" with modern extension system which instead of covering individual farmers started working at national level (Cheng *et al.*, 2016). Now, the public agricultural extension service is dominantly working in the country (Babu *et al.*, 2015; Cai *et al.*, 2019). To provide the effective agricultural extension service to the farmers, which are major food producer, the government re-established the agricultural extension services stations at county and township level (Hu *et al.*, 2009; Huang *et al.*, 2009). Similarly, in developing countries like India, whose economy is agriculture based (Debnath *et al.*, 2016), the agricultural advisory services are provided to farmers by both public and private sectors (Nedumaran and Ravi, 2019). About 0.3 million of pesticide companies are providing agricultural service to the farming communities (Singh *et al.*, 2016).

In Pakistan, the agricultural advisory service system is functional since its independence in 1947 (Abbas *et al.*, 2009; Qamar, 2012) but after green revolution, these services emerged as most institutional part of the country (Shahbaz and Ata, 2014). Once the public sector extension was appreciated for its successes but the performance of public sector extension gradually decreased due to high demands of food products. In order to sustain the technology dissemination system and support public sector extension system the private sector emerged in late 1980s in Pakistan. to support public sector extension. Now both public and private sector are working parallel to each other in process of extension service delivery (Ali *et al.*, 2011; Abbas *et al.*, 2009; Riaz, 2010).

In the provision of information related to agricultural production, the role of agricultural advisory service providers is very crucial (Anaeto *et al.*, 2012). Effectiveness of agricultural extension services is dependent upon the technical and professional competencies of agricultural extension workers who are the main actors in capacity building of farmers (Saravanan *et al.*, 2009; Talib *et al.*, 2018; Ashraf *et al.*, 2019). Ashraf *et al.* (2019) found effectiveness of agricultural advisory services dependent on four major factors i.e work environment of EFS, compensation, performance management and career growth. Unless these four factors are not addressed properly, the extension field staff cannot work effectively (Mengal *et al.*, 2017; Ashraf, 2020).

Extension advisory services have been examined across the world by researchers pointing the need and modes of development in extension advisory services (Saravanan and Veerabhadraiah, 2007; Onyenkazi and Gana, 2009; Sylla *et al.*, 2019). In Pakistan, somehow the literature is scanty on the topic. Few studies such as (Davidson and Ahmad, 2002; Mengal *et al.*, 2018; Talib *et al.*, 2018; Muhammad *et al.*, 2020) had investigated the working of extension advisory services in the Pakistan. Most of them were of local nature or specific for the one crop and weak in its implications for the development of public and private sector extension service. Therefore, the need was to bridge this research gap through a study aiming at comparing the effectiveness of public and private sector with a broader scope. This is anticipated that the findings of this study would be of greater scope for the practitioners in agriculture department, government of the Punjab, Pakistan.

METHODOLOGY

The study was conducted in Punjab province of Pakistan. The province is the major producer of agriculture in the country. It comprises 25% of the land area of Pakistan and agriculturally most productive province (Govt. of Pak., 2017). There are thirty-six districts in the Punjab province. Considering the resource limitation, study was confined to one district "Multan". The study district was selected through purposive sampling technique. Study was further confined to two tehsils such as Multan Sadar and Shuja Abad, selected purposively having more rural union councils viz 29 and 18 respectively (Govt. of Punjab, 2017). A complete list comprising 7955 farmers from the selected tehsils was prepared with the help of Extension Agents from the office of Deputy Director of Agriculture Extension (Extension) Multan. At earlier, a

sample of 367 was determined by using online computer software i.e www.surveysystem.com which was later increased to 400 for more generalization. The data were collected through face-to-face interviews. The data, then were analysed by using Statistical Package for Social Sciences (SPSS). In addition, paired t-test was also applied for comparing the effectiveness of both sectors.

RESULTS AND DISCUSSION
Sectors like public and private that are involved in the agricultural advisory service system, concentrate their efforts on reaching farmers with a specific extension message or advice. As the EFS of both agencies deals

with the heterogeneous farming community. So, it was tried whether there is a difference in the perceptions of sampled farmers who favour an agency and why.

Acquaintance with the EFS
Farmers' acquaintance with the EFS indicated the interest of the farming community in agricultural extension activities as well as also represents the interest level of EFS towards their job.
Therefore, farmers were asked about their nature of acquaintance with EFS and their response is presented in Table 1.

Table 1. Farmers' nature of acquaintance with EFS.

Nature of acquaintance	Public sector		Private sector	
	f	%	f	%
By face only	62	15.5	102	25.5
By name only	8	2.0	24	6.0
Both by face and by name	156	39.0	154	38.5
Neither by name nor by Face	174	43.5	120	30.0
Total	400	100.0	400	100.0

The data revealed that as compared to public extension workers, people had more acquaintance with private EFS. One-fourth of the respondents (25.5%) know the EFS of the private sector by face while on the other side, only 15.5% of the farmers know the public EFS by face only. There was almost an equal percentage of public and private EFS (39% and 38.5% respectively) who were known to farmers both by name and by face. A notable percentage of the respondent (43%) did not know the public EFS either by name or by face while on the other hand, less than one-third of the respondents (30%) did not know the private EFS of their area. It was observed that due to the shortage of staff in the public sector, the public EFS had to cover a large area for

service delivery. Each field assistant of the public sector has one union councils that contain a bunch of villages under their control for the delivery of agricultural services. It was difficult for one EFS to cover such a large area. That's why the EFS of public departments were unable to show up to date performance and were unknown to most of the farmers. On the other hand, multiple private EFS were working in the area and they remained in touch with the farmers throughout the season to facilitate them technically, which makes them familiar among the farmers. According to Ahmad *et al.* (2007) only 15% of the respondents in the study area know the EFS of both sectors by face and by name.

Table 2. Access to EFS to discuss/ report problems (n=341).

Frequency of contact	Response			
	Public sector		Private sector	
	f	%	f	%
Very often (twice in a month)	68	19.9	181	53.1
Often (once in a month)	154	45.2	48	14.1
Occasionally (twice in a year)	34	10.0	40	11.7
Rarely (once in a year)	85	24.9	72	21.1
Total	341	100.0	341	100.0

Table 2 shows the views of 341 farmers who reported their problems to the EFS of both sectors. From the sample of 400, 59 respondents were those who never contacted EFS. Instead, they tried to solve the crop related problems by themselves or with the help of fellow farmers. In case of the public sector, slightly less than one-fourth of the respondents (19.9%) contact the EFS twice in the month while in contrast, more than half of the selected respondents (53.1%) contacted EFS of private sector twice a month. Less than half the farmers (45.2%) contacted public EFS once in a month to discuss the crop-related problem. On the other hand, only 14.1% of selected respondents contacted private EFS often. There were exactly one-tenth (10%) and slightly more than one-tenth (about 12%) of the respondents who contacted EFS of both public and private sector respondents respectively twice in a year. On the other hand, about one-fourth (24.9%) of respondents

contacted rarely with EFS of the public sector while one fifth (21.1%) of the farmers contact with private sector once in a year.

It was observed by the researcher that there are representatives of more than one private sector extension (FMC, Jaffer Brother, Arysta Life Science and Bayer Crops, etc.) in the area of the study to provide agricultural service to the farming community. So, they frequently visited the field of farmers or home one after one.

Effectiveness of agricultural advisory services

In this section, an effort is made to assess the effectiveness of AASs provided by the EFS of both public and private sector regarding crop production, protection and crop management. It should be noted that the analysis was based on the perceptions of sampled farmers.

Table 3. Farmers' perception regarding the effectiveness of advisory service provided by EFS for crop production.

Crop production	Public Sector		Private Sector		t-value	Sig*
	Mean	S.D.	Mean	S.D.		
Land preparation	1.92	1.80	2.12	1.66	-1.800	.073[NS]
land levelling methods	2.01	1.85	2.01	1.55	0.500	1.00[NS]
Soil analysis	1.98	1.84	2.08	1.61	-.797	.426[NS]
Water Analysis	1.70	1.68	2.06	1.53	-3.448	.001**
Improved seed varieties	2.08	1.83	2.16	1.63	-.636	.525[NS]
Seed treatment methods	2.18	1.89	2.23	1.66	-.445	.657[NS]
Seed rate	2.01	1.83	2.37	1.70	-2.981	.003**
Sowing time	2.09	1.88	2.11	1.61	-.163	.871[NS]
Sowing method	2.12	1.90	2.29	1.65	-1.423	.155[NS]
Fertilizer application	1.82	1.65	2.30	1.66	-4.478	.000**
Fertilizer requirement of crop	2.06	1.84	2.27	1.68	-1.853	.065[NS]
Methods of irrigation	1.98	1.86	2.11	1.70	-1.041	.299[NS]

Scale: 1= Very low, 2= Low, 3= Medium, 4= High, 5= Very high

Table 3 shows that, there was a non-significant difference for the services such as land preparation (t-value= -1.800), methods of land levelling (t=-0.500), improved seed varieties (t= -0.636), sowing time (t= -0.163), sowing methods (t=1.423), seed treatment methods (t=-0.445), fertilizer requirement of the crop (t=1.853), soil analysis (t=-0.797) and methods of irrigation (t=-1.041).

The compared data shows a significant difference (t=-2.981) in the seed rate. The mean values show the effectiveness of the private sector ($\bar{x}$ =2.37±1.663) as compared to the public sector ($\bar{x}$=2.01±1.830). The mean

value of the private sector fell between low to medium but more tended towards low. There was a highly significant difference (t= -4.478) in fertilizer application as mean values also represent here the effectiveness of the private sector ($\bar{x}$= 1.82±1.653) over public sector extension ($\bar{x}$= 2.30±1.657). In the fertilizer application private sector was relatively more effective because its mean value fell between low to medium and tended towards low.

There was a highly significant difference (t=3.448) regarding the effectiveness of water analysis services provided by both sectors. The mean value of the private

sector ($\bar{x}$ = 2.06±1.534), which lies between low to medium but preferably tended towards low, shows that the advisory services provided by this sector regarding water analysis were effective. Soil and water quality testing play a greater role in enhancement of crop production (Balaban *et al.*, 2017; Havlin and Heiniger, 2020). Both public and private sectors were motivating the farmers to avail the soil and water testing services,

though the private sectors were ahead of the public sector in context of motivation to farmers for soil and water testing. Findings are endorsed with those of (Iqbal, 2018). He maintained that, private sector EFS was successful in convincing the farmers to get the water tested from soil and water testing laboratories either under management of public sector or private sector.

Table 4. Effectiveness of advisory service provided by EFS for crop protection.

Crop protection	Public sector		Private Sector		t-value	Sig*
	Mean	S.D.	Mean	S.D.		
Weeds management	2.14	1.787	2.16	1.936	-.222	.824[NS]
Pest scouting techniques	2.28	1.852	2.35	1.850	-.602	.548[NS]
Methods of pesticides application	2.24	1.845	2.31	1.901	-.616	.538[NS]
Safe use of pesticides/ weedicides	2.50	1.902	2.08	1.824	3.935	.000**
Recommended pesticide	2.67	1.900	1.99	1.905	-5.863	.000**
Identification/utilization of beneficial insects	2.04	1.77	1.80	1.711	2.139	.033*
Climate related information	1.85	1.636	2.00	1.614	-1.542	.124[NS]
Intercultural practices	1.99	1.775	2.09	1.754	-.911	.363[NS]

Scale: 1= Very low, 2= Low, 3= Medium, 4= High, 5= Very high

The data presented in Table 6 shows a non-significant difference were observed regarding weeds management (t= -0.22), pest scouting techniques (t = -0.602), methods of pesticide application (t= -0.616), climate related information (t= -1.542) and intercultural practices (t= -0.911) respectively. The compared data showed that both agencies were showing almost similar performance regarding these crop protection aspects.

There was a significant difference in the safe use of pesticides (t= -3.935). The mean values indicate that the performance of the public sector ($\bar{x}$ =2.50±1.902) was comparatively better than the private sector ($\bar{x}$ = 2.08±1.824). The mean value of public sectors is falling between low to medium but more tending towards the medium. The public sector was motivating people towards the safe use of pesticides while the private sector promoted the excessive use of pesticides because their concern was mainly towards the sale of their products.

Similarly, the compared results also show a strongly significant difference (t= -5.863) in recommended pesticides. The mean value ($\bar{x}$ =2.67± 1.900) of public sector which fell between low to medium but inclined towards the medium, shows that it suggested recommended pesticides to the farmers while the

private sector ($\bar{x}$ = 1.99±1.905), due to their profit-oriented nature, force farmers to apply more pesticides to their crops. This policy of private sector limits their trust level in farming communities.

The excessive use of insecticides on crops created a serious threat to the environment of the country (Ali *et al.*, 2013). Nowadays, the department of agriculture, Punjab government is promoting the biological methods of the insects' control. For this purpose, they have distributed various pheromone traps to the farming community on subsides rates. The compared data also shows a significant difference (t-value=2.139) in the utilization of natural enemies. The mean value ($\bar{x}$ =2.04±1.77) falling between low to the medium category but more inclined towards low, shows that the public sector falling between were showing effective performance in this aspect than the private sector ($\bar{x}$ =1.71±2.139).

Biological control/ IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices (Ofuoku *et al.*, 2008; Delahoy *et al.*, 2018; Ali *et al.*, 2013) Therefore, Public sector extension had introduced various schemes to promote the IPM control method of insects by motivating farmers (Ahmad *et al.*, 2005).

Table 5. Effectiveness of advisory service provided by EFS for crop management.

Crop management	Public sector		Private sector		t-value	Sig*
	Mean	S.D.	Mean	S.D.		
Harvesting and post-harvest techniques						
Signs of ripening/ harvesting	1.54	1.626	1.66	1.616	-1.102	.271[NS]
Harvesting methods	1.62	1.597	1.88	1.604	-2.365	.019*
Pre-storage techniques	1.75	1.793	2.09	1.701	-3.127	.002**
Storage of harvested crop	1.81	1.892	2.15	1.706	-2.999	.003**
Packaging	1.68	1.867	1.81	1.787	-1.167	.244[NS]
Marketing						
Method of packing	1.48	1.580	1.66	1.490	-1.770	.078[NS]
Method for transportation to market	1.52	1.577	1.90	1.660	-3.767	.000**
Handling and transportation	1.51	1.596	2.05	1.744	-4.838	.000**
Market price update	1.61	1.613	2.22	1.694	-6.736	.000**
Reducing role of middleman	1.54	1.611	2.00	1.701	-4.811	.000**

Scale: 1= Very low, 2= Low, 3= Medium, 4= High, 5= Very high

The compared results showed that farmers were satisfied with the private sector regarding the advisory services related to harvesting methods of crops ($\bar{x}$ =1.88±1.604) as compared to the public sector ($\bar{x}$= 1.62±1.597). The mean value of the private sector fell among very low to the low category but preferably tended towards low. Analysis of the data further shows a significant difference in pre-storage techniques (t= -3.127) and mean values also show the satisfaction of respondents with the private sector ($\bar{x}$=2.09±1.701) whose mean value lies between low to medium but more tended towards low. Proper storage of harvested crop with various methods was an important concern for the farmers in order to increase their crops' shelf life (Mesterházy *et al.,* 2020). Here the data explore that private sector ($\bar{x}$ = 2.15±1.706) showing the mean falling between low to medium but inclined towards low, was giving more advisory service related to storage while the performance of the public sector ($\bar{x}$=1.81±1.892) were lower than the private sector. There was non-significant difference in signs of ripening (t= -1.102) and packaging of harvested crop (t= -1.167). The overall means shows that the performance of private sectors regarding harvesting and post-harvest techniques of crops was effective than public sector. The results are in line with those of (Ali *et al.*, 2011) who found that private sector was playing an active role in harvesting and marketing aspects of crops in Pakistan.

CONCLUSION AND RECOMMENDATIONS

The agricultural advisory services are provided to the farmers by both public and private sectors with the best of their available resources but still the effectiveness of advisory services are regarded as ineffective. However, the EFS of private sectors comparatively provide better advisory services related to crop production, protection and management of harvested crops. Additionally, their interaction with the farmers was greater than the public sector because of functioning of various national and multinational companies in the study area. on the other hand, public sector is criticized for their less access to the farmers. However, due to its profit-oriented strategy, private sector was focused towards sale of their products (pesticides and fungicides). Both of the sectors show below average performance in crops production technologies. Therefore, it may be needed to upgrade the knowledge level of the EFS of both sectors as well as a proper policy should be introduced for private sectors by third parties so that they may deliver agricultural services to the farmers in true sense. Taking the results of this study into account, following recommendations are made;

The results of the study showed the below-average performance of both sectors in crop production, protection and management. So, it is suggested that policy makers should pay attention on the capacity building of EFS by in-service training.

The private sector was focusing on the excessive use of

pesticides for insect pests' control while ignoring the other methods (biological control). It causes a serious threat to the environment as well as also the main reason for killing the natural enemies. It is therefore suggested that policy should be devised by the government to reduce the massive use of pesticides and promote biological control methods of insect/pest control.

The data shows that interaction of private EFS was more than that EFS of public sector. Therefore, attention must be given by EFS of public sector to fulfil this communication gap to strengthen their interaction with farmers.

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