Assessing the implications of farm advisory services of Model Farm Services Center from a Productivity Perspective

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ABSTRACT

The aim of this study is to determine the role of Farm Advisory Services in order to offset the problems of the yield productivity gaps in the study area. The farmers’ perceptions of the Model Farm Services Center (MFSC) were statistically examined via a comparison of the differences within two subgroups. A sample size of 120 was selected in order to enable equal representation from both the member farmers and the independent farmers of the MFSC. An independent sample t-test along with a dummy variable was used to identify differences in their farming practices and obtained yield respectively. It was found that 80% of the respondents entirely relied on farming, whereas 20% only partially relied on farming. Similarly, 70% of the farmers were living in a joint familial system, while 30% of them were individual households. Further, some of the farmers 28% used canals while only 13% relied on tube-wells from the member respondents, whereas 30% of the independent farmers relied on canals and 10% used tube wells. The independent farmers were more productive with wheat, rice, and sugarcane crops, but a lower yield with the maize crop was identified compared to the member farmers. The study concludes that there are inefficiencies and gaps in the service delivery value chain of the MFSCs and recommends actions, such as by providing basic farm inputs, modern equipment,

Keywords

Farm advisory services, Yield productivity, Production gaps, Farming practices, Model Farm Services Center

JEL Classification

Q10, Q18, M11,
interest free credit as well as technical guidance. The study contributes by using the farmers’ perceptions as a stepping stone for the policy input in regards to the agriculture laden productivity.

1. Introduction

Sustainable growth in farm-oriented productivity stands pivotal for agricultural economies, such as Pakistan, which is a country where agriculture is livelihood source for a whopping stratum of the total population (Lowder, Skoet, & Raney, 2016). Pakistan is in the fifth spot among the most populous nations that are prone to climate change has a population of 224.78 million (Update, 2021; Yousafzai, Nawaz, Xin, Tsai, & Lee, 2020). According to the official records, 33.33% people live in extreme poverty due to the fact that Pakistan is consistently ranked amongst the most exposed countries to poverty risk in the Asia Pacific region (Thouret et al., 2022). According to Malthus (1872) the population of the human grows geometrically, whereas food production and resource generation grows arithmetically. This ultimately leads to food insecurity especially with outdated farming methods and the scarcity of funds (Yaqoob et al., 2022). Agriculture generates employment for almost 37.4% of the total workforce, and it contributes 22.7% of the Gross Domestic Product (GDP) of Pakistan. The annual Productivity growth rate of 4.40% in agriculture is dismal considering a high corresponding rise in the population in Pakistan (Update, 2021). Agriculture stands critical for the attainment of sustainable development goal SDG 1, which is the end to extreme poverty, and SDG 2, which is zero hunger, in order to actualize the United Nations 2030 agenda (Gil et al., 2019; I. Khan et al., 2021). Countermeasures to neutralize the threats of food scarcity are needed more than now than ever before. The onus is on the scholars from the occidental cultures as well as the oriental cultures to inform the policy makers who evaluate the effectiveness of farm support services in their respective localities. We examined the program interventions of the Model Farm Services Center (MFSC) initiative in this context in the form of the farm advisory services, which are undertaken by the government of Pakistan in order to meet its food security targets.

Pakistan seems to be in the quagmire of an economic trap from a socioeconomic perspective as it experiences economic stagnation in the post Covid 19 scenario (Kögel & Prskawetz, 2001). This inwardly, manifests itself in socio-economic terms, such as the erosion of moral values, gender roles, and empowerment. According to the Economic Survey of Pakistan (2022) Pakistan still imports its main subsistence crop, which is wheat, mostly from Ukraine and other countries. In situations where there is a higher ground rent due to lack of land availability then in light of the Marxist socio-economic theory, it results in a
higher polarity between the agrarian bourgeoisie and the rural preliterate (Djurfeldt, 1981). These internal factors, coupled at the confluence of climate change, serve as a double whammy for farm productivity, which adversely impact the GDP, because it accounts for more than 20% of the total GDP of country. Pakistan has the highest deforestation rates on the Asian continent. Its forest cover declined from 33% in 1947 to only 4% in 2022, in the past 75 years (Haider & Sultan, 2022). This has caused ripple effects, which are evident from the rise in temperature that are due to the fast melting of the glaciers. The quick melting of the glaciers contributes to floods, which killed more than 150 people in Pakistan in 2022 during the short bursts of the Monsoon rain spells (Mir, H., 2022). However, the majority of the tenant farmers believe in fatalism, such as climatic changes are something beyond their locus of control in contrast to the anthropogenic global warming theory despite these facts (Yousafzai et al., 2022). This situation merits a unique productivity oriented purposeful study in order to enliven the spirit of competition and instill a passion for productivity in farmers. One approach to accomplish this is to evaluate the efficacy of the farm advisory services with a broader aim to improve the farmer productivity in the target area through a quantitative approach.

The idea of value orientation theory was proposed in an informative study, which shows significant differences across cultural approaches to nature-human relationships (Kopittke, Menzies, Wang, McKenna, & Lombi, 2019). On one hand, the occidental conceptions of life share close affinities with future oriented efforts to be dominant over nature. On the other hand, native oriental cultures are mostly past oriented and emphasize group relations and desires to be in harmony within the context of man-nature relationships. Hence, examining productivity issues in agriculture require a collectivist Asian perspective. There is an essential global need for an upward shift in food productivity and the competitiveness of agricultural products (Krafft, Höckert, Ljung, Lundberg, & Kolstrup, 2021). Therefore, there is a need to conduct a re-assessment of the service delivery mechanisms of the farm advisory services of MFSC. This holds significance for all the concerned stakeholders whether they are members or independent farmers of these types of schemes, even though there are certain incentives that are offered at the MFSCs in order to facilitate their members by improving their productivity. It is estimated that the world food demand will increase by 50 percent in the year 2030 with a corresponding rise in population, which will necessitate a 70% growth in agriculture productivity worldwide (Bruinsma, 2009). Agricultural based research and their subsequent contributions in development are not confined to convey knowledge. It also hinges on its capacity to generate proper communication in order to share favorable procedures and new techniques (Saleh et al., 2015). The conduct of quantifiable studies, such as evaluating farm advisory services from a production lens for the two subgroups of the
MFSC in the Mardan District is useful for the salient stakeholders of farm management in the target area of the study as well as it leaves behind a trail for future researchers and inputs to the policymakers.

The agriculture productivity gaps are universal worldwide, because most countries fail to realize their true potential farm yields. There is need to weigh agriculture production against the loss of value in other sectors, because food growth is expected to come mainly from yield growth instead of the expansion of land (Kopittke et al., 2019). Pakistan is ranked among the top ten producers of cotton, wheat, mangoes, rice, and sugarcane in the world on one hand, whereas 40 million of its population remains undernourished or food insecure due to a variety of reasons, which includes recurrent floods, droughts, earthquakes, landslides, and conflicts on the other hand (Mughal, 2019). Food production in Pakistan has increased by almost 50% over the past two decades. However, the agricultural crop sector productivity is far below international yields. For instance, Pakistan produces 3.1 tons of wheat from one hectare, which is 62% lower than the 8.1 tons that is produced in France. Pakistan produces 2.5 tons of cotton per hectare, which is 48% lower than the 4.8 tons that China produces. Sugarcane yield stands at 63.4 tons per hectare in Pakistan, which is 51% of the 125.1 tons that is produced in Egypt. Maize productivity is estimated at 4.6 tons per hectare, which equates to 41% of the 11.1 tons that France produces. Pakistan produces 2.7 tons of rice from every hectare, which is merely 29% of the 9.2 tons per hectare that is produced in the US (Hanif, U., 2018). An examination of the spatial heterogeneity in terms of the actual and potential yields shows a productivity gap in Pakistan (I. Khan et al., 2021); which legitimizes the studies about evaluating the efficacy of the farm advisory services in order to bridge this widening gap with the agriculture production.

The majority of the people are small-scale farmers in Pakistan, and they are considered frontline stakeholders in regards to agricultural development. According to Krafft et al. (2021) most of the world’s 570 million farmers hold small farms which account for 12% of the total available land, or family farms, which operate on 75% of the total available land. Most farmers hold land sizes that are less than five acres, which represent 74% of the farming population in the country. The available literature indicates that they have limited access to credit and farm production resources due to a variety of reasons (Yousafzai et al., 2020). In addition to credit constrains, they also confront challenges, such as water availability, even though Pakistan has one of the best Indus Basin water canal systems still it is 3rd most water deficient country in world (Akram & Hussain, 2008). The experts often argue that the further development of the nation particularly depends on the development of the agriculture sector (Mustafi & Islam, 2008). This study advances the relationship among the variables of interest
by the way of hypothesizing the relationship of the two subgroups of the Model Farm Service Centers, which include the registered and unregistered independent farmers, and the productivity variable. It is pertinent to note that membership with the Model Farm Service Centers requires a registration fee, which makes the member eligible for incentives that are announced by the government from time to time. As a result, the following hypothesis are proposed for this quantitative study.

2. **Hypothesis of the research work**

Ho1: There is no significant difference in terms of the proactive agricultural practices in the MFSC member farmers and the independent farmers.

H1: There is a significant difference in terms of the proactive agricultural practices in the MFSC member farmers and the independent farmers.

Ho2: There is no significant difference in productivity with the member respondents of the MFSC than there is with the independent farmers.

H2: There is a significant difference in productivity of the member respondents of the MFSC than there is with the independent farmers.

Ho3: There is no significant difference in financial support with the MFSC members compared to the independent farmers.

H3: There is a significant difference in financial support for the MFSC members compared to the independent farmers.

The primary objective of the study was to explore the prevalent farming practices of the study area in regards to the farm advisory services, which are undertaken in the Model Farm Service Centers (MFSCs). Also, efforts will be made to investigate agricultural oriented farms in regards to the work activities of the farmers in milieu of the Mardan District. In addition, the differences in the socioeconomic factors, farm practices, and agricultural yield gap between the member and independent farmers of the MFSC were determined. Furthermore, the problems of the MFSC in the target district were identified. Some recommendations are made in regards to improving the agriculture productivity of the study area, which are based on these findings.
3. **Data and Methodology**

The study used quantitative research design with a survey of the farmers in the Mardan District. The research used a positivist ontological paradigm with a survey as strategy of inquiry that was conducted in order to quantify the evidence that was collected in an objective and ethical manner (Iqbal et al., 2018; Yousafzai et al., 2020). This section contains the detail mechanism of this study. This part provides brief information of the study area, the techniques used in the sampling procedure, the data sources, the data collection, and the statistical techniques that were used for the analysis.

3.1 **Study area**

Agriculture employs the largest proportion of labor force in the Khyber Pakhtunkhwa Province, approximately 44%. Agriculture contributes almost 24% of the GDP of the province, which is behind forestry and mining, but it is ahead of construction and
manufacturing (Gul, Iqbal, & Javed, 2022; A. Khan, Ali, Khan, Waqas, & Khan, 2020). The total area under cultivation in the Khyber Pakhtunkhwa Province is 1.85 million hectares (GOKP, 2020). Mardan is one of the main plain districts of Khyber Pakhtunkhwa, which has a total covered area of 1632 square kilometers. The geographical location of the Mardan District is shown in Figure (2). Three tehsils, which are known as Mardan, Katlang, and Takhtbahi, come under the territorial jurisdiction of the Mardan District. Mardan is the most populated among these three tehsils, and it is the second largest city after Peshawar, which is the provincial capital of Khyber Pakhtunkhwa, Pakistan (Saqib, Ahmad, & Panezai, 2016).

**Figure 2: Map of Pakistan showing Study area**

### 3.2 Sampling Technique and Sample Size

The three tehsils of the Mardan District were divided into different union councils as per land classification nomenclature in vogue. Two tehsils, which included Mardan and Takhtbhai, were chosen randomly for the data collection. Sixty farmers from Mardan as well as sixty farmers from Takhtbhai were chosen through a random sampling method in order to gather information via a structured questionnaire. Hence, a sample of 120 farmers was determined. In addition, a similar ratio of 1:1 was employed, which included sixty member farmers and sixty independent (autonomous) farmers were selected, with the assumption of
representative sample of entire Mardan District. The respondents were not pressured to sign the consent forms in light of (Creswell & Creswell, 2017). We disclosed this limitation as naiveté about the ethical dimension of the research is in itself unethical (Iqbal et al., 2018).

3.3 Data Analysis

A structured questionnaire was constructed for this study, which was recursively refined throughout the span of data collection, in order to obtain the desired information. Various questions regarding the basic information of the respondents along with their cropping system, the basic farm inputs, their yield from selected crops, and information about their livestock were elicited via a personally administered structured questionnaire. All of the 120 respondents were contacted for a face-to-face meeting, and the purpose of research was explained in their native language in order to induce responder confidence. The reason for a face-to-face meeting was to explain the purpose of every question to the respondents in an effort to collect data beyond the language and literacy barriers. The data was transferred to a computer with the help of an SPSS package for the analysis after the desired information was collected. Simple techniques, such as average, frequencies, and cross tabulations along with simple bar charts were performed during the first phase of the analysis for the illustrations of the findings. An independent sample t-test was conducted during the second phase in order to determine the diversities in the basic information as well the other associated methods of farming of both subgroups of farmers. A dummy variable was placed for the third phase in order to clarify the actual disparity in the yield of the selected crops, such as wheat, maize, rice, and sugarcane of the member and independent farmers of the MFSC with the help of following statistic formula equation.

\[
Y = \alpha + \beta (D) + E
\]

As
\( Y \) = Crops yield (wheat, maize, rice and sugarcane)
\( \alpha \) = Constant
\( \beta \) = Coefficient
\( D \) = Dummy variable (1 is member, 0 is other)
\( E \) = Error

4. Results and Discussion

It was observed that majority of the community members solely relied on farming for
their livelihoods, whereas there were still others who strives to survive on a variety of seasonal livelihood sources. They are mostly involved in poultry, cattle ranch farming, and agro-pastoralism. Pakistan is the 11th largest poultry producer in the world (Ibrar, Kakepoto, Manzoor, & Khan, 2022). Information in Figure 3 indicates that the majority of both the member farmers as well the independent farmers respondents were engaged in farming full time. While, whereas only a few of them were partially involved in the farming profession. The traditional societies mostly consist of the joint family system in developing societies around the world. A recent census from the year 2017 indicates that the total population is 2.37 million with an average growth rate of 2.58 from 1998 to 2017. It was discovered that the ratio of the joint family system is higher compared to nuclear families in both subgroups of the respondents. There are various factors, which act as obstacles for the farmers in terms of profitability. The most general is the unavailability of sufficient land for cultivation. In addition, unskilled labor and unstable commodity prices are common in the region. The finding of this study revealed that most of the respondents are small-scale farmers with sufficient farming experience in their fields. Most of the respondents are owners, which is illustrated in Figure 3 of their cultivated land and perform all the field related tasks. The data suggests that some of them are tenants as well as a few are owner-cum-tenants. The majority of the farmers shy away from the acquisition of farm advisory services that are offered by government, which is due to past experience as well as a reduction in the autonomy of their farming. Hence, the many seasoned farmers are not subscribers of the services that are offered by the MFSCs.

The geographical area of the study district is about one thousand six hundred and 32 (1632) square kilometers. Out of the total agricultural land, 75% is irrigated, 24.6% is rain fed, and up to 0.4% is cultural waste (Nawaz et al., 2021). The available sources of irrigation in the Mardan District are rainwater, the canal system, and tube wells. The canal is the main source of irrigation in the Mardan District, which is possible due to the diversion of the rivulets from the upstream rivers. The canal comes from the upper Swat and irrigates a huge portion of the Mardan District. There has been an enormous increase in the use of tube-wells for farming in past two decades. However, in absence of formal laws for ground water, the tube-wells puncturing is not a sustainable practice. The growing low-cost tube-well technology also tends to exploit groundwater in certain ways (DAEO, 2014). Our findings indicate that the canal is the major source of irrigation for the both types of respondents in the study area. These finding are in contrast with Fahad and Wang (2018), who observed that 75 percent of farmers used tube-wells for the purpose of irrigation in their farming. It has been observed with great concern that there is no systemic trend, because the tube wells densities continuously increase, which is due to an ever-increasing population and a rise in
the overall cropping volumes in Pakistan. This is evident from the fact that Pakistan is on the brink of a water crisis, because 90 percent of the water is used in agriculture in order to meet the ever-increasing food requirements of the youth bulge population (FAO, 2019). The findings from the recent study of the merged areas of KPK indicate that inaccessibility or limited access to irrigated water was reported by 59% of the farmers (Kamal et al., 2022). A significant potential can be fulfilled by improving the water conveyance efficiency, which can be improved up to 80%, by watercourse lining followed by the proper management of the concurrent resources (Klapper, Singer, Ansar, & Hess, 2019).

Figure 3: Frequency distribution of the respondents in regards to timework, family type, tenancy status, and irrigation sources

Agriculture is the main occupation of the people who are living in KPK. It is reported in the land utilization information of the district Mardan that out of a total area of 1632 square kilometers, 76% of the land is utilized for farming purposes, 22% is uncultivated, and a dismal 2% consists of forests (DAEO, 2014). The data in Figure 3 shows that the majority of the independent respondents (32) as well as the member respondents (24) drew their income from agriculture. The business and government jobs are the major sources for both categories of respondents in regards to their livelihood. The majority of (30) independent
farmers and (24) member respondents were farming with just one active family member, which is followed by (12) independent farmers and (16) member respondents who used two family members to farm. In addition, 6 independent farmers, 4 members, 2 non-members, and 4 members were using a team of four, five, or more family members in regards to farming. The availability of high-quality seed is critical in order to bolster the agriculture yield production. Various varieties of seeds are available in the local markets from agricultural inputs dealers who also serve as a source of commercial advisory services. The agriculture department also provide seed to some extent for reasonable price to the farming communities in the study area. The information in Figure 3 shows the different purchasing sources of agriculture seeds, which is where both subgroups of the respondents procure seeds. The data in Figure 4 shows that the majority of the respondents procure wheat and maize seeds from input/seed dealers, which is followed by the agriculture extension department as well as some purchase the desired seed from the MFSC and fellow farmers.

**Figure 4: The distribution of respondents in regards to the source of income, family members involved in farming, and sources of seed purchases**

Agricultural oriented technology improves with the passage of time. The farmers need to stay aware of any changes in the surrounding environment that can adversely affect their crops yield. The farmers should stay updated about the recent advancements in their respective field in order to maximize their crop yields. The services of an agricultural extension as a supporting contributor are quite essential for sustainable farming in these types of circumstances (Davidson, Ahmad, & Ali, 2001). These types of extension services
endow farming communities especially those who live in rural areas with essential knowledge about their potential to adopt agricultural based innovations (Betz, 2009). The study of Brummett, Gockowski, Pouomogne, and Muir (2011) indicates that extension workers are responsible for assisting rural communities in regards to enhancing productivity and maintaining the efficacy of farming practices. Hence, the role of extension services is quite influential in regards to obtaining useful information about sustainable agricultural practices in the farming communities (Sucheta & Hensel, 2014). The information in Table 1 indicates that the majority of the farmers, which is irrespective of their membership with the farm advisory services, sought guidance from the agricultural department in various farming activities, whereas a small percentage was reluctant to approach the agricultural department. The finding of Kansiime et al. (2019) shows that 86% of the farmers received agri-advisory information from their fellow farmers. Similarly, Adamides and Stylianou (2013) reported that a vast majority (98%) of the respondents were using mobile phones as an information source. About 89% of farmers received information from their fellow farmers, which was followed by the agricultural extension services, private extension services (81%), and input dealers (74%). According to Bonye, Alfred, and Jasaw (2012) an extension is a preliminary source of information, which brings technological changes among the farming communities, which ultimately improves the production, profits, and standards of living. The extension-based service providers build an innovation that is known to farming households, which speeds up the diffusion rate, controls changes, and attempts to prevent some individuals in the system from halting the adaptation process (Alemu, Maertens, Deckers, Bauer, & Mathijs, 2016). Information is an essential component in order to increase production in this regard, which reduces the transaction and travel costs and provides rapid access to accurate and timely market information (Rashid & Elder, 2009).
Table 1: Information of the respondents in regards to guidance, contact, and knowledge

<table>
<thead>
<tr>
<th>Awareness/ linkages</th>
<th>Independent farmer</th>
<th>Member</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Do you approach agriculture department for farm improvement?</td>
<td>38</td>
<td>22</td>
</tr>
<tr>
<td>Do any agricultural extension agents visit your area/farm for improved technology?</td>
<td>24</td>
<td>36</td>
</tr>
<tr>
<td>Are you aware of the agriculture extension office address?</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Have you attended any agricultural program?</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Do you know extension personnel by name or by face?</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Did you receive any agriculture training in past one year?</td>
<td>2</td>
<td>58</td>
</tr>
</tbody>
</table>

The agro-climatic conditions and fertile lands in the study area are very suitable for the cultivation of cereal crops as well as vegetables. Also, various factors, such as land availability of reasonable sizes, household labor, and the costs of the input commodities are directly associated with the potential crop yields. The crops yield in a region illustrates a stochastic fickle productivity curve where farmers experience gains one year, which is preceded by losses, and it continues in a recursive manner (Arifullah et al., 2009). This is perhaps due to the geographical location, which is prone to natural disasters and a lack of the effective delivery of farm advisory services. The insufficient access to timely information may cause a decline in the estimated production (Ashraf, Khan, Ali, Ahmed, & Iftikhar, 2015). The overall productivity of the agricultural sector is quite low in the target area of the study. There is intense need to enhance the agricultural productivity to a desirable level that is on par with the international standards in order to satisfy the youth quake, because Pakistan is experiencing a youth population bulge with more than 63 percent of its population is in the 15-33, year age range (Pakistan Economic Survey, 2022). This type of skewed demographic statistic also indicates a unique demographic window of opportunity, because an overwhelming proportion of the population is able to work. The agricultural production of some crops shows a greater yield disparity compared with the benchmarks that are set forth by developed nations. The responsibility lies on agricultural research centers, the extension workforce, and the farming communities to close the
existing productivity gap. The agricultural extension also includes the issues that are related to economics and sales, which are apart from the advisory services and related to the farm production technology (Golba, Kazimierczak, Zając, Kucieńska, & Rembiałkowska, 2014). In the ensuing lines we furnish empirical information in the backdrop of productivity related such as Table 2 gives the cultivated area of some crops as well their associated yields for both of the subgroups, which include the members of the MFSC and the independent autonomous farmers.

**Table 2: Information of the respondents in regards to the crops area and production**

<table>
<thead>
<tr>
<th>Respondents’ status</th>
<th>Non-member</th>
<th>Member</th>
<th>Average</th>
<th>Mean. Difference</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat rabi crop area (acres)</td>
<td>3.96</td>
<td>2.72</td>
<td>3.34</td>
<td>1.24</td>
<td>0.06</td>
</tr>
<tr>
<td>Wheat crop production in monds per acre</td>
<td>31.24</td>
<td>29.59</td>
<td>30.41</td>
<td>1.66</td>
<td>0.34</td>
</tr>
<tr>
<td>Maize kharif crop area (acres)</td>
<td>3.07</td>
<td>1.99</td>
<td>2.61</td>
<td>1.09</td>
<td>0.01</td>
</tr>
<tr>
<td>Maize crop production in monds per acre</td>
<td>23.88</td>
<td>28.46</td>
<td>25.61</td>
<td>-4.58</td>
<td>0.08</td>
</tr>
<tr>
<td>Rice kharif crop area (acres)</td>
<td>1.50</td>
<td>2.17</td>
<td>2.00</td>
<td>-0.67</td>
<td>0.42</td>
</tr>
<tr>
<td>Rice Production in monds per acre</td>
<td>33.00</td>
<td>17.14</td>
<td>21.11</td>
<td>15.86</td>
<td>0.00</td>
</tr>
<tr>
<td>Sugarcane crop area(acres)</td>
<td>6.21</td>
<td>3.65</td>
<td>4.93</td>
<td>2.56</td>
<td>0.05</td>
</tr>
<tr>
<td>Sugarcane crop production in monds per acre</td>
<td>601.33</td>
<td>430.33</td>
<td>512.41</td>
<td>171.00</td>
<td>0.02</td>
</tr>
</tbody>
</table>

It has been observed that the agricultural crops yield has been accelerated in both developed and developing countries. Wheat, maize, and sugarcane are KPK’s most important crops. Approximately 1.32 million tons of wheat was produced in 2018-2019 on 739,570 hectares in KPK. Numerous studies thus far have exposed the yield differences among various crops in with and without conducting farm advisory services. This study measured the crops covering area in acres as well as the crops yield in mounds. A mound is common local unit that is equal to forty kilograms. The data in Table 3 contains the details of a dummy variable regression that was used for various types of crops, such as wheat, maize, rice, and sugarcane as well as their respective covering areas. The information in the table that is provided expresses the actual yield differences for both the member farmers and the independent farmers of the MFSC. The yield of wheat, rice, and sugarcane for the independent farmer respondents are higher than the member respondents of the MFSC among all the compared crops. However, the members’ respondents are enjoying a greater yield with maize. These findings are revelations, because they show that
commercial and amateur farmers out produce farmers who are guided by the professional staff members of the MFSC. There are many reasons for this trend, because the MFSC programs are yet to achieve critical mass in terms of the registered members in Mardan.

Maize is KPK’s second most important cereal crop after wheat with an annual production of 904,548 tons that are cultivated on 467,979 hectares, which is followed by sugarcane. Sugarcane is produced on approximately 110,991 hectares, which produces 5.53 million tons (KP, 2018-2019). The data in Table (3) shows the actual yield differences of both the member farmers and the independent farmers of the MFSC. The yield of wheat, rice, and sugarcane from the independent farmer respondents are higher than the member respondents of the MFSC among all the compared crops. However, the members’ respondents are enjoying a greater yield with maize. These findings are revelations, because they show that commercial and amateur farmers out produce farmers who are guided by professional staff members of the MFSC. However, there are many reasons for this trend, because the MFSC programs have yet to achieve critical mass in terms of the registered members in Mardan.

Table 3: Information of the respondents regarding the yield differences

<table>
<thead>
<tr>
<th>Crops</th>
<th>Constant</th>
<th>Dummy</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>31.24</td>
<td>-1.66</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(1.23)</td>
<td>(1.73)</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>23.88</td>
<td>4.58</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(1.56)</td>
<td>(2.53)</td>
<td>0.08</td>
</tr>
<tr>
<td>Maize</td>
<td>33.00</td>
<td>-15.86</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(2.58)</td>
<td>(2.98)</td>
<td>0.00</td>
</tr>
<tr>
<td>Rice</td>
<td>601.33</td>
<td>-171.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(48.96)</td>
<td>(67.89)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Achieving sustainable food supplies globally is one of humankind’s major challenges, which has obtained a considerable amount of public attention over the past decade (Duan, Chen, Zou, & Nover, 2019). The basic purpose of extension work is to infuse agriculture-oriented innovations to the farmer’s land for adaptation (Hedjazi, Rezaee, & Zamani, 2006). In addition, assuming any decisions in regards to the related farmers’ perceptions about pensive conditions are essential, which need to be taken into consideration (Huong, Bo, & Fahad, 2019). Both types of respondent opinions were solicited in this study about the emerging issues and problems with their farming methods. It is evident from the findings, which are shown in Figure 4, that the lack of modern agricultural equipment and machinery, such as tractors, manure spreaders, and multi crop harvesters is a major issue.
There is dearth of basic farm inputs, such as improved quality seeds, proper fertilizer, and pesticides at reasonable prices. It is pertinent to note that Pakistan meets 85 percent of its fertilizer requirements indigenously (Pakistan Economic Survey, 2022), but they are unable to afford the required fertilizer on time due to the economically strapped conditions of the farmers. The intensification of agriculture activities has impoverished the soil to the extent that there is a decline in productivity. According to Kopittke et al. (2019) soil accounts for 98% of the global food supply, and he argues for its inclusion in the water-energy-food nexus in order to broaden it into the water-soil-food-energy nexus. The ignoramus farmers fall prey to foolhardy practices, because they don’t pay attention to the experts especially when it comes to the type of and the timing of fertilizer use. Also, adulteration in the maize seed, which is due to the lack of government monitoring and evaluation, the long distances from the MFSC, low quality fertilizers, and inefficient service delivery were also reported by some of the respondents. One of the most highlighted constraints to agricultural technology adoption is the availability of a sizeable cultivable land in order to achieve larger yields via the attainment of economies of scale (Carletto, Kirk, Winters, & Davis, 2007; Janvry, Dustan, & Sadoulet, 2011; Pingali, Bigot, &Binswanger, 1987). Handling these types of problems with care would definitely turn into a prosperous environment where the farmer can easily achieve their potential yields.

**Figure 4: Distribution of respondents regarding problems in the MFSC**

Anthropogenesis, such as soil erosion, urbanization, rapid industrialization, and
biophysical changes reduce productivity as well as signal anthropogenic thresholds (Ureta & Otaegui, 2021). It is crucial for each successive government to form a consistent agrifriendly policy in order to satisfy the credit requirements of the rural agriculturalists for the growth, stability, and survival of the agricultural sector. Pakistan has the second largest population of Muslims, which necessitates the introduction of the Islamic mode of finance-based schemes in order to satisfy the farmers socioeconomic needs. The agricultural production can be raised via the timely and rapid provision of credit facilities (Habib & Disbursed, 2015). There is also need for distributive justice in terms of social, financial, and material inclusion in regards to farm advisory, because selective patronage will dilute the efficacy of these types of programs (Shostak, 2022). Providing high quality seed is a key in regards to enhancing agricultural productivity. The improved seeds are high yielding as well as resistant to droughts, salinity, pests, and diseases (Ali & Ali, 2004). Several studies mentioned that a large landholding size leads to an increased access to credit (Amjad & Hasnu, 2007; Dzadze, Osei, Aidoo, & Nurah, 2012). Agriculture debt ensures the availability of agriculture tools, which leads to an improvement in agriculture production (Hashmi, Kamran, Bakhsh, & Bashir, 2015). The yield per hectare of food crops is continuously increasing, which is due a higher use of chemical fertilizers and improved water management and farm mechanization. Urea and DAP are the two major fertilizers that are used in Pakistan. Their demand is increasing at an average rate of 6% for Urea and 8% for DAP.

5. Conclusion and Policy Recommendations

This study leads us to conclude that commercial advisory services and solutions are better poised than the ones that are offered by the MFSCs in the target area of the study, which show room for improved efficiency, awareness, monitoring, and evaluation mechanisms. Agriculture is one of the foremost occupations of the respondents with full time involvement. The target area values emphasize the collateral relationships, which are evident from a joint family system that prevails in the region. The majority of the respondents are the owners of their farms, whereas some of them are tenants in the district of Mardan. Canal systems are heavily relied on by most of the farming community for irrigation, which is followed by tube-wells. An encouraging finding was that most of the farmers were already aware of the importance of the agriculture department, which they frequently contacted in order to seek guidance in various farming practices. However, they did not attend any agricultural training or programs for their farm productivity improvement. A classical paradox of the expectations exists, because a comparison of various crops unexpectedly revealed that yields of rice and sugarcane crops from the
independent farmer respondents were significantly higher than the member respondents of the MFSC, which signals inadequacies with the advisory services of the Model Farm Service Center. This study contributes to the literature by using indigenous farmers perceptions as a stepping stone for policy refinement with the overall goal of contributing to global food security via productivity improvements with the farm advisory services. The current study takes into consideration the farmer’s perspective in regards to evaluating the farm advisory services of the MFSCs. We hereby acknowledge that there is a need for further studies with the socioeconomic milieu of the target area that involve multiple stakeholders, such as mixed method studies that involve the MFSC staff, agro-scientists, and the commercial advisory service providers in order to further validate the findings. The following recommendations are suggested in order to improve the farmer’s productivity via strengthening of the farm advisory services, which are based on the overall findings of this study.

- The provision of farm inputs as well as constant communication with the farmers via the MFSC.
- Strengthening of the MFSC in order to arrange the agricultural based programs and training program.
- The provision of agricultural credit for farmers on a recurring basis via Islamic modes of insurance in order to bring the unbanked strata of farmers into the formal economy.
- A remuneration of the MFSC staff for their additional value laden services.
- Strengthening the existing linkages between the agricultural experts and the farming communities.
- Extramural education for ignoramus farmers and awareness programs regarding credit and insurance schemes that are announced on a yearly basis.
- Approved crop calendar usage and crop rotation in order to attain sustainable productivity.

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