Research Article

Perceptions of Small Scale-Farmers with Regard to Agricultural Knowledge and Information System: Case Study of Punjab, Pakistan

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Abstract | This research looks into the perceptions of small-scale farmers with regards to the Agricultural Knowledge and Information System (AKIS) boundaries. The study was conducted in district Sargodha, Pakistan, one of the important district of Punjab province. Face-to-face quantitative data were collected from 300 farmers. The collected data were exposed to SPSS examination, utilizing descriptive insights. Discoveries demonstrated that while farming filled in as a primary income source, farmers often took part in non-ranch exercises for supplemental income. Fluctuated landholding sizes were noticed, and the most sought-after information regions were "Selection of varieties" and "Improved cultivation practices." Strikingly, vocal formats were leaned toward for getting agricultural-related information. Findings distinguished a few constraints in getting to agricultural knowledge, featuring the need to upgrade knowledge providers, fortify linkages among establishments, and give skill-based training. The research underscores the meaning of creating Agricultural Information Resource Focuses with general media resources and emphasizes the significance of training agricultural information providers in taking care of and transferring knowledge successfully. Reinforcing institutional linkages is suggested for consistent knowledge delivery. All in all, the review reveals insight into the multifaceted difficulties faced by small-scale farmers in getting to vital agricultural information and underscores the need of fitted mediations to improve their admittance to significant knowledge.

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Introduction

Around 80% of the world's poor people are used to live in rural areas where farming is the major source of livelihood for majority of the people (World Bank (2017). Boosting agricultural productivity by having better access to agricultural and information mechanism is vital (Sahu and Das, 2015). It is very much important to mention here that 50-80% of food in developing and third world countries is being produced by small scale famers who didn't have much access to agricultural extension or rural advisory services (Pye-Smith *et al.*, 2012). For successful livelihoods, access to information plays a crucial role. There are

three components of the Agricultural Knowledge and Information System. These are research, extension, and education. All these are interlinked with farmers. These are represented in the form of a triangle. These pillars are linked with their common clientele namely the farmers who are represented in the center of the triangle. The objectives of AKIS include poverty reduction, increase in agricultural productivity, food security, and environmental sustainability (Rivera and Qamar, 2005).

Role of agricultural extension in sustainable agricultural and rural development is worth mentioning (Rivera and Qamar, 2003). Historically agricultural extension serves as major source of knowledge, information and advice for farmers through non-formal education. Recently agricultural extension comprehends a wide range of ICTs and learning/educational/training activities organized by Extension Field Staff (EFS). The needs of rural farm producers are continuously changing with the advancements in agricultural sector (Maulu *et al.*, 2021). Throughout the world, agricultural extension and rural advisory services are undergoing a significant transformation due to the ever-growing and changing demands of rural community (Davis *et al.*, 2016). In the global world, agricultural extension or outreach rural advisory services are being provided by the public sector to the rural dwellers (Sikhweni and Hassan, 2013). In many of the developing countries like Pakistan Agricultural Extension is the major motive force for enhancing agricultural productivity (Labarthe and Laurent, 2013). As compared to other neighboring countries agricultural productivity in Pakistan is very low. Small-scale farmers are living in a miserable situation (Saqib *et al.*, 2019). There is dire need of a strong agricultural knowledge and information system with zero gap, zero lag characteristics (a dream that there is minimum gap between emergence of problems of farmers and their solutions developed by researchers; and there is minimum lag between solutions developed by academicians/ researchers and adopted by farmers). Current and potential barriers to information and strategic development of the ICT to overcome these activities it is important to identify (Rahman, 2006).

All the stakeholders of AKIS must have better access to technical knowledge, information and advice (through mechanism of rural advisory services) to integrate food markets and agricultural value chains with small-scale farmers to improve their livelihoods on sustained basis. Agricultural Extension policies and approaches need to be redefined for sustainable agricultural and rural development and livelihood security of the small-scale farmers at household level based on Agricultural Knowledge and Information System. The system should be re-structured to make agricultural extension worthwhile to offer livelihood security to farmers. Agricultural extension needs to involve farmers actively in the process of change. With this background the present research was conducted to evaluate the Agricultural Knowledge and Information System (AKIS) parameters for small scale farmers. This study is critical in understanding the effectiveness and impact of AKIS with reference to adopted agricultural practices.

Materials and Methods

The present study was conducted in Sargodha Pakistan, that is located at hub of central Punjab. Personal face-to-face method was used for the collection of information and data under the present research study. In the present research study non-probability (convenient) sampling procedure was adopted. A number of research studies (Baker *et al.*, 2013 Onwuegbuzie and Collins, 2017; Sarstedt *et al.*, 2018 and many others) reported that convenient sampling is one of the best suitable sampling methods to choose targeted samples population who are inaccessible. Above all convenient sampling method is inexpensive and quick. Due to which the researcher used this method for picking required sample from the population. As the District Sargodha comprises of six tehsils, from each tehsil, fifty (50) farmers were selected through convenient sampling. Total sample size of the study was 300. Structured interview schedule was designed keeping in mind the specific objectives of the study. Reliability of the research instrument (interview schedule) was measured by Cronbach Alpha through SPSS. The value of Cronbach Alpha for all items of the interview schedule was 0.80. The collected data was analyzed using SPSS descriptive statistics (frequency, percentage, mean, SD etc.)

Results and Discussion

The given data in Figure 2 showed that 53.3% of the farmers (160 out of 300) fall in the "Up to 30 Years" age category. The "31-45 Years" age category comprises 29.7% of the farmers (89 out of 300). Lastly, the "46 Years or above" age category farmers 17% of the farmers

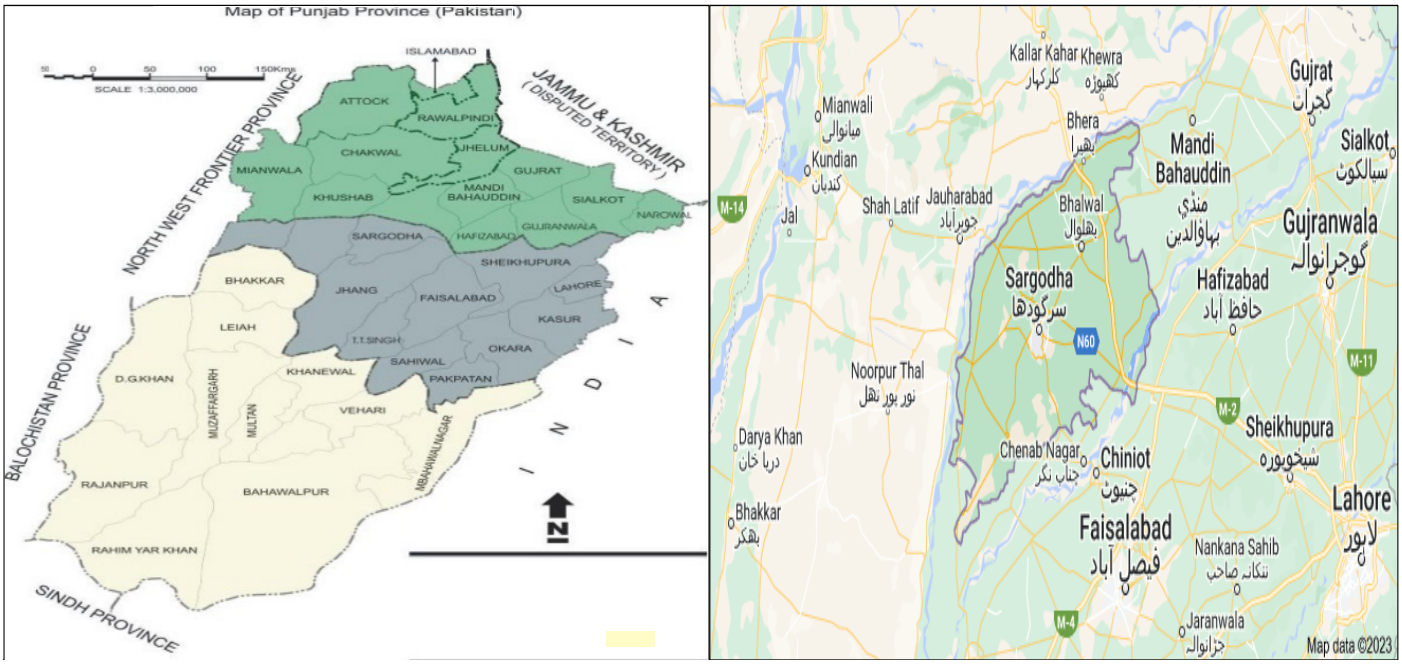

Figure 1: *Map of District Sargodha.*

(51 out of 300). Majority of the farmers (53.3%) are up to 30 years old, followed by 29.7% in the 31-45 years' age range, and 17% who are 46 years or above. This indicates that in their early years of farming, they have access to limited arable land, which put them in the vulnerability situation as small-scale farmer.

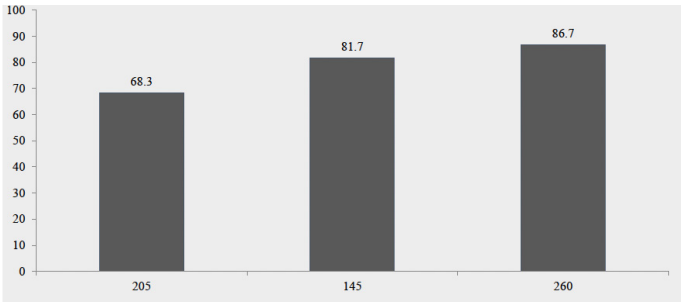

Figure 2: *Frequency distribution of age of the farmers.*

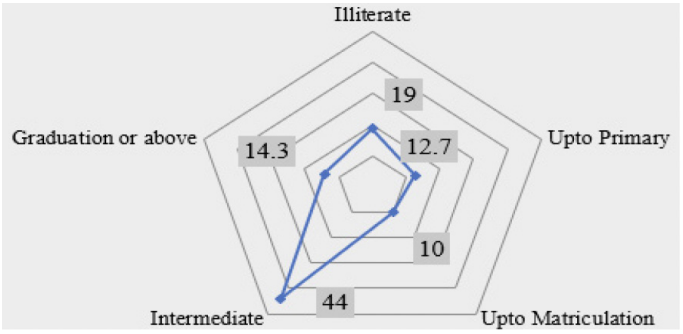

Figure 3: *Frequency distribution of educational level of farmers.*

According to the data in Figure 3, 19% of the farmers (57 out of 300) are categorized as "Illiterate" or had no formal education. "Upto Primary" education level represents 12.7% of the farmers (38 out of 300). "Up-to Matriculation" level comprises 10.0% of the farmers (30 out of 300). "Intermediate" educationlevel is the highest among the farmers, accounting for 44.0% (132 out of 300). Lastly, "Graduation or above" level represents 14.3% of the farmers (43 out of 300). Overall, the majority of the farmers (44.0%) have completed "Intermediate" education level, followed by19.0% who are "Illiterate", 14.3% with "Graduation or above" education, 12.7% with "Up to Primary" education, and 10.0% with "Up to Matriculation" education. Situation explains that farming community of Sargodha do acquire education. Their literacy rate has the potential to be productive in upscaling their living standard by having access and utilization of resources. As Doye *et al.* (2000) concluded that education and utilization of information has positive relationship.

The data placed in Figure 4 presents information on income sources for a group of 300individuals. The frequency and percentage of individuals, who rely solely on farming as their source of income, as well as those who earn income from both farming and non-farming sources are outlined.Out of the 300 individuals surveyed, 230 individuals, or 76.7% of the total, report that their income comes exclusively from farming. This indicates that a significant majority of thegroup relies solely on farming as their source of income. 70 individuals, or 23.3% of the total, report that they earn income from both farming and non-farming sources. This suggests that a smaller portion of the group has diversified their income by engaging in both farming and other income sources.

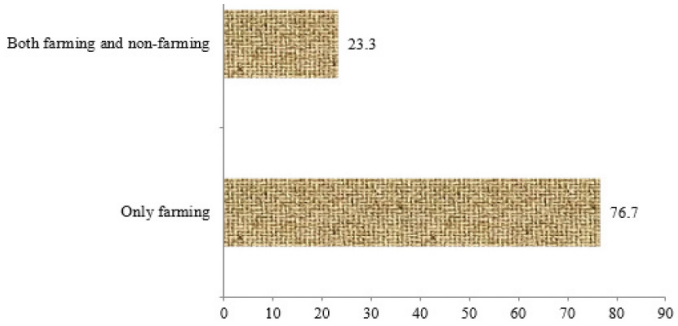

Figure 4: *Percentage of source of income.*

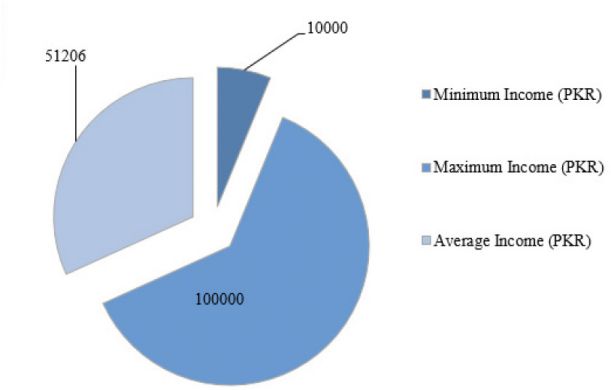

Figure 5: *Per month incoome of farmers.*

While data given in Figure 5 as above shows that minimum monthly income of farmers was Rs. 10000/- and maximum monthly income was Rs. 100000/-. The data also shows that averagemonthly income of farmers was Rs. 51206/-. This indicates that small scale farmers in the study area has the characteristics from being vulnerable to well-off, which they gain by having limited resources and diversified income sources respece*s*.

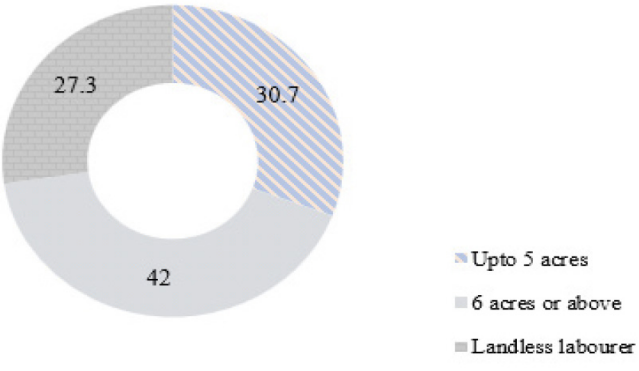

Figure 6: *Percentage of landholding status of farmer.*

The provided data in Figure 6 presents information on the size of landholding in acres for a groupof individuals, indicating the frequency and percentage of individuals falling into differentcategories based on their landholding size. 92 individuals, or 30.7% of the total, report that their landholding size is up to 5 acres. This suggests that a significant portion of the group has relativelysmall landholdings. 42% of the total, said that their landholding size is 6 acres or above. This indicates that a relatively larger portion of the group has landholdings of 6 acres or more. While 27.3% of the total told that they are landless laborers. The surveyed individuals have varied landholding sizes, with a significant portion having landholdings up to 5 acres, relatively larger portion having landholdings of 6 acres or more, and a significant portionbeing landless laborers who do not own any land. Connectivity and ownership of land has impact on reach and accessing the knowledge and information sources.

Minimum (Years)	2 Years
Maximum (Years)	22 Years
Average (Years)	9.9 Years

Figure 7: *Status of small scale farmer's experience.*

The data given in Figure 7 provided presents information on the minimum, maximum, and average number of years for a particular variable, based on the values provided. Here in the data set 2 years represents the smallest value observed in the dataset. While 22 years represents the largest value observed in the dataset. The average value for the farming experience of total farmers is 9.9 years. Average experience around 10 years indicates that their thirst for knowledge and information could have been much favorable. This experience with knowledge and information can play exhaustibly productive for small scale farmers. But Aldosari *et al.* (2019) acclaimed that experience has no significant impact on usage of information specifically obtained from electronic media. The data provided in Table 1 gives information on the percentage of farmers who expressed a need for information in various areas related to agriculture. The data is derived from a survey conducted among

a sample of individuals involved in agriculture, and the frequency and percentage values are based on the responses received. The survey revealed that marketing of agricultural produce (50.3%) and agricultural loans/credit (49.7%) were the two most commonly identified areas where farmers expressed a need for information. This indicates that farmers and agricultural stakeholders are interested in understanding how to effectively market their agricultural produce and secure loans or credit for agricultural activities.

The survey also highlighted the importance of government agricultural related schemes/initiatives, with 68.3% of the farmers expressing a need for information in this area. This suggests that farmers are keen to stay updated on government policies, programs, and initiatives related to agriculture, which could impact their farming practices and profitability. Other areas where farmers expressed a need for information included latest farm machinery/agricultural equipment (81.7%), selection of varieties (86.7%), improved storage methods (81.0%), pesticides/insecticides availability (86.7%), improved cultivation practices (88.7%), insect/pest management practices (87.0%), disease management practices (84.3%), fertilizer/manure management practices (85.0%), poultry management practices (64.7%), livestock management practices (58.3%), orchard management practices (57.3%), wa ter conservation and management practices (84.0%), post-harvest practices/techniques (87.3%), modern irrigation techniques (85.0%), intercropping techniq-

Table 1: *Frequency distribution regarding information needed areas of farmers.*

Information needed areas	Frequency	Percentage
Marketing of agricultural produce	151	50.3
Agricultural loans/credit	149	49.7
Use of GIS/remote sensing in agriculture	93	31
Government agricultural related schemes/initiatives	205	68.3
Latest farm machinery/agricultural equipment	145	81.7
Selection of varieties	260	86.7
Improved storage methods	243	81
Pesticides/insecticides availability	260	86.7
Improved cultivation practices	266	88.7
Insect/pest management practices	261	87
Disease management practices	253	84.3
Fertilizer/manure management practices	255	85
Poultry management practices	194	64.7
Livestock management practices	175	58.3
Orchard management practices	173	57.3
Water conservation and management practices	252	84
Post-harvest practices/techniques	262	87.3
Modern irrigation techniques	255	85
Intercropping techniques	255	85
Soil conservation techniques	243	81
Weather forecast	260	86.7
Biological control of insect/pest and diseases	258	86
Soil and water testing	255	85
Availability of new and viable seeds	261	87
Crop insurance policy	241	80
Agroforestry practices	239	79.7
Household food security techniques	239	79.7
Nursery management practices	252	84
Off season vegetable production practices	241	80.3

ues (85.0%), soil conservation techniques (81.0%), weather forecast (86.7%), biological control of insect/pest and diseases (86.0%), soil and water testing (85.0%), availability of new and viable seeds (87.0%), crop insurance policy (80.0%), agroforestry practices (79.7%), household food security techniques (79.7%), nursery management practices (84.0%), and off-season vegetable production practices (80.3%). Alongside the physical deficits, problems associated with access to knowledge and information sources are considered as major limitations (Mittal *et al*., 2010). Crop production itself has plenty of risks associated with it. It requires relevant and in-time provision of information at every stage of crop production (Boyd and Watts, 2013). In this case small scale farmers felt the need of information related to cultivation practices. Information needs mentioned here related to inputs have been prioritized by the small scale farmers of Sargodha. They felt the need of information about post-harvest techniques and storage of produce to manage marketing of their much-awaited benefit.

The data provided in Table 2 presents the major constraints faced by small-scale farmers in accessing agricultural knowledge and information, as reported by farmers. The data includes the frequency of each constraint and the percentage of farmers who identified it as a constraint. Based on the frequency values, the top five constraints reported by small-scale farmers are: Weak linkages with extension field workers (frequency = 292, percentage = 97.3%) suggests that small- scale farmers face challenges in establishing effective connections with extension field workers who are responsible for disseminating agricultural knowledge and information. Weak mechanism of information flow (frequency = 256, percentage = 85.3%) indicates that small-scale farmers encounter difficulties in accessing information due to ineffective mechanisms or channels through which agricultural knowledge is disseminated. Less educational level (frequency = 289, percentage = 96.3%) highlights that limited education or low literacy levels among small-scale farmers may hinder their ability to access and understand agricultural knowledge and information. Language barrier (frequency = 272, percentage = 90.7%) tells that language differences or lack of information in local languages may pose a challenge for small-scale farmers in understanding and utilizing agricultural knowledge and information. Distance from the market place (frequency = 273, percentage = 91.0%) indicates that geographical distance from the market or agricultural information centers may limit small-scale farmers' access to timely and relevant agricultural knowledge and information. In a study related to barriers Siyao (2012) argued that current, relevant and appropriate information are the role players of stagnant growth of small scale farmers specifically. Other constraints identified in the data include late dissemination of agricultural information by extension field workers, poor financial condition of farmers, inadequate resources for demonstration plots (Autio *et al*., 2021), irregular field visits by extension field workers, limited availability of funds by the state (Barzola *et al*., 2020), lack of training opportunities,

Table 2: *Constraints faced by farmers in accessing agricultural knowledge and information.*

Constraint	Frequency	Percentage
Weak linkages with extension Field worker	292	97.3
Weak mechanism of information flow	256	85.3
Less educational level	289	96.3
Language barrier	272	90.7
Distance from market place	273	91.0
Late dissemination of agricultural information by EFS	277	92.3
Poor financial condition of farmers	278	92.7
Inadequate resources for demonstration plots	267	89.0
Irregular field visits by EFS	282	94.0
Availability of limited funds by the state	272	90.7
Lack of training opportunities	274	91.3
Limited number of workshops/symposia organized for Farmers	273	91.0
Poor feedback mechanism among stakeholders of Agricultural Knowledge and Information System (AKIS)	288	96.0

limited number of workshops/symposia organized for farmers, and poor feedback mechanism among stakeholders of the Agricultural Knowledge and Information System (AKIS). In case of loss or less return from the farming, small scale farmers do not have secondary option to rely on. This is the reason that their dependence on knowledge and information is more in comparison to progressive or commercial farmers. Diminishing the barriers related to access for knowledge and information sources can have positive impact on their growth.

Conclusions and Recommendations

Farming is the primary source of income for the majority of the farmers in the research study. However, a notable proportion of the farmers also engage in non-farming activities alongside farming to supplement their income. Significant proportion of the farmers engage in non-farm income activities, such as formal employment in public and private sectors, running their own businesses, or engaging in labor-intensive activities. The surveyed individuals have varied landholding sizes, with a significant portion having landholdings up to 5 acres, a relatively larger portion having landholdings of 6 acres or more, and a significant portion being landless laborers who do not own any land. Most frequently mentioned information needed areas by the farmers are "Selection of varieties", followed by "Improved cultivation practices". There is some variation in the priority of information needed areas among the farmers, with some areas having higher variability compared to others. It shows various constraints faced by small-scale farmers in accessing agricultural knowledge and information, pointing towards the need for addressing these challenges to improve farmers' access to relevant and timely agricultural information and knowledge. There is a need to increase the number of agricultural information and knowledge providers, provide authentic information especially on social media, strengthen linkages between institutions, and provide skill-based training to agricultural information providers. Agricultural Information Resource Center should be developed with audio visuals to increase the thrust for knowledge and information among end users. Adequate skill-based training should be provided to agricultural information providers about acquiring, handling and transferring of knowledge and information. Linkages between institutions should be strengthened for smooth delivery of knowledge.

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Novelty Statement

AKIS transforms the agriculture sector by amalgamating traditional knowledge and modern technologies to improve decision-making, competence, and sustainability. By promoting prompt information and knowledge exchange and coordination among farmers, policymakers, academic practitioners, and researchers, AKIS certifies innovative solutions to current agricultural challenges.

Author's Contribution

Muhammad Luqman: Conceptualization
Aqsa Ashraf: Formal analysis, investigation, resources
Muhammad Yaseen: Data curation, writing - review & editing
Muhammad Umer Mehmood: Software, writing - original draft

Conflict of Interest
The authors have declared that there is no conflict of interest.

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