
Bridging the Gap: Extension Staff and Farmers in Integrated Crop Management Practices

Kashif Shehzad¹, Ikramul Haq², Raheel Saqib³, Waseem ur Rehman⁴, Karim Ullah⁵

^{1,2,3,4,5} Department of Agricultural Extension Education and Communication

The University of Agriculture Peshawar.

Corresponding author: kashifext88@gmail.com

DOI: <https://doi.org/10.70670/sra.v3i1.530>

Abstract

Effective communication between Extension Field Staff (EFS) and farmers is crucial for the successful adoption of integrated crop management (ICM) practices. This study aims to identify key communication gaps in extension services affecting crop management practices in Khyber Pakhtunkhwa, Pakistan. A multistage sampling technique was used to select four districts of Khyber Pakhtunkhwa representing different agro ecological zones. The study surveyed 378 farmers and 147 Extension Field Staff to assess the effectiveness of current extension communication strategies, barriers to information dissemination and farmers' perceptions of extension services. The findings reveal significant communication gaps that hinder the adoption of ICM practices. Access to finance and infrastructure emerged as the most significant barrier to technology adoption (Mean = 4.52), highlighting the need for improved financial support and rural infrastructure. The findings reveal significant communication gaps that hinder the adoption of ICM practices. Access to finance and infrastructure emerged as the most significant barrier to technology adoption with a mean value of 4.52, highlighting the need for improved financial support and rural infrastructure. Moreover, the results reveal that majority of the EFS were using field demonstration as a communication channel followed by workshops and training ranked 1st and 2nd respectively. Further results indicated that limited reach of information (Mean = 4.3, SD = 0.82) has the highest impact on communication that affect the dissemination of Integrated Crop Management practices. Additionally, the study identifies differences in the priorities of farmers and extension staff. Farmers emphasized the need for more frequent visits (34.3%). In contrast, EFS prioritized additional resources and training (33.3%) these differences highlight the need for better alignment between farmers' expectations and extension service delivery. Effective communication between EFS and farmers is crucial for adopting integrated crop management. Addressing gaps in information dissemination, training and feedback can enhance knowledge transfer, improving productivity and sustainability.

Key Words: Crop Management Practices, Extension Field Staff, Communication Gap, Agro-Ecological Zones, Khyber Pakhtunkhwa

Introduction

Strengthening of agricultural systems has become a global challenge to address the increasing demand of food. Sustainable farming practices, based on the combined use of multiple biophysical feedback loops, are capable of raising crop yield while reducing the environmental impact (Chai et al., 2021). However, the implementation of such integrated management practices has proven to be a significant challenge for many farmers, often due to limited access to resources, knowledge

gaps, and insufficient support from extension services (Khan et al., 2021). Extension services play a crucial role in bridging the gap between research and Farmers. Agricultural extension has traditionally focused on improving crop yields through technological innovations (Dechamma et al., 2020). Yet, the productivity differential between actual and potential yields can also be attributed to management gaps, which extension can address through training and advisory services. Increasingly, extension systems are broadening their scope beyond production-oriented activities to include market-driven approaches and address the diverse needs of both farmers and consumers (Suvedi, 2019). To bridge the gap between extension services and farmer adoption of integrated crop management practices, several key strategies should be considered. Addressing the logistical challenges and staffing shortages that constrain extension delivery is crucial (Niagia et al., 2022). Additionally, extension programs should be designed to meet the specific needs of smallholder farmers, taking into account their resource constraints and preferences. (Amrullah et al., 2023) Providing subsidized inputs, such as fertilizers, can also enhance the impact of extension services on adoption and farm incomes (Ahmed & Anang, 2019). The effective integration of crop management practices requires a collaborative linkage between extension, research and the farming community (Ullah and Khan, 2019). However, the ratio of extension workers to farmers remains a major challenge, with as many as 1000 farmers per extension worker in some regions (Khan et al., 2023). Furthermore, the diversity of agro-ecological conditions across the country adds an additional layer of complexity (FAO, 2020) The gap between extension field staff and farmers poses a major challenge, impeding the efficient transfer and adoption of crop management practices that have the potential to significantly improve the productivity and resilience of the agricultural sector (Dechamma et al., 2020). This research paper aims to explore the factors contributing to this gap and propose strategies to strengthen the collaboration between extension personnel and farmers, thereby promoting the integration of sustainable crop management practices in Khyber Pakhtunkhwa.

Research Methodology

The study assessed to bridge the communication gap between EFS and farmers while disseminating crop management practices across four agro-ecological zones of Khyber Pakhtunkhwa. Using the Sekaran sampling table, 147 EFS and 378 farmers' respondents were selected through proportional allocation technique from Abbottabad, Swabi, Dir Upper, and D.I. Khan. Data were collected via a pre-tested interview schedule and analyzed in SPSS v.20 using descriptive statistics, a chi-square test was used to examine the association between communication gaps and their contributing factors.

Table 1. Primary Channels used by EFS to Communicate Crop Management Practices Farmers Perspective

Communication Method	Frequency	Percentage	Mean	SD	Rank
Field Demonstrations	117	30.95	4.68	0.78	1
Workshops & Training	53	14.02	4.15	0.85	2
Local Community Leaders	43	11.38	4.05	0.89	3
In-Person Training Sessions	39	10.32	3.90	0.92	4
Community Outreach	95	25.13	3.80	0.82	5
Print Media	22	5.82	3.75	0.95	6
Radio/TV	9	2.38	3.50	1.02	7

Calculated by Author

Effective communication is essential in agricultural extension to ensure knowledge transfer and

the adoption of improved farming practices. Various studies emphasize the significance of participatory and interactive approaches in extension education (Rivera et al., 2019). The above table highlights the effectiveness of various communication methods in extension services. Field Demonstrations ranked highest (Mean = 4.68), emphasizing the importance of hands-on learning for agricultural adoption. Workshops & Training (4.15) and Local Community Leaders (4.05) followed, indicating the value of structured training and peer influence. Despite high participation (95 respondents, 25.13%), Community Outreach (3.80) ranked lower, suggesting variability in effectiveness. Mass media methods (Print = 3.75, Radio/TV = 3.50) were least effective, likely due to lower engagement. These findings suggest that interactive, field-based, and community-driven approaches are most effective for agricultural extension, while mass media should serve as a supplementary tool.

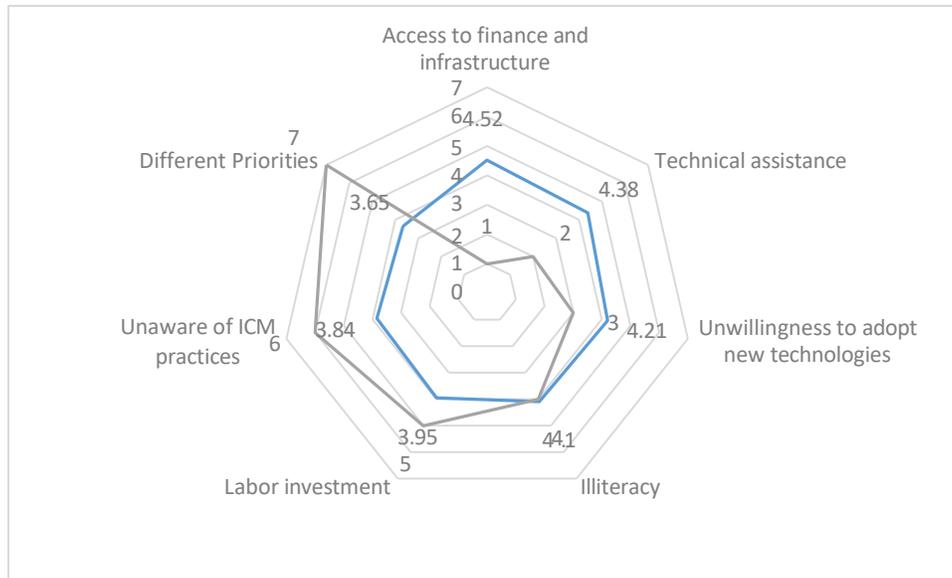


Figure 1. Barriers to Effective Dissemination of Knowledge Regarding Integrated Crop Management Practices

The above graph highlights key barriers to agricultural technology adoption, with access to finance and infrastructure (Mean = 4.52) emerging as the most significant challenge. This finding aligns with studies by Dercon and Christiaensen (2011), which emphasize that financial constraints and poor infrastructure limit farmers' ability to invest in and adopt modern technologies. Lack of technical assistance (Mean = 4.38) also ranks high, indicating the need for effective extension services and farmer training. Previous research by Ragasa et al. (2016) underscores that well-functioning agricultural extension systems are crucial for increasing adoption rates. Furthermore, unwillingness to adopt new technologies (Mean = 4.21) suggests that traditional practices and scepticism about modern techniques hinder progress. Abdulai and Huffman (2014) noted that farmers' risk aversion and uncertainty about profitability contribute to slow adoption. Similarly, illiteracy (Mean = 4.10) poses a challenge, restricting farmers' ability to understand and apply modern practices. Studies by Mwangi and Kariuki (2015) indicate that education significantly influences technology adoption, as literate farmers are more likely to embrace innovation. Additionally, labour investment (Mean = 3.95) acts as a barrier, as modern technologies are often perceived as labour-intensive. Lack of awareness about Integrated Crop Management (ICM) practices (Mean = 3.84) further limits adoption. Different priorities (Mean = 3.65) ranked the lowest, indicating that while farmers may focus on immediate economic needs, financial and technical barriers are more pressing concerns. This supports the findings of Morris et al. (2001),

who emphasized that farmers in resource-constrained environments often prioritize short-term survival over long-term investments.

Table 2. Impact of Communication Gap on the adoption rate of crop management practices

Communication Gap Factor	Mean	Standard Deviation	Rank
Limited Reach of Information	4.3	0.82	1
Misunderstanding of Information	4.2	0.85	2
Inaccessibility of Information	4.0	0.88	3
Inadequate Feedback Mechanisms	3.9	0.90	4
Lack of Trust	3.8	0.92	5
Delays in Information Dissemination	3.6	0.95	6
Increased Resistance to Change	3.5	0.97	7
Ineffective Training and Education	3.4	1.00	8

Calculated by Author

The analysis of communication gap factors affecting the adoption rate of crop management practices reveal that limited reach of information has the highest impact (Mean = 4.3, SD = 0.82), indicating that many farmers struggle to access relevant agricultural knowledge. This finding aligns with Carlisle (2016) review, which highlights that limited exposure to information significantly hampers the adoption of soil health practices among farmers. "Misunderstanding of information" (Mean = 4.2, SD = 0.85) is another major issue, suggesting that even when information is available, its clarity is a challenge. Roesch-McNally et al. (2017) found that farmers often face difficulties in comprehending complex agricultural recommendations, leading to misapplication or non-adoption of beneficial practices. Inaccessibility of information (mean = 4.0, Sd = 0.88) further emphasizes the barriers posed by inadequate dissemination channels. Khalsa et al. (2022) discuss how the lack of accessible information sources contributes to low adoption rates of conservation practices among fruit and nut growers in California's San Joaquin Valley. Factors such as inadequate feedback mechanisms (mean = 3.9, Sd = 0.90) and lack of trust (mean = 3.8, Sd = 0.92) also play significant roles. The absence of trust in information sources and insufficient platforms for farmers to seek clarifications can deter the adoption of new practices. Lower-ranked factors like increased resistance to change (mean = 3.5, Sd = 0.97) and ineffective training and education (mean = 3.4, Sd = 1.00) suggest that while resistance and training deficiencies are present, they may be less critical compared to information accessibility and clarity.

Table 3 Suggestion to overcome the Communication Gap between Farmers and EFS

Farmers' Top Priorities	F	%	Extension Staff's top Priorities	F	%
More frequent Visits	129	34.3	More resources and training	49	33.3
Demonstrations	97	25.6	Improved communication skills	48	32.6
Feedback	85	22.4	Collaboration with other organizations	31	21.2
Greater access to Extension Staff	67	17.7	Regular meetings with farmers	19	12.9

Table 3 highlights a significant gap in how farmers and extension field staff (EFS) perceive communication challenges and their solutions. Farmers prioritize direct engagement methods, with more frequent visits (34.3%) being their top preference, followed by demonstrations (25.6%), feedback (22.4%) and greater access to extension staff (17.7%). This indicates that farmers feel disconnected from extension services and require more hands-on support and regular interaction. In contrast, EFS focus more on institutional challenges, with more resources and training (33.3%) and improved communication skills (32.6%) as their top concerns. They also consider collaboration with other organizations (21.2%) important, while regular meetings with farmers (12.9%) rank lowest, suggesting they do not see direct engagement as a primary solution. This misalignment shows that while farmers demand better field presence and practical demonstrations, EFS believe they lack the training and resources needed to provide effective support. Addressing this gap requires a balanced approach, where extension services focus on both increasing engagements with farmers and improving staff capacity through training and resource allocation.

Table 4 Association between Communication Gap and Factors Responsible for Communication Gap

Factors	Communication Gap		χ^2	P -Value
	Yes	No		
Limited Reach of Information	291	87	10.532	0.001***
Increased Resistance to Change	329	49	3.214	0.073 ^{NS}
Misunderstanding of Information	303	75	5.632	0.018**
Lack of Trust	335	43	2.901	0.088 ^{NS}
Delays in Information Dissemination	334	44	6.432	0.011**
Inaccessibility of Information	302	76	1.874	0.171 ^{NS}
Inadequate Feedback Mechanisms	299	79	8.521	0.004***
Ineffective Training and Education	277	101	4.109	0.043*

Source: Author's Calculation

Note: ***, ** means significant at 5 and 1 percent level of probability whereas NS means non- significant

The findings in Table 4 highlight key factors contributing to the communication gap between farmers and extension field staff (EFS). The limited reach of information ($p = 0.001$), misunderstanding of information ($p = 0.018$), delays in information dissemination ($p = 0.011$), inadequate feedback mechanisms ($p = 0.004$), and ineffective training and education ($p = 0.043$) were found to have significant associations with communication gaps, indicating that these factors hinder effective knowledge transfer. The limited reach of information and delays in dissemination suggest that farmers often receive agricultural guidance either too late or not at all, reducing their ability to implement improved practices. Additionally, misinterpretation of information highlights the need for clear, localized messaging, while inadequate feedback mechanisms indicate a lack of structured two-way communication. The significance of ineffective training and education suggests that extension workers may lack the necessary skills to effectively convey technical knowledge. In contrast, factors such as increased resistance to change ($p = 0.073$, NS), lack of trust ($p = 0.088$, NS), and inaccessibility of information ($p = 0.171$, NS) were not statistically significant, indicating that these issues may not be the primary contributors to communication gaps. These findings underscore the need for improving information dissemination strategies, enhancing feedback systems and strengthening extension staff training programs to bridge the farmer-extension communication divide.

Conclusions and Recommendations

The adoption of Integrated Crop Management practices in Khyber Pakhtunkhwa is hindered by multiple barriers that affect the relationship between extension staff and farmers. By enhancing training, improving communication strategies, and fostering community trust, stakeholders can create a more collaborative environment that supports sustainable agricultural development.

Expanding communication channels through community-based sessions, mobile technology, and digital platforms can enhance extension outreach, while simplified materials and visual aids improve message clarity. Strengthening feedback mechanisms, such as helplines and interactive training, ensure two-way communication and timely dissemination of information at crucial farming stages enhances relevance. Capacity-building programs for EFS should focus on effective communication and updated agricultural knowledge. Future researchers should adopt a multi-dimensional approach, examining both farmer-side (literacy, preferences, accessibility) and extension-side (training, workload, funding) factors to develop sustainable and context-specific solutions for improving agricultural communication.

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