From Awareness to Action: Influence of Agricultural FM Radio Broadcasts on Innovation Adoption among Farmers

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Abstract

The study examines how radio serves as a main medium for diffusing agricultural innovations among farmers of the selected two districts. The research focused on the role of radio programs in influencing farmers' awareness, knowledge, and their adoption of modern farming techniques. A quantitative survey was conducted among 260 farmers. One hundred thirty from each of the Mansehra and Multan districts were selected randomly through a triangulation approach that combined stratified and purposive sampling research techniques. The findings further revealed that selected farmers who regularly listened to agricultural radio programs were more likely to adopt innovative farming methods compared to those who did not listen to FM agriculture-based programs. However, the study found that FM radio programs effectively promote the adoption of innovation. Listeners do not consistently seek further confirmation and validation before implementing new research techniques. The results further indicate that radio plays a significant and vital role in shaping and reshaping farmers' attitudes and decision-making regarding the adoption of new agricultural practices in both districts.

Keywords: *Radio, Agricultural, Communication, Diffusion, Innovation, Farmers.*

Introduction

Radio devices that relied on wireless transmissions characterised the early days of wireless technology. Additionally, many people contributed to radio rumours and designs since wireless records are problematic (Rappaport et al., 2002). "Telegraphy" was the precursor of wireless advancement. Indoctrination and content issues are increasingly included in the radio schedule. Wayne demonstrated how electromagnetic growth might persist in open space. In a laboratory environment, Heinrich Rudolf Hertz and several others saw the wireless trend taking off. Wireless technology has been able to spread its message far into rural villages because of the availability of inexpensive, battery- or electricity-operated devices. Radio is an excellent medium for spreading information, awareness, encouraging good attitude adjustments, and assisting listeners in learning new topics. To improve their knowledge and skills, illiterate ranchers can access a variety of information on agricultural and related topics. The ability to listen to the radio programs is essential, rather engaging in other activities is another benefit of wireless (Potter & Kind-Kovacs, 2022).

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Additionally, unlike Marconi and other experimenters who later used less receptive coherers, Tesla employed responsive electromagnetic receivers (Seifer, 2016). To locate the remaining items, he soon began expanding the command equipment that was wirelessly isolated. Marconi put together a wireless system in 1895 that could transmit messages over a distance of 1.5 miles (2.4 km). In addition to being a significant source of pleasure, the mass media have become the primary channel through which people believe they can keep up with world events. The influence of media in our lives is expanding as people's responsibilities and stress levels increase, making it increasingly complex to envision a future without it. Engagement through movie theatres, plays, sporting events, and songs shown on TVs and listened to online is a concern for millions of people globally. With their abundance of media alternatives, electronic gadgets like smartphones, tablet computers, and iPods have evolved from being a luxury to a necessity (Anwar et al., 2004). The media is dynamically fulfilling its duties, ranging from entertainment to data provision. By providing information to the public, newspapers are essential for both educating and promoting agreement on particular topics (Brenner, 2009). The phenomenon known as "Marconi's law" is derived from Marconi's tests and states that the strength of transmission is proportionate to the square of aerial size. Radio equipment uses this concept, which is a physical law (Launiainen, 2018).

Today, the public must be informed about what could happen in other areas of the world. Since countries' finances are reliant on one another, events that take place thousands of miles abroad could have an effect at home. In order to quickly distribute this information, the media is essential (Khuhro et al., 2019). You may catch a peek at the electrical equipment and newspapers in use to be informed, but it is not limited to current events. Furthermore, by guaranteeing an unhindered flow of data to the people of Pakistan, it guarantees the maintenance of a certain level of openness and accountability. Pakistan Electronic Media Regulatory Authority has been involved in media censorship on a variety of occasions, which is to blame for allowing the public unfettered access to information.

Wireless is most commonly employed as a data transmission medium in electrical devices, such as audio equipment used to broadcast programs to the public (Hong, 1994). Three radio stations existed when Pakistan was established on August 14, 1947. Lahore, Dhaka, and Peshawar were the locations of these radio stations (Sheikh et al., 2023). The additional radio stations were later set up. It is part of the 2012 PEMRA regulation to improve personal media management. To guarantee that the administration's decisions remained fair and unbiased, the data agency was first subordinated to the cabinet division. By expanding the reach of TV networks among the populace, the government has instructed the PEMRA to enhance access to information, education, and entertainment in the country. With its cosmopolitan attitude, this intermediary is ideal for reaching millions of individuals who live in rural regions and are widely scattered (Salman, 2023).

Radio as Medium of Agricultural Information

The topic of believability has been the focus of several researchers in farming communication. In light of this, research was carried out to determine the level of exposure, the usefulness of the information, and the farmers' perception of the radio's legitimacy. In order to update their knowledge and skills, illiterate ranchers can obtain a variety of information on agricultural and related topics (Talib et al., 2025). The radio's ability to let listeners enjoy shows while doing other things is another benefit. All India Radio has been essential in helping farmers accept new agricultural technology and related topics. Because of an electrical device that broadcasts programs to its audience using audio material, this intermediary is ideal for reaching millions of individuals who live in rural regions and are widely scattered. Wireless technology has been able to spread its message far into rural villages because of the availability of inexpensive, battery- or electricity-operated devices (Jurriëns, 2021).

Radio is an excellent medium for spreading awareness, encouraging good attitude adjustments, and assisting listeners in learning new topics. They arrived at an integrity hierarchy after evaluating the integrity patterns of several mass publications. There is a need for empirical research evaluating the credibility span that each media outlet adheres to by ranchers (Melander, 2018). To achieve this, it is necessary to identify the key components of source credibility that ranchers consider when assessing the reliability of mainstream media. In today's ever-changing agricultural world, ranchers are now the focus of several data-driven projects. One of the most important aspects of communication strategy is data integrity. If recipients believe the sources are reliable and capable, the method's efficacy will increase proportionally (Bloom, 2016).

Significance of the Study

Large distances separate the researcher from the country grower, creating an even wider divide between the two parties in rural locations (Long, 2003). It is considerably more difficult for the research material to reach the suggested assembly because of additional barriers like dialect and heritage variation. It is recommended as subset of research connections and is carried out both formally and informally by agricultural elongation. It includes agricultural technologies, seeds, fertilisers, and pesticides. Non-urban radio is two-way approach that necessitates separating press and detail resources for use by the categories and integrating viewpoints from many sources. It provides group members with access to information, education, and entertainment, while also offering the group the opportunity to be highlighted in the media as producers, artists, and organisers. Instead of being for the group itself, it serves as way to identify the group (Hoggart, 1990). In contrast to built-up radio, it is particularly designed to meet the information demands and preferences of each individual. About 70% of Pakistan's population lives in rural regions, with the remaining 30% residing in cities. Rural regions are home to the majority of farming groups.

A clear correlation exists between radio and agriculture in rural areas. This results from agriculture being the primary source of income for the majority of people living in

rural regions (Hasan & Raza, 2009). One area of research and study that examines the relationship between data related to farming and earlier studies is agricultural programs (Mushtaq et al., 2011). There is a disconnect between ranch users and agricultural and scientific researchers. Farmers do not use many of the findings from research groups and labs. Farmers do not employ research data on improved seed types, better agronomic practices, post-harvest management, and marketing because either they did not obtain the data or it is unclear whether the data was completed.

Statement of the Problem

Many farmers, especially in rural regions like Mansehra and Multan districts, continue to use old agricultural methods despite numerous government and commercial initiatives. This is because they are unaware of and do not grasp modern agricultural practices. Agriculture continues to be the mainstay of Pakistan's economy, making a substantial contribution to rural development, employment, and food security. Nonetheless, low productivity, restricted access to contemporary technology, and insufficient distribution of current farming information remain issues facing the agricultural industry. It aims to ascertain the extent to which radio can stimulate the conversion of conventional agricultural methods into more effective and efficient systems. Additionally, it examines whether farmers who tune in to such programs are more inclined to embrace new farming techniques than those who do not. Throughout history, radio has been an essential tool for agricultural communication because it is an affordable and easily accessible way to reach farmers across various geographic and literacy barriers. Radio shows with an agricultural focus might spread knowledge about sustainable practices, crop management, pest control, and better farming methods. Nevertheless, little is known about how many of these initiatives affect farmers' uptake of innovations in Pakistan. By examining the impact of agricultural radio programs on farmers' adoption of contemporary farm innovations in the districts of Mansehra and Multan, this study fills the knowledge vacuum.

Research Objectives

This study's main goal was to evaluate, using advances in modern knowledge, the effects of radio as an information source and its technological characteristics on the adoption patterns of rural farmers in Mansehra and Multan. The study's specific goals were as follows:

1. To examine the relationship between sources of agricultural information and the adoption of innovations among farmers.
2. To assess the relationship between the characteristics of technological innovations and their adoption in agricultural practices.
3. To analyse the association between farmers' socio-economic characteristics and their adoption behaviour toward farming innovations.

Review of the Literature

Regarding particular issue, literature review is a body of writing that attempts to re-examine the important aspects of current knowledge, including substantive discoveries as well as theoretical and methodological ideas. Reviews of publications do not disclose any fresh or untested studies since they are minor causes. This study's main goal was to examine the relationship between sources of agricultural information and the adoption of innovations among farmers and to assess the relationship between the characteristics of technological innovations and their adoption in agricultural practices (Basit, et al., 2025). The results of relevant studies carried out in various nations are reviewed in the section that follows. Rahim (1991) concluded that the adoption of sophisticated farming methods was strongly correlated with data reasons. While some data sources successfully provide most of the information on new methods, others are likely to have a significant impact in introducing them to ranchers. Moreover, the revision of a publication may be seen as a reconsideration of an abstract achievement. It was decided that radio, extension agents, model farms, demonstrations, other ranches, and friends, family, and neighbours were the primary means of communication available to the farmers (Nagar, 2023).

The most efficient way to distribute data and communicate information on shifts in respondents' beliefs, emotions, and attitudes was through wireless (Mabuku, 2015). Just 18% of farmers used radio to learn about the most fantastic kind of wheat. Rapid broadcasting to a huge gathering is a benefit of radio communication. The majority of respondents viewed the "Zari Programs" and the content they included favourably. Therefore, the most affordable and accessible mass communication medium for enforcing behavioural changes was radio. The attitudes of the chairs and the basic democratic members of the amalgamation councils regarding the farming extension initiative (Akmal, 2021; Hussain et al., 2021). Radio and television are beneficial in providing people in far-separated areas with relevant information, including agricultural statistics and educational programs. These facilities enable individuals or small groups to reach a large audience and exert greater influence in educating farmers about new methods. The participants obtained farming information via the wireless broadcasts (Amjad, 2025).

The research looks at how farmers in Pakistan's Khyber Pakhtunkhwa province use and embrace agricultural advances. The respondents' low incomes and limited assets, along with the lack of applications and ignorance, were the main contributing factors (19.33 %) of farmers received wireless assistance for applying enhanced diversity in different plants (Maqsood, 2015). Additionally, the respondents got their information about plant defence from television and wireless media. Distant rural agrarian organisations could use country radio to better disseminate agricultural data (Chapman et al. 2003). Farming extension initiatives can benefit from participatory communication strategies, especially when using rural Wi-Fi and regional languages to speak with listeners' assemblies and ranchers directly. Ranchers who listen to farming extension radio programs like a format that blends local actors performing drama with related topic talks. The level of education is much worse in many developing nations, especially in rural areas. Alternative forms of mass media significantly influence the mass connection.

The rapid spread of contemporary farming knowledge has the potential to alter their lives drastically. A key note-taking mechanism that is essential to farming progress is farming extension. It helps farmers improve their output and trading by providing them with guidance and assistance (Nyoike, 2015).

Given the combination of data and learning in the form, targeted assembly research may assist in determining listener preferences, broadcast scheduling, and program content. The dissemination of systematic, mechanical, and mechanical knowledge to individuals is greatly aided by the radio medium (Ayirebasia, 2008). Newspapers and other electronic gadgets play a crucial role in exposing ranchers to a specific kind of information. These were considered the best print newspaper formats for implementing sugarcane production technology. It has been confirmed that ranch publications are an effective way to spread information, especially when introducing new technology. For literate ranchers, ranch periodicals are often a valuable source of knowledge. One tool for spreading pertinent information is a radio. Different techniques and media for elongation, such as mass contact, assembly, and one-on-one, are used to conduct elongation education. The transmission of technology is anticipated to be significantly aided by mass communication, which includes print and electronic media.

Theoretical Framework

The dissemination of the concept of innovation encompasses a wide range of resources from various professions. The dissemination of novel ideas involves four main components: the discovery, the interaction paragraphs, the time, and a public plan (Dearing, 2008). This process is primarily dependent on human resources. The radio spreads swiftly in Pakistan's rural areas because it is affordable and widely accessible. In order to self-sustain, the advancement must typically be adopted (García-Avilés, 2020; Javed et al., 2020). The advancement becomes noteworthy at a particular stage in the adoption process. Adopters' sessions are divided into four categories: creators, laggards, delayed adopters, and starting adopters. According to the spread of an idea's growth, social associates and the media both supply information and shape attitudes (Warner, 1974). In farming communities, it is now one of the most common household items. Understanding how, why, and the speed at which new concepts and abilities spread across cultures is facilitated by the Diffusion of Innovations concept.

In his 1962 book The Diffusion of Innovations, sociologist Everett Rogers popularised the concept. Diffusion, according to him, is the process by which a discovery eventually spreads through the components of a public plan via specific routes. The energy and effort required for a specific number of elements in a public system to progress are typically used to compute rates. The rates of innovation uptake are shown by your top-level categorisation (Johnson & Brown, 1986). Although opinion management focuses on using viewers' personal relationships to influence their behaviour, the dissemination process also incorporates other intermediaries like gatekeepers and change groups (Dearing, 2009).

The factors influencing farmers in the districts of Mansehra and Multan to embrace agricultural innovations are referred to as independent variables in this study. Exposure to agricultural-based radio programs, which encompasses the frequency and length of listening, the relevance of the program content, and the perceived reliability of the radio source, is the primary independent variable. Adoption processes are often shorter for people who adopt innovations initially than for those who adopt them later (Siguaw et al., 2006). Roger outlines several strategies to aid in reaching a critical point, illustrating how development reaches this stage. Implementing an innovation by a well-known person in an online community (Green et al., 2009). This study's main goal was to examine the relationship between sources of agricultural information and the adoption of innovations among farmers and to assess the relationship between the characteristics of technological innovations and their adoption in agricultural practices. Farmers' adoption of agricultural advances is the study's dependent variable. This variable shows how much farmers use new agricultural technology, methods, and procedures that were broadcast on the radio. It involves implementing better crop types, cutting-edge irrigation systems, contemporary agricultural tools, and pest control techniques. Access to agricultural information via radio, which includes radio signal availability, accessibility. Furthermore, farmers' socioeconomic attributes, such as age, education, income, farm size, and farming experience, are regarded as independent variables.

Study's Hypotheses

A particular relationship between variables can be two or more; a prediction about something is called a hypothesis. In the analysis of the general plan, the hypotheses, in a broad sense, aim to decide:

H_1: There is a significant relationship between sources of agricultural information and the adoption of farm innovations among farmers of Mansehra and Multan.

H_2: The characteristics of technological innovations significantly influence their adoption in agricultural practices.

H_3: Farmers' socio-economic characteristics are significantly associated with their adoption behaviour toward farming innovations.

Research Methodology

To gather information from farmers in Mansehra and Multan, a requirement survey research study has been carried out. The study's methodology describes the research design, sampling processes, data collection methods, and analytical methodologies used to examine the impact of agricultural-based radio programs on farmers' adoption of innovations in Pakistan's Mansehra and Multan districts (Gill et al., 2024). The methodological approach is based on the diffusion of innovation theory, which provides a conceptual framework for understanding how mass media communication influences farmers' adoption behaviour and decision-making processes. A methodical technique or procedure that follows a logical flow or approach within a study framework is referred to as methodology. Conversely, a research strategy describes

how the study's nature and research methodology are related. The study employs quantitative research methodology to establish quantifiable links between farmers' adoption of new farming advances and their exposure to agricultural radio programs. To ensure accuracy and dependability in analysing behavioural patterns and identifying causal linkages, the research methodically collects data from selected respondents using a standardised questionnaire (Saeed et al., 2025).

This study was carried out to look at how radio agricultural programs affected farmers' adoption of innovations in Mansehra and Multan. According to Neuman (2014), qualitative social research is a technique that involves asking several people the same questions in a methodical manner, then documenting and analysing their responses. According to Choy (2014), a survey is the act of looking at something from all angles (Aziz et al., 2024). The survey approach was judged a suitable for examining the impact of radio agricultural programs on farmers' adoption of innovations in Mansehra and Multan, given the nature of study. Selecting the group of individuals for the study is a crucial step in the research method. Choosing the study's staff or unit of analysis is the first step in the research process. To build a strong foundation for the findings and research methodology, every researcher aspires to learn from the entire population. Researchers are involved in the sampling process since reality is quite complex for those who wish to undertake a study. A selection of the entire population with similar individuality to the entire population is called a sample. Two hundred sixty farmers from the districts of Mansehra and Multan will serve as the study's unit of analysis. The farmers in the districts of Mansehra and Multan will make up the study's universe.

Results and Analysis: In Mansehra and Multan, radio agricultural programs are widely listened to because of their accessibility and cost. Tables and graphs are used to display the descriptive analysis in percentages. The researcher discovered that most farmers rely on radio agriculture programs to obtain information, which helps them respond to some of the research questions posed earlier in the study. Many people in the areas of Mansehra and Multan are gaining knowledge about agricultural innovation, largely thanks to radio agriculture programming. The study's findings examine how people listen to agricultural radio programming and how it affects farming methods. Additionally, it was noted that listeners tune into agricultural radio programs with differing levels of interest. To ascertain their impact on the listeners of radio-based agricultural programs, the study's descriptive analysis focuses on the demographics of the respondents, such as age, location, and education.

Table 1: *Frequency of Listening to the Radio*

Frequency of Listening to the Radio		
Category	**Frequency (f)**	**Percentage (%)**
Very Much	90	34.62
Much	74	28.46
Somewhat	50	19.23
Rarely	22	8.46
Not at all	24	9.23

Total	**260**	**100**

***No. of responses (n=200)*

The results also show that (34.62 %) of respondents would rather listen to agricultural programs very much. Respondents' answers about listening generally show a similar pattern: (28.47 %) say they listen to radio agricultural programs to some extent, whereas (19.23 %) say they somewhat listen to the agricultural-based radio programmes. According to the listener's analysis, (8.46 %) of listeners listen to radio programmes rarely, although (9.23 %) farmers never listen to the radio for any reason.

Table 2: *Time Spent on Agricultural Programs*

Listening to Radio Programs		
Category	**Frequency (f)**	**Percentage (%)**
1 to 3 hours	106	40.77
4 to 6 hours	84	32.31
7 to 10 hours	57	21.92
10 hours or more	13	5.00
Total	**260**	**100.00**

**No. of responses (n=200)

The above table 2 findings indicate that (21.92 %) of respondents say they listen to the radio for seven to ten hours per day. This table also indicates that some farmers (5 %) listen to the radio for more than ten hours per day. A substantial majority of respondents (40.77 %) listen to radio agricultural programs for 1 to 3 hours or during a day, followed by (32.31 %) who listen for 4 to 6 hours a day, according to an analytical review of the time spent on radio agricultural programs by all respondents.

Table 3: *Frequencies of Listening to Radio Programs*

Response Category	**%age**	**Age**		**Education**			**Location**	
Agricultural Programs	**Overall**	**Up to 40 Yrs**	**More than 40**	**Matric**	**Under Graduate**	**Graduate**	**Mansehra**	**Multan**
Very Frequently	42	22	20	15	7	6	22	20
Frequently	19	11	8	6	9	5	15	4
Rarely	17	9	8	7	11	8	10	7
Somewhat	13	6	7	0	2	5	8	5
Not at all	9	2	7	8	7	4	4	5
Total	**100**	**50**	**50**	**36**	**36**	**28**	**59**	**41**
News	**overall**	**Up to 40 Yrs**	**More than 40**	**Matric**	**Under Graduate**	**Graduate**	**Mansehra**	**Multan**
Very Frequently	31	16	15	9	10	12	15	16
Frequently	38	16	22	16	14	8	22	16

Rarely	12	9	3	4	6	2	4	8
Somewhat	9	6	3	7	0	2	2	7
Not at all	10	3	7	5	1	4	4	6
Total	**100**	**50**	**50**	**41**	**31**	**28**	**47**	**53**

**No. of responses (n=200)

Table 3 presents the frequency of listening to different categories of radio programs by the selected population of Mansehra and Mardan. Selected categories are Agricultural, News, Sports, and Entertainment. In this research study, the demographics are analysed across age, education, and location variables. Table 3 also provides an overview of audience listening patterns in percentage terms. This table also reflects how demographic and educational characteristics influence the consumption pattern of radio among respondents of Mansehra and Multan. In the education category, Matric and undergraduate listeners make up the highest proportion of regular listeners of agricultural programmes. Respondents from Mansehra (22%) listen more regularly than those from Multan (20%), which reflects that there is a greater agricultural dependence on radio agricultural programmes among listeners of Mansehra. The Agricultural programs section shows that the majority of listeners (42 %) tune to radio programs *very frequently*, which indicates strong engagement with agricultural content. In this research study, the response rate is very high, especially among younger respondents (22%) compared to those over 40 years (20%). Results further reveal that, smaller portion of respondents listen "rarely" (17 %) or somewhat (13 %), while only (9%) report not at all, showing generally high interest in agricultural programming.

The second category was news and general knowledge about agricultural news. For news programs, the listening frequency of news is notably high, with (38%) of respondents reporting frequently and (31%) very frequently from both Mansehra and Multan. This shows that there is a balanced listenership between both areas. It emphasizes that news content appeals broadly regardless of region. In term of Education, graduate-level listeners (17 %) exhibit the highest rare response, which indicates less interest compared to matric and undergraduate listeners. According to region-wise, Mansehra (15 %) shows higher regular listenership compared to Multan (7 %), but both regions maintain steady participation across frequency levels. Furthermore, it indicates that news remains one of the most followed categories across both demographics. Moreover, respondents aged more than 40 years (15 %) slightly surpass younger ones (16 %) in frequent listening, which reflects that the older population has a stronger inclination toward current affairs and news. In terms of Education, matric and undergraduate groups show nearly equal engagement. While graduates (12 %) demonstrate consistent interest among radio listeners.

Table 4: *Frequencies of Listening to Radio Programs*

Sports	**overall**	**Up to 40 Years**	**More than 40**	**Matric**	**Under - Grad**	**Graduate**	**Mansehra**	**Multan**
Very Frequently	22	7	15	8	6	8	15	7
Frequently	33	22	11	7	13	13	15	18
Rarely	29	11	18	7	5	17	14	15
Somewhat	10	6	4	6	2	2	4	6
Not at all	6	4	2	4	1	1	1	5
Total	**100**	**50**	**50**	**32**	**27**	**41**	**49**	**51**
Entertainment	**overall**	**Up to 40 Years**	**More than 40**	**Matric**	**Under Graduate**	**Graduate**	**Mansehra**	**Multan**
Very Frequently	41	20	21	14	12	15	31	10
Frequently	9	6	3	6	2	1	4	5
Rarely	11	7	4	7	2	2	5	6
Somewhat	20	10	10	13	4	3	10	10
Not at all	19	7	12	10	2	7	14	5
Total	**100**	**50**	**50**	**50**	**22**	**28**	**64**	**36**

**No. of responses (n=200)

Table 4 reveals the listening habits of two response categories. The Sports Programs section illustrates moderate engagement between listeners. With (33 %) listening "frequently" and (22 %) responding as very frequently. Younger respondents (7%) listen less very frequently as compared to those who are older than 40 years of age (15 %). This indicates the possibility of older individuals' a stronger cultural affinity for radio-based sports commentary. For entertainment programs, (41%) of respondents listen very frequently. This shows strong engagement with leisure-oriented content. In terms of region, respondents from Mansehra (31 %) exhibit a very significantly higher frequency of listening than Multan (10 %), perhaps due to limited alternative media entertainment options in more rural areas. About (19%) report not at all, suggesting a smaller audience segment uninterested in entertainment content. This pattern is higher among younger listeners (20 %) than older ones (21 %). This confirms that entertainment attracts audiences across age groups almost equally. Matric level respondents (14 %) dominate in frequent listening of entertainment programmes, with a noticeable contribution from graduates (15 %). Tables 3 and 4 further highlight apparent variations across program types and demographics. Agricultural and entertainment programs show strong local engagement, while news programs attract a balanced audience across different educational backgrounds and regions. Sports programs, though moderately popular, exhibit selective interest among older and more educated groups. These findings further suggest that radio remains an important medium in both urban and rural areas of

Mansehra and Mardan. Its content preferences is closely tied to listeners' age, educational background, and regional lifestyle.

Statistical Analysis

Parametric and non-parametric statistics are the two categories of research and statistics. ANOVA is a parametric statistical approach in SPSS. Karl Pearson person who was the first to study the characteristics of the ANOVA test distribution in 1900. This statistical method is employed to show the observed frequency and distribution deviates from the predicted frequency distribution. The ANOVA test is unquestionably the most significant and frequently used by statistical analysts. For this research investigation, we used a 0.05 ($p < 0.05$) probability threshold. This suggests that there is 5% risk that the researcher will decide incorrectly. It applies to all viewpoints, including organising experiments, conducting surveys, and collecting and analysing statistical data. Studying statistical information and making inferences are facilitated by research statistics. The precise locations of many complicated phenomena can be easily estimated using statistics (Singh, 2001). It is standard procedure in mass media research to establish the level of probability at .01 or .05.

Table 5: *Application of ANOVA*

Source of Variation	Sum of Squares	df	Mean Square	F	Sig. (p-value)
Between Groups	22.413	1	22.413	17.518	0.027
Within Groups	381.267	298	1.279	—	—
Total	**403.680**	**299**	**—**	**—**	**—**

Table 5 consists of three main components, which are the main source of variation. The between-groups section shows how much variation exists among the different groups that are being compared. This ANOVA table also presents the statistical results to determine whether there are significant differences between groups related to the adoption of new agricultural innovations. The Sum of Squares value of 22.413 represents the amount of variation. The degrees of freedom (df) are 1, which indicates that two groups are being compared with each other. The Mean Square, also 22.413, is obtained by dividing the Sum of Squares by the degrees of freedom of the collected data. The p-value (0.027) of this research data is at a significance level, which is less than the conventional threshold of 0.05. The Within Groups section measures variation among individuals. The F value of (17.518) represents the ratio of the variation between groups. A higher F-value indicates greater differences between groups relative to the variability within them. The Sum of Squares is (381.267), which represents how much individuals in the same group differ from each other. The degrees of freedom are (298). The Mean Square value of (1.279) shows the average amount of variation within groups. Statistically, the result can be expressed as $F(1, 298) = 17.518$, $p = 0.027$. The Total Sum of Squares is 403.680, and the total degrees of freedom are 299. Since the p-value is below 0.05, this indicates that we reject the null hypothesis and conclude that there is a

statistically significant difference between the groups in how they acquire agricultural information regarding the adoption of innovations.

Table 6: *Application of ANOVA*

Source of Variation	Sum of Squares	df	Mean Square	F	Sig. (p-value)
Between Groups	20.280	1	20.280	19.711	0.001
Within Groups	306.600	298	1.029	—	—
Total	326.880	299	—	—	—

The ANOVA table 6 presents the statistical results of an analysis examining whether there is a significant difference between groups in their motivation for adopting new agricultural innovations. The Sum of Squares value of (20.280) indicates the amount of variability in motivation that exists due to differences among group means. The F-value, which is 19.711, represents the ratio of variance between groups to the variance within groups. The p-value (0.001) is well below 0.05, showing that the difference between groups is statistically significant. The degrees of freedom, 298, indicate the total number of participants minus the number of groups. The Mean Square value of 1.029 shows the average variation within the groups, representing individual differences not explained by group membership. Statistically, the ANOVA result is $F(1, 298) = 19.711$, $p = 0.001$. Factors such as education, exposure to agricultural programs, access to information, or previous experience with innovation may contribute to these differences. Therefore, enhancing these factors may help increase motivation levels toward adopting new agricultural technologies across all groups.

Summary and Discussion

It is anticipated that the results would emphasise how important radio is as an easily accessible medium for spreading agricultural information, especially in rural regions of Mansehra and Multan with low literacy rates and limited access to other forms of communication. The study methodically investigates the connection between farmers' exposure to radio programs, their socioeconomic traits, and their adoption behaviour using a quantitative research methodology backed by the diffusion of innovation theory. The study advances knowledge about agricultural communication. It guides media professionals, extension agencies, and policymakers on how to improve radio's ability to support sustainable agricultural growth. This demonstrates how radio has a significant influence on farmers' information availability and innovation uptake. In these regions, radio is a particularly popular medium. With an emphasis on innovation, this research examines the effects of radio-based agricultural initiatives on farmers. It was discovered that the majority of respondents preferred to listen to agricultural radio programs.

Thus, the purpose of this study was to determine the extent to which radio agricultural programs impact farmers in Mansehra and Multan. Overall, respondents preferred listening to radio agriculture programs to other programs. The research hypothesis that listeners are more inclined to give radio agriculture programming more attention than other programs was fully supported by the findings. The study documents the respondents' consumption habits of radio agricultural-based programs and assesses

their listening proficiency. The researcher concluded that radio agricultural programs had some direct or indirect effects on farmers' acceptance of information, based on the results of earlier related studies. The study's trial was limited to two hundred and sixty farmers. According to a critical analysis of empirical data, respondents from all demographic groups are primarily drawn to the content and features of radio-based farm programs, especially new technologies, pesticides, laser harvesting, and seeds, which affect farmers in Mansehra and Multan.

The research hypotheses were supported by the study's findings in this area. The research hypothesis that listeners are more likely to pay attention to radio agriculture programming than to other kinds of programs was fully supported by the study's findings. Other research findings also support this circumstance. The results of the research study also showed that the agricultural radio programs they listened to significantly influenced most listeners' information and farming methods. The results of this analysis showed that farmers' farming practices and adoption of innovations were significantly influenced by radio agriculture programming. In Mansehra and Multan, radio has had a significant impact on the respondents' decision to embrace a variety of innovations, including those from radio agriculture programs. The research hypothesis was fully supported by the study's findings, which showed that viewers who listen to radio agricultural programs more frequently are more likely to learn about advances.

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