Communication Channels and Information Sources Utilised By Agricultural Extension Practitioners to Communicate Agricultural-Related Information to Farmers in the Eastern Cape Province

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ABSTRACT

Using a random sampling technique, the channels used by extension practitioners to communicate agricultural-related information to farmers were investigated from a sample of 126 practitioners and managers. Research activities included a formal survey, and data were collected using a structured questionnaire. The Pearson's Chi-square (χ2) test of independence with α = 0.005 as a criterion for significance and the binary regression method were used to analyse the data. Findings from descriptive statistics reported that 52.4% of the respondents comply with the Norms and Standards of Extension and Advisory Services, which prescribe that all practitioners in South Africa should have a four-year bachelor's degree as a minimum qualification requirement. Many Extension practitioners (60.3%) preferred visiting farmers in person; however, logistical issues such as transport to the field (38.9%) posed a barrier to farm visits and information sharing. The binary logistic regression model results showed that information sources and the frequency of farm visits were among the variables that influenced the channels extension practitioners used to communicate agricultural information. The study concludes that extension officers still prefer in-person farm visits despite the emergence of ICT and digital technologies. This study recommends

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that in-person farm visits be utilised with ICT and other digital technologies to address agricultural-related information delivery challenges.

Keywords: Communication Channels, Extension Practitioners, Farmers, Information Sources

1.   INTRODUCTION

Agricultural extension is pivotal in agricultural development, particularly in developing countries where agriculture is a primary economic activity (Pan et al., 2018). Effective agricultural extension addresses poverty, ensures food security and promotes sustainable development (Swanson & Samy, 2016). In South Africa, a country with significant agricultural dependence, a robust agricultural extension system is essential for enhancing agricultural productivity. Despite advancements in agricultural research and extension systems, important gaps still need to be made in how agricultural information is communicated and utilised.

One of the critical constraints to agricultural development identified by the Technical Centre for Agricultural and Rural Cooperation (1996) is limited access to agricultural information. In technical topics like the context of climate change, access to relevant information is crucial for developing effective coping and adaptation strategies (Popoola et al., 2020). Agricultural extension services aim to bridge this gap by disseminating up-to-date information through various channels. However, the effectiveness of these communication channels significantly impacts the quality of information transfer and its influence on farming practices (Kurtzo et al., 2016).

In South Africa, the challenge of disseminating agricultural information is compounded by financial, infrastructural, and human resource constraints, resulting in a poor extension-agent-to-farmer ratio (World Bank, 2018). Consequently, there is a need to optimise the use of communication channels—both non-interpersonal (e.g., radio, television, internet) and interpersonal (e.g., extension practitioners, field demonstrations)—to enhance the delivery and impact of agricultural information (Okwu et al., 2006; Boz & Ozcatalbas, 2010). While much research has focused on the effectiveness of various communication channels in broader contexts, a noticeable gap exists in understanding how these channels perform specifically within the Eastern Cape.

The Eastern Cape, with its unique socioeconomic and environmental conditions, may experience distinct challenges and opportunities regarding communication. According to Aker (2011), environmental conditions such as geographical isolation can limit the effectiveness of certain communication channels. This further suggests existing channels may not fully address the region's needs, leading to suboptimal dissemination of agricultural information. Therefore, it is critical to investigate how well current communication channels perform in this region, considering factors such as accessibility, suitability, and effectiveness.

1.1.   Research Objective

The study investigated the communication channels and identified information sources utilised by agricultural extension practitioners to communicate agricultural-related information to farmers in the Eastern Cape Province.

2.   METHODOLOGY

2.1.   Study Area

The study was conducted in the Eastern Cape, South Africa, the second-largest province in the country, spanning 168,966 square kilometres and with a population of 6,562,053—the province's climate suits agricultural production, including crops, vegetables, citrus, and livestock. Smallholder farmers rely on farming for income, engaging in both household consumption and surplus for the market to alleviate poverty and reduce food insecurity at the household level. The three districts' municipalities are Chris Hani, OR Tambo, and Amathole.
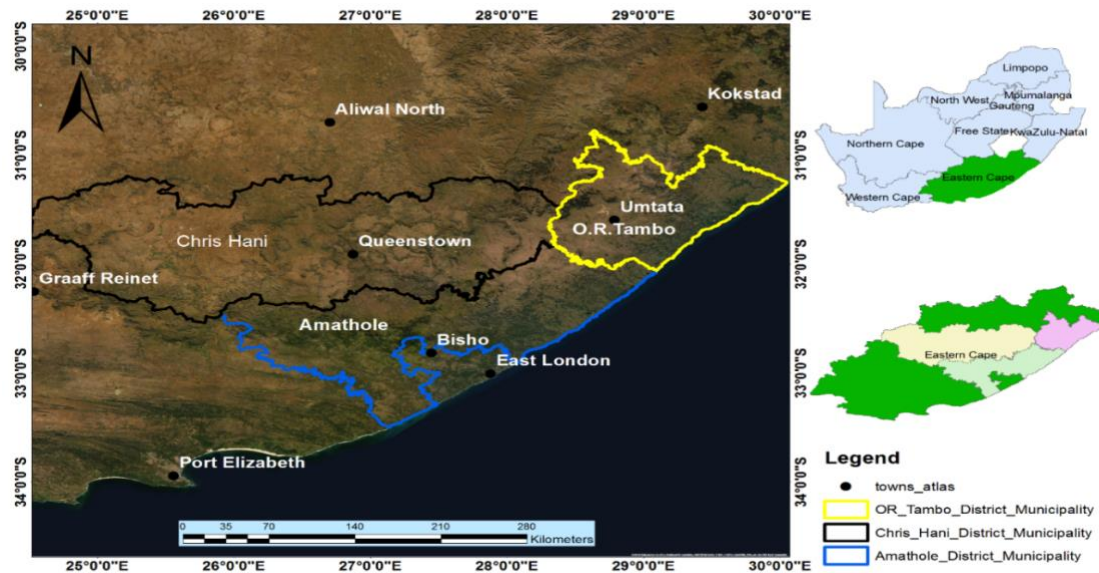
FIGURE 1: Map of the Three Study Areas

2.2.   Research Design

The study employed a cross-sectional survey where the data were collected at one point using semi-structured questionnaires. This research design was used because it allowed the investigators to simultaneously measure the outcome and exposures of the study participants.

2.3.   Sampling Procedure, Frame, and Sample Size

The study's sample followed a non-probability convenience sampling method due to the availability of respondents. A total of 126 extension officers were surveyed using a mixed-methods approach involving questionnaires and surveys. According to departmental records, the total population of extension officers across the three provinces was 353. While the sample does not cover the entire population, it is representative enough to provide valuable insights into the perspectives and distribution of extension services across the study area.

2.4.   Data Collection and Analyses

This study employed a quantitative approach that collected data through semi-structured personal interviews with farmers. Face-to-face and telephone interviews were used for data collection, allowing feedback between the researchers and the respondents. The reason for using face-to-face interviews was to gather as much information as possible, which could make the respondents feel more comfortable and open, leading to more honest and detailed answers.

The following table represents the variables modelled in the logit regression with their expected outcomes.

TABLE 1: Variables Used in the Binary Regression Model

Dependent variable	Measure
In-person visit	1 if the extension officers prefer utilising in-person farm visits, 0 for no
Mass Media	1 if the extension officers prefer utilising mass media, 0 for no
ICT	1 if the extension officers prefer utilising ICT, 0 for otherwise
Farmer-to-farmer	1 if the extension officers prefer utilising farmer to farmer, 0 for otherwise
Community leaders	1 if the extension officers prefer utilising community leaders, 0 for otherwise

Explanatory variable	How it is measured	Expected outcome
Gender	Male = 1, Female = 0	-
Level of education		+

	Diploma = 1, Degree = 2, Honours = 3, Master's = 4	
Source of information	Formal written communication (Journals, Articles) = 0, Internet = 1, Radio/Television = 2, Magazine/Newspaper (Farmers weekly) = 3, Colleagues = 4	+
Platform availability	No = 0, Yes = 1	–
Frequency of farmer visits	Weekly = 0, Monthly = 1, Quarterly = 2, Bi-yearly = 3, Yearly = 4, When an incident occurs = 5	+

2.5. Empirical Model

Binary logistic Regression

The predictive modelling tool of binary regression was used to model the relationship between the set of independent variables, which are the socioeconomic factors of smallholder farmers, and the dependent variable, which is diverse and was modelled as a logit of p that represents a probability of the dependent variable, which are extension officers choice of communication channel. An exploratory analysis was conducted, and the following statistical model was used, followed by a likelihood test. An analysis was done using R Studio to test the hypotheses of this study. The following equation was used to model:

$$\log\left(\frac{p}{1-p}\right) = b_o + b_1 X_1 + \cdots + b_k X_K \tag{1}$$

Where p is the probability that $y = 1$ given x, y represents the dependent variable, $x_1, x_2, \ldots, x_k$ represent the independent variables.

Lastly, $b_1, b_2, \ldots, b_k$ represent the parameters of the model.

3.   RESULTS AND DISCUSSION

This section presents results from the topics developed based on the predefined questions. The results section is divided into 1) Demographic characteristics of respondents, 2) Sources of information, and 3) Communication channels used by extension practitioners.

3.1.   Demographic Characteristics of Respondents

As shown in Table 2, the survey results show that most respondents are male (56.6%). A study by Lahai et al. (1999) encouraged an increase in the recruitment of female extension practitioners, noting that women farmers who had female extension practitioners reported having better adoption of suggested technologies and practices and technical knowledge of such techniques. Witinok-Hube et al. (2021) highlighted that it was not only female farmers but a plurality of farmers (women and men) who reported wanting more women extension practitioners to serve them and their communities because of the satisfaction with the quality of the practitioners' services, and credibility.

The results also show that 52.4% (31% with honours degree, 21.4% with master's degree) of the respondents comply with the Norms and Standards of Extension and Advisory Services (DoA, 2005), encouraging practitioners to be well-trained, motivated, and highly skilled. They further prescribe that all practitioners in South Africa should have a four-year bachelor's degree as a minimum qualification requirement (DoA, 2005). According to Agha et al. (2018), the level of education and training influences the adoption and use of other communication channels, including ICTs.

The respondents ranged between 24 and 64 years, with a mean age of 41. Lukhalo (2017) also notes that most practitioners in South Africa fall in the 36–45 age group. This may positively affect the channels and sources of information used because younger practitioners are anticipated to have higher knowledge levels of the different media and sources and utilisation of them. A study by Narine et al. (2019) revealed that the adoption of modern communication channels was higher among younger extension practitioners than older ones.

TABLE 2: Demographic Characteristics of Extension Practitioners

Variables Demographic	Frequencies N	%
Gender		
Male	69	56.6
Female	53	43.4
Educational level		
Diploma (NQF 5)	22	17.5
Degree (NQF 6)	26	20.6
Honours (NQF 7)	39	31.0
Masters (NQF 8)	27	21.4
Age		

Frequency (n)	Minimum	Maximum	Mean	Std Deviation
126	24	64	41.48	9.927

3.2.   Sources of Agricultural Extension Sources Information

Table 3 shows sources of agricultural-related information for practitioners in the study areas. The internet is ranked as the top source of information at 59.5%, followed by radio, colleagues at work, formal written communication, magazines/newspapers, and others.

The analysis of information sources indicated that practitioners primarily use the internet, radio, and colleagues at work as sources of information in the study areas. Subsequently, with the rapid development of ICT, the internet is becoming a more common instrument for people to use for information sourcing (Deshpande et al., 2014). Unlike traditional media, another school contends that the internet offers a level playing field for ideas. It gives organisations more chances to reach a wider audience with their messages (Popoola et al., 2020), and it opens many doors for those who might not otherwise have access to information (Gavin et al., 2008). Over the years, mobile phones and associated applications have been utilised effectively in several African nations to gather weather-related data and general agricultural information. Mobile phones are acknowledged

as a crucial medium for information (Aker & Fafchamps, 2015), emphasising how vital mobile phones and the internet are to obtaining information.

TABLE 3: Information Sources for Practitioners

Variables	Frequency (n)	Percentage (%)
Formal written communication (Journals, Articles)	37	29.4%
Internet	75	59.5%
Radio/Television	64	50.8%
Magazines/Newspapers (Farmers weekly)	37	29.4%
Colleagues at work	39	31.0%
Other institutions	6	4.8%

Radio and television were ranked second in this study as a source of information for practitioners. Radio was reviewed by Olajide (2011) and found to be significantly less expensive than other information sources. The study further emphasised its numerous unique advantages, making it a highly utilised and preferred information source among extension practitioners (Olajide, 2011). The inference is that radio and television, in this context, play a significant role in society. The media is essential in bringing about change by raising public knowledge of issues and influencing people's interests, attitudes, and, ultimately, governmental legislation (Murphy, 2015). It is the most effective and quickest way to spread information and significantly impacts farmer's productivity. (Popoola et al., 2020).

In this study, practitioners highlighted radio and television news reports as their most crucial and trustworthy source of information. According to Gavin et al. (2008), this could be because, for most people, watching television is still the most effective way to learn about science and the environment.

Personal interaction with colleagues at work is another source of information used in the study areas, as noted by 31% of respondents (see Table 2). Participants indicated that personal interaction

with co-workers leads to information sharing. The participants fully encouraged this and highlighted that it allows for information sharing and participatory and collaborative interactions. They also encouraged the development of a platform/forum to discuss agricultural-related information with other extension practitioners.

Formal written communication (journal articles) and magazines/newspapers ranked last, at 29.4% each, for providing participants with information. The high costs of formal and informal communication methods are attributed to the low numbers utilising them. To support agricultural growth, there is a dire need to encourage a strong interest in using formal and informal information.

3.3.   Communication Channels Used by Extension Practitioners

Respondents were asked to indicate their frequently used communication channels for extension services. Table 4 summarises the results, showing that practitioners in the study areas use in-person visits, mass media, ICTs, farmer-to-farmer extension, community leaders, and other communication channels.
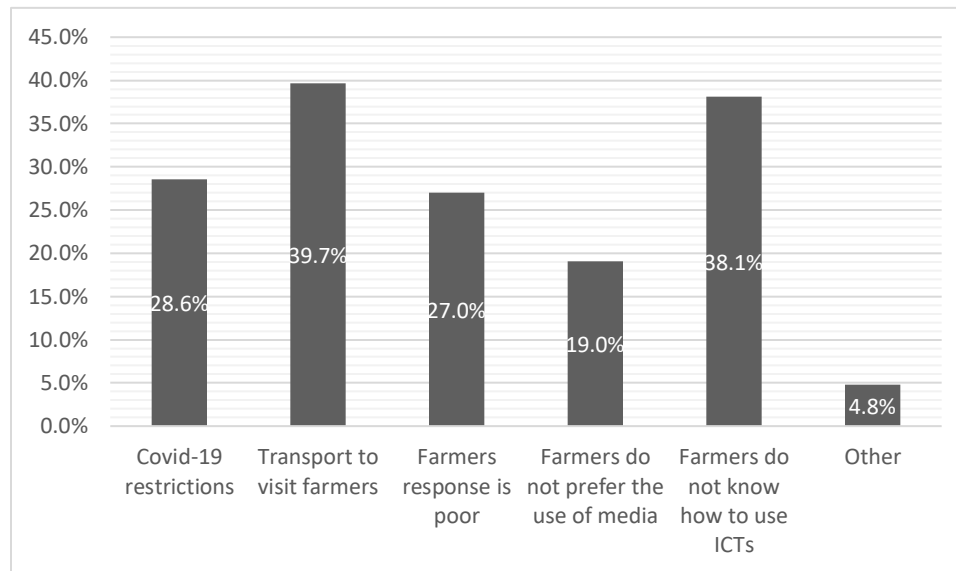
TABLE 4: Communication Channels

Communication channel	Frequency (n)	Percentage (%)
In-person visit	76	60.3%
Mass media	15	11.9%
ICT	25	19.8%
Farmer-to-farmer extension	75	59.5%
Community leaders	47	37.3%
Other	7	5.6%

The findings, as shown in Table 4, indicate that in-person visits (60.3%), farmer-to-farmer extension (59.5%), and community leaders (37.3%) were the main and frequently used communication channels in the study areas, proving that practitioners in the region prefer to use interpersonal extension, which could be due to several reasons, as noted during the survey. Extension practitioners indicated that accessibility, the nature of the message, and the farmers'

expectations impacted their preferred channel choice. Sobalaje and Adigun (2013) note that the accessibility of a channel is essential in determining its use, which is consistent with Zikhali et al. (2021), whose study showed that it is easier to convey agricultural extension services, when doing so face-to-face, as it allows practitioners to assess whether farmers understand and gives them a chance to address any misunderstandings or questions quickly.

The respondents were asked whether their communication channels were effective, using a scale of 1–10, with one being ineffective and ten being effective. Most (56.8%) of the respondents chose ratings between 7 and ten, indicating that their choice of communication channels is practical. However, because they are now experiencing significant difficulties with interpersonal communication channels, the participants mentioned that they prefer to investigate non-interpersonal channels (mass media and ICTs).

Figure 1 below shows challenges experienced by practitioners with the current extension channels.

FIGURE 1: Challenges with Current Communication Channels

The study was conducted when COVID-19 limitations were still in place in South Africa. This meant that the interpersonal routes usually used by practitioners presented difficulties. Extension workers in South Africa were recognised as essential workers during the COVID-19 pandemic due

to the critical services they provided to communities; however, 28% of the respondents highlighted that they still struggled with accessing farmers due to the COVID-19 restrictions.

The DoA's continued struggles with transportation for farmer visits were emphasised by 39.7% of the practitioners in the study areas, as shown in Figure 1. These struggles are due to the limited number of vehicles available and the administrative procedures necessary to obtain them. Practitioners highlighted that there is a problem with farmers' response rates and, overall, the farmers are either unable to utilise or prefer not to use mass media and ICTs.

Results from the study indicated that the frequency of farmer visits was not statistically significant; however, participants who only used interpersonal communication channels conducted more frequent visits than those who used both interpersonal and non-interpersonal. This could be because participants who have diverse means of communicating feel that they do not need to visit the farmers as frequently. In contrast, those using only interpersonal communication regard more frequent farmer visits as important.

Further investigation was done, and a logistic regression was performed to determine which independent variable/s had a statistically significant effect on communication channels. Independent variables included gender, age, level of education, information source, platform availability, and visitation. All assumptions were met; therefore, the results were interpreted and showed that the logistic regression model was statistically significant, with $\chi 2(6) = 18,593$, p = 0,005. The model explained 28% (Nagelkerke R^2) of the variance in communication channels and correctly classified 71% of cases. The results are presented in Table 5.

TABLE 5: Factors Affecting the Use of Communication Channels

	Coefficient estimates		Marginal effect	
Variables	**Coff.**	**Std. Err**	**Coff.**	**Std. Err**
Gender	0.384	0.543	-0.980	0.519
Age	-0.410	0.561	-0.287	0.263

Highest level of education	-0.797	0.564	0.257	0.287
Information sources	3.084	1.081	-0.027	.007**
Discussion platforms	0.276	0.587	0.014**	0.011**
Frequency of farmer visits	-0.170	0.022**	0.081	0.036*
Number of observations = 12	pseudo r-squared 0.625	-2 log-likelihood 103.868	Prob > chi2 = **	

Notes: ***, **, * mean significance at 1%, 5%, and 10% significance levels, respectively.

 ns = not statistically significant

Six independent variables included in the logistic are gender, age, highest level of education, information sources, availability of discussion forums, and frequency of visits. The pseudo-R-squared was 0.625%, indicating that the model used was relatively strong to reliably predict factors affecting the use of communication channels, the explanatory variables, and the variance.

The coefficient estimate for gender was 0.384 (p > 0.05), as shown in Table 5, which indicates that being a female increases one's propensity to use communication channels. However, the marginal effect of -0.980 suggests that being female is associated with a lower likelihood of utilising communication channels. This disparity between the estimated coefficient and marginal effect raises the possibility of interactions between gender and other unexplained factors, calling for more research.

However, studies examining how communication preferences and methods vary by gender suggest that, compared to males, women typically participate in more frequent and varied communication, including communication channels. Karatsoli and Nathanail (2020) assert that women are more

likely than men to reach out for information offered by social media and to use varied communication channels.

According to Table 5, the age variable shows that using communication channels is less frequent for older individuals, according to the negative coefficient estimate of -0.410 (p > 0.05). The marginal effect of -0.287 (p 0.05) further suggests that using communication channels is less likely as individuals age, supporting this finding. These results indicate that younger individuals are more responsive to and comfortable with different communication mediums, which is confirmed by Wilkins et al. (2018) and Lukhalo (2017), who highlight that younger practitioners are projected to have more awareness of the various communication channels and information sources and to use them more.

The marginal effect for the variable "level of education of extension practitioners" was positive at 0.257 (p < 0.05), indicating that an increase in the highest level of education leads to a higher probability of using communication channels. Oladele (2015) reports that extension practitioners with more education better understand how ICTs and other communication channels are used in agricultural research and extension activities.

A total of 87% of participants whose communication channel included physical interaction and media used more than one source of information compared to 57% of participants whose communication channel included only physical interaction (they had a 30% higher use of a single information source), as presented in Table 5. The positive coefficient estimate of 3.084 (p < 0.05) suggests that information sources significantly influence communication channel usage. According to Abukari et al. (2021), using communication channels depends on the accessibility, availability, and cost.

Lastly, the use of discussion as a variable appears to have a favourable impact on the use of communication channels, according to the positive coefficient estimate of 0.276 (p > 0.05). The marginal effect of 0.014 (p 0.01), which indicates that the likelihood of using communication channels rises with discussion boards, supports this finding. These findings underline platforms' importance in encouraging user interaction and information sharing.

4. CONCLUSION

Agricultural extension is central in fostering agricultural development, especially in rural communities. However, the effectiveness of these efforts is often constrained by the channels through which information is communicated. Ensuring proper, efficient communication channels is paramount in enabling farmers to understand, trust, and implement climate adaptation strategies. This research investigated the sources of information and channels used in extension in the Eastern Cape.

Results revealed that extension practitioners in the region mostly used interpersonal communication channels. Moreover, the availability, accessibility, resources, and facilities required to use a specific communication channel all impacted the choice of channels. It was concluded that practitioners were experiencing challenges with their current channels and exploring interpersonal mediums.

Sources of information distribution are considered vital as they successfully link people to information they might otherwise be unaware of. As a result, people's reliance on information sources is growing. The top information sources used by the agricultural extension practitioners were the internet, radio and television, and colleagues. These sources were discovered to be more successful than the public at disseminating information about agricultural-related information.

This study suggests increasing the use of mass media and written communication as sources of information in the study areas to increase awareness, knowledge, and skills. Additionally, it is necessary to raise the educational level of extension practitioners by acquiring more qualifications in related fields so that they comply with the DoA's (2005) Norms and Standards.

Since the internet is the most widely used source, the study recommends providing all practitioners with data bundles and internet gadgets. Additionally, setting up community information centres is also key.

Lastly, the study suggests that adequate policies and sufficient provision of sources and channels for information should be used to improve the extension practitioners' readiness, which is a composite of access, availability, accessibility, and competency.

5.   ACKNOWLEDGMENTS

6.   CONFLICT OF INTEREST

The authors have declared no conflicting interests.

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