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Determinants of social media use for professional agricultural extension: a cross-sectional survey of practitioners in Limpopo Province, South Africa

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ABSTRACT

The increasing need for cost-effective and accessible communication in agricultural extension has driven the adoption of social media platforms. This study examined the use of social media platforms for professional extension work among agricultural extension practitioners in Limpopo Province, South Africa. A quantitative cross-sectional survey was conducted in 2025 among 225 extension practitioners selected through multistage random sampling from a population of 538. Data were collected using structured questionnaires and analyzed using descriptive statistics and Pearson chi-square tests in SPSS version 30. The results showed that social media is widely used amongst extension practitioners. WhatsApp emerged as the dominant platform used by all respondents. On the other hand, platforms such as Facebook, YouTube, and TikTok are also used, but mainly for sharing visual and interactive content. Extension practitioners were more likely to access agricultural information on social media than to create original advisory content for their farmers. Text messages and voice notes were the most shared content types, reflecting the preference for simple, low-data communication formats. This preference is suitable for rural connectivity conditions and less expensive. A significant association was found between years of service and professional social media use. Factors like age, gender, qualification, and district showed no significant influence. The findings indicate that although social media has strong potential to enhance extension service delivery, it remains underutilized. The study highlights the need to strengthen digital skills, improve internet access, and develop guidelines for professional social media use.

Keywords: agricultural extension, digital communication, extension practitioners, social media

1. Introduction

Agricultural extension plays a central role in linking farmers with new knowledge and technology. In South Africa, extension practitioners are expected to provide timely and relevant information to farmers, many of whom operate in rural areas. Traditional communication methods such as face-to-face meetings, information days, print materials, television, and radio have long been used effectively, but they are often limited by cost, accessibility, and availability [1]. Physical distance between farmers and extension offices, limited transport resources, and time constraints reduce the frequency of direct contact for advisory services. These challenges have created a growing need for alternative communication approaches like social media that can complement traditional extension methods.

Digital communication has become an important part of extension work because of its ability to reach more farmers at lower cost and in less time [2]. The rapid growth of mobile phone ownership, even in rural areas, has made digital platforms more accessible to both farmers and extension practitioners. As part of the Fourth Industrial Revolution, digital tools are reshaping how agricultural knowledge is produced, shared, and applied.

Social media platforms have introduced new opportunities for real-time interaction, group learning, and rapid information exchange that were not possible with traditional extension approaches.

Social media platforms offer convenient ways for extension practitioners to share information with farmers and support their decision-making [3]. Platforms such as WhatsApp, Facebook, and YouTube allow fast, two-way communication and can reach many farmers at the same time. These applications are commonly available on smartphones in South Africa and are already used for everyday communication. They allow farmers to interact with each other and with practitioners in real time, creating virtual communities. Research shows that social media improves access to information and increases the rate at which information spreads from extension practitioners to farmers [4]. In addition, visual and audio features such as photos, videos, and voice notes make it easier to explain farming practices and provide timely advisory support.

Despite these advantages, the professional use of social media in agricultural extension does not always translate into active knowledge sharing. In many cases, extension practitioners use social media mainly to access information rather than to create and share original advisory content. This difference between passive consumption and active knowledge production is important, as effective extension depends on the adaptation of information to local farming conditions. Understanding how extension practitioners balance these roles is essential for improving the quality of digital advisory services.

While the use of social media platforms is growing, there is still limited research on how extension practitioners in Limpopo Province adopt these platforms for professional work. Existing studies focus on farmers' use of digital tools, with less attention given to the practices of extension personnel themselves. There is also limited evidence on how frequently practitioners share information compared to how often they access it, and which personal or professional factors influence their level of engagement. This knowledge is important for strengthening digital agricultural extension strategies and guiding the training and support of practitioners. Therefore, this study aimed to identify the social media platforms used by extension practitioners, determine how frequently they access and share agricultural information, and examine the factors influencing their professional use of social media.

Despite the growing use of social media in agricultural extension, there remains a limited understanding of how extension practitioners actively use these platforms for professional advisory services, particularly in rural contexts. Existing studies largely focus on farmers' access to digital information, with less attention given to the role of extension practitioners as content creators and knowledge intermediaries. Furthermore, there is insufficient empirical evidence on the factors influencing whether practitioners use social media for passive information consumption or active knowledge sharing. This gap limits the effectiveness of digital extension strategies. Therefore, this study hypothesizes that demographic and professional characteristics influence the extent of social media use for professional purposes among extension practitioners.

2. Materials and Methods

2.1. Description of study area

The researcher conducted the study in the Limpopo Province in South Africa. Limpopo Province borders three countries: Mozambique, Botswana, and Zimbabwe. It also borders three provinces, namely Mpumalanga, Gauteng, and North-West. This province is well known as the fruit basket of South Africa, but it also has other agricultural activities such as vegetable farming, wildlife, bushveld, and rain-fed crop farming. The province's population comprises rural black people who speak Sepedi, Xitsonga, Tshivenda, and other African languages. Many people from this province earn a living through grants and small-scale and backyard farming. Limpopo takes up to 10.2% of the country's total land. This province produces main crops like potatoes, tomatoes, citrus, avocado, and mangoes. About 700,000 tons of timber are produced in this province annually. Most of the farmers in the province produce vegetables for household consumption and sale. Limpopo Province has five district municipalities: Capricorn, Vhembe, Mopani, Waterberg, and Sekhukhune. The study focused on all the district municipalities in the province. These district municipalities have varied agricultural land for production with different farming categories.

2.2. Study approach and sampling technique

A quantitative research approach with a cross-sectional survey design was employed to capture information on social media platforms used by extension practitioners, information posting and access, and factors influencing the use of social media among extension practitioners. Structured questionnaires with closed-ended questions were used to collect data face-to-face. The study focused on commonly used social media platforms

in agricultural extension, including WhatsApp, Facebook, YouTube, TikTok, Instagram, and X (formerly Twitter), as these platforms support different forms of communication such as messaging, video sharing, and public engagement.

The target population for this study was the 538 public-sector agricultural extension practitioners employed in the Limpopo Department of Agriculture and assigned responsibilities to service local farmers. To ensure fair representation, a multistage sampling technique combined with simple random sampling was used. In the first stage, the province was divided into its five district municipalities: Sekhukhune, Waterberg, Capricorn, Mopani, and Vhembe; all were included. In the second stage, extension officers' lists from each district office of the Limpopo Department of Agriculture and Rural Development were used, and participants were randomly selected from these lists. Using the Rao soft sample size calculator at a 95 % confidence level and a 5 % margin of error (for a population of 538), a minimum sample size of 225 respondents was calculated. The population distribution across districts was proportionally estimated based on the sampling frame obtained from the Limpopo Department of Agriculture and Rural Development, ensuring representative sampling across all districts.

Table 1. Sample distribution by district

District	Population	Sample
Capricorn	129	53
Sekhukhune	129	53
Waterberg	75	32
Mopani	97	42
Vhembe	108	45
Total	538	225

2.3. Data analysis

Descriptive statistics were used to summarise and interpret data collected from agricultural extension practitioners in Limpopo Province. Frequencies and percentages were applied to describe the social media platforms most used for professional purposes, the frequency of posting and accessing agricultural information, and the factors influencing professional use of social media by extension practitioners were analysed using cross-tabulations with the Pearson chi-square test. This approach allowed for a clear understanding of patterns and trends in extension practitioners' digital communication practices, directly addressing the study's objectives.

The Pearson chi-square test was selected because the study involved categorical variables such as age group, gender, district, and levels of social media use. This test is appropriate for examining associations between categorical variables and determining whether observed relationships are statistically significant [5]. IBM Statistical Package for Social Sciences (SPSS) software version 30.0 was used to capture the data and perform the analysis.

3. Results and Discussion

3.1. Demographic profiles of extension practitioners

The distribution by district shows that Capricorn and Sekhukhune each contributed 24% of respondents, followed by Vhembe (20%), Mopani (18%), and Waterberg (14%), indicating broad provincial representation. Gender distribution was nearly balanced, with 52% male and 48% female practitioners, suggesting inclusivity within the extension workforce. In terms of age, the largest group was 50–59 years (24%), followed by under 30 years (21%), indicating a mix of experienced and younger practitioners. Regarding qualifications, most respondents held bachelor's degrees (27%), followed by diplomas (25%), honours (24%), and master's degrees (25%), reflecting a well-qualified workforce. Years of service showed that 28% had 11–20 years of experience, while 25% had less than one year, indicating both experienced and newly recruited practitioners. Although all respondents owned smartphones, only 68% reported regular internet access, highlighting a key constraint in digital extension.

All respondents reported owning a smartphone provided by their employer, indicating that basic digital devices are widely available among extension practitioners. However, only 68% reported having regular internet

access for work activities, while 32% experienced irregular access at their workstations. This gap highlights ongoing inequalities in digital connectivity. Even where devices are available, unstable internet access may limit the consistent use of social media platforms for advisory communication. These connectivity challenges are important when interpreting patterns of social media use among extension practitioners in the province.

The distribution of respondents across districts confirms broad representation of extension practitioners in the province. The gender distribution indicates a balanced workforce, while the age structure reflects a mix of early-career and experienced practitioners. Educational qualifications show that most practitioners possess formal agricultural training at the tertiary level. Years of service indicate both newly recruited and long-serving practitioners, suggesting opportunities for knowledge sharing. Although all respondents had access to smartphones, only 68% reported regular internet access, highlighting persistent connectivity challenges that may affect digital extension practices. These demographic characteristics show a balanced and diverse workforce in Limpopo's extension services. Diversity in age, qualifications and experience supports digital extension efforts, as younger practitioners tend to lead in the adoption of new technologies while senior practitioners contribute practical field knowledge necessary for quality information sharing.

Table 2. Demographic profiles of extension practitioners in Limpopo (N = 225)

	Frequency	Percent (%)
District		
Capricorn	53	24
Sekhukhune	53	24
Waterberg	32	14
Mopani	42	18
Vhembe	45	20
Gender		
Female	108	48
Male	117	52
Age Group		
Under 30 Years	48	21
30 - 39 Years	41	18
40 - 49 Years	37	16
50 - 59 Years	53	24
60 Years and above	46	20
Highest Qualification		
Diploma	56	25
Bachelor's Degree	60	27
Honours	54	24
Masters	55	25
Years of Service		
Less than 1 year	56	25
1 to 5 years	51	23
6 to 10 years	56	25
11 to 20 years	62	28
Regular internet access for work		
Yes	154	68
No	71	32

3.2. Social media platforms used for professional work

Different social media platforms were assessed among extension practitioners, and the findings are presented in Table 3 below. All extension practitioners (100%) reported using WhatsApp, confirming its position as the dominant communication tool for extension work in Limpopo Province. Practitioners commonly manage work-related WhatsApp groups that include both colleagues and farmers they support. This widespread adoption reflects the platform's affordability, ease of use, and ability to function in areas with weak network coverage [6]. In addition, features such as photo sharing, voice notes, document transfer, and location sharing make WhatsApp highly practical for day-to-day advisory work, especially when quick responses are needed.

The universal use of WhatsApp also suggests that extension communication is becoming more immediate and interactive. Group messaging allows practitioners to reach multiple farmers at once, provide timely production advice, and respond to emerging challenges such as pest outbreaks or weather-related risks. This shift supports more continuous engagement compared to traditional face-to-face visits, which may be limited by distance and time constraints. This finding is consistent with previous studies that identified WhatsApp as the most widely used platform in agricultural extension due to its low data requirements and accessibility in rural areas [7], [8]. Similar patterns have been reported in developing countries where mobile-based communication dominates over more data-intensive platforms.

Facebook was the next most used platform, with 50% of respondents indicating professional use. Facebook appears to serve a different purpose from WhatsApp. While WhatsApp is often used for direct group communication, Facebook is more suitable for public posts, announcements, and sharing broader community updates. It provides a space where extension practitioners can reach wider audiences, including farmer groups, community organizations, and other stakeholders. These findings are like those of Kabir et al. [9], who observed that extension practitioners use Facebook as a virtual meeting space for professional networking and information sharing. This finding is consistent with previous studies which show that Facebook is widely used in agricultural extension as a platform for broader information dissemination, networking, and community engagement [10]. Unlike messaging applications, Facebook enables extension practitioners to share information with larger and more diverse audiences, including farmer groups and stakeholders. Similar patterns have been reported in developing countries where Facebook serves as a semi-formal platform for knowledge exchange and public agricultural communication.

Use of YouTube (51%) and TikTok (48%) indicates growing interest in video-based communication. These platforms support demonstrations, short training clips, and visual explanations of farming practices. Visual content is particularly useful in agricultural extension, where farmers benefit from seeing techniques rather than only receiving written and spoken instructions [11]. The use of these platforms suggests a gradual shift towards more creative and engaging forms of digital extension. However, the findings also indicate that practitioners may use these platforms more for viewing content than for producing their own videos. This has implications for the level of locally relevant material available to farmers from extension practitioners. The growing use of YouTube and TikTok aligns with previous studies that highlight the increasing importance of video-based communication in agricultural extension [12]. Visual platforms support demonstration-based learning, which is particularly effective in agriculture where practical skills and techniques need to be clearly illustrated. Similar trends have been observed in developing contexts where short-form and video content is gaining popularity due to its ability to simplify complex information and enhance farmer understanding, although content creation remains limited among practitioners.

Instagram was used by only 38% of practitioners. Instagram's vast focus on images and short videos makes it suitable for awareness campaigns, showcasing demonstration plots, and highlighting success stories from farming communities. Although some studies suggest that Instagram is less relevant for extension work Farida et al. [13], its lower usage compared to Facebook and WhatsApp may be linked to its emphasis on visual content and limited functionality for direct advisory communication. While Instagram is useful for showcasing activities, demonstration plots, and success stories, it is less effective for detailed, interactive engagement with farmers. This reduces its relevance for routine extension work, although it remains useful for public engagement and awareness.

Only 14% of respondents reported using X for professional purposes. The low usage may be linked to the platform's emphasis on short text-based updates and national or global discussions, which may be less directly connected to local advisory needs. Rural farmers may also be less active on this platform compared to more

commonly used messaging and video applications. While some authors argue that professionals should increase their presence on X to build networks and share expertise Aguilar-Gallegos et al. [14], its limited adoption among extension practitioners in Limpopo suggests that platform choice is strongly influenced by farmer accessibility and practical communication needs. Irrespective of farmers being available in small numbers on this platform, practitioners may still share their good agricultural practices with the world and increase their reach and network. Unlike WhatsApp, which supports localized and interactive communication, X is more suitable for global information sharing and professional networking. This suggests that platform choice among extension practitioners is strongly influenced by farmer accessibility, communication efficiency, and relevance to local agricultural contexts.

3.3. Type of content shared

The type of content shared by extension practitioners reflects practical communication needs within rural advisory contexts. As shown in Table 3 below, text messages and voice notes were the most common formats, each reported by 22% of respondents. These forms of communication are simple, quick to produce, and easy for farmers to access using basic smartphones. Text and voice messages allow practitioners to provide immediate instructions, answer questions, and give reminders about farming activities. Previous studies have shown that text and voice-based communication is effective in areas with weak network coverage and limited data availability, as these formats require moderate network strength while still supporting real-time advisory exchange [15].

Photos from the field and links to articles or websites were each used by about 20% of practitioners. The sharing of photos plays an important role in agricultural extension, as it allows practitioners to document field conditions, crop performance, pest damage, and demonstration activities. Visual evidence can improve understanding and help farmers compare their own situations with examples provided by the practitioner. Sharing website links, on the other hand, allows practitioners to direct farmers to additional resources such as production calendars and severe weather warnings [16]. This suggests that extension practitioners are not only communicating directly but also acting as information brokers who connect farmers to wider knowledge sources.

Short video clips were used by only 16% of respondents. Although this percentage is lower than for other content types, it reflects a gradual move towards more visual and demonstration-based advisory methods. Videos can be especially effective for explaining farming practices step by step, showing machinery use, or demonstrating disease symptoms. However, producing and sharing videos often requires more digital skills, time, and data, which may limit wider adoption among practitioners. Despite this, the presence of video use indicates growing awareness of the value of multimedia learning in extension. Similar findings have been reported by Karubanga et al. [12], who observed that many practitioners use video tools to communicate important agricultural messages to farmers. The limited use of video-based content may be attributed to barriers such as high data costs, limited digital skills, and time constraints faced by extension practitioners. These constraints reduce the ability of practitioners to produce more advanced and engaging content despite its potential effectiveness.

Table 3. Social media platforms used by extension practitioners.

		Frequency	Percentage (%)
Type of Social media platform	WhatsApp	225	100
	Facebook	112	50
	YouTube	114	51
	TikTok	108	48
	Instagram	85	38
	X	31	14
	Text Messages	50	22
Type of content shared	Photos from field	44	20
	Short video clips	36	16
	Links to articles and websites	45	20
	Voice Notes	50	22

3.4. Practitioner's frequency of posting and accessing agricultural information

The frequency of accessing agricultural information was tested among the respondents, and the findings are presented in Table 4 below. The findings show a clear difference between how often extension practitioners access social media and how often they post content online. As shown, 65% of practitioners access agricultural information on social media every day, while only 10% post daily. This means that the practitioners depend more on what other online creators develop than what they can develop locally. The disadvantage of this is that practitioners do not have context-specific content on the platforms.

Weekly access (23%) is also much higher than weekly posting (28%). Most practitioners post either monthly (35%) or rarely (22%), which indicates that social media is mainly used as an information source rather than a platform for creating original content. Only a very small number reported never accessing information (1%) or never posting (6%). The small number of practitioners who never access information shows that more than 90% of them are well informed about the latest news and trends.

The results concur with Worlet et al. [17], showing that most practitioners are on X and stay updated with current trends. The pattern observed suggests that social media is widely used by extension practitioners as a learning and monitoring tool rather than a space for regular content generation. This mirrors findings of Alhassan et al. [18] where extension practitioners report high levels of online engagement but low levels of content production. This low content creation was observed to be a result of heavy workloads, insufficient creation skills and fear of sharing unverified information with farmers [19]. The tendency of practitioners to consume rather than create content may be linked to factors such as limited digital content development skills, heavy workloads, and concerns about sharing inaccurate information. Institutional support and training are therefore critical to encourage more active knowledge production.

Table 4. Frequency of posting and accessing information

	Posting		Accessing	
	Frequency	Percentage %	Frequency	Percentage %
Daily	22	10	146	65
Weekly	62	28	51	23
Monthly	78	35	17	8
Rarely	50	22	8	4
Never	13	6	3	1

3.4. Factors influencing professional social media use among extension practitioners

Respondents were asked to identify factors that influence professional social media use; the findings are indicated in Table 5 below. It shows the relationship between professional social media use and selected demographic characteristics of agricultural extension practitioners. A Pearson chi-square test revealed a statistically significant association between professional social media use and years of service ($\chi^2 = 14.595$, $df = 3$, $p = 0.002$). This result indicates that practitioners with more years of experience are more likely to use social media for agricultural information dissemination than those with less experience. This may be due to stronger relationships with farmers, greater exposure to field challenges, and increased confidence in sharing advisory information. In addition, experienced practitioners are more likely to recognize the efficiency and cost benefits of digital communication in reaching farmers across dispersed rural areas.

No statistically significant associations were observed for district ($p = 0.944$), gender ($p = 0.448$), age group ($p = 0.610$), or academic qualification ($p = 0.208$). These results suggest that the use of social media for professional purposes is consistent across personal characteristics and geographical settings. A study by Guerra et al. [20] agrees that usage patterns appear to be linked more to the level of professional experience gained over time than to demographic factors.

The findings of this study show that most extension practitioners are active users of social media, particularly WhatsApp. This platform which remains a dominant tool for communicating with farmers and colleagues. However, while access and usage are high, the level of professional engagement, such as sharing engaging content and agricultural information, remains moderate. This reflects a pattern noted in a similar study where

social media was widely adopted for communication but underutilized for technical extension support and advisory services [16].

The study also examined whether demographic factors influence professional social media use. The results below indicate that years of service is the only factor significantly associated with increased use of social media for work-related purposes. Practitioners with longer tenure appear more likely to incorporate social media into their extension practice. Experienced practitioners might also recognize the efficiency gains and cost-effectiveness of digital communication in facilitating advisory services in rural areas [21]. The influence of years of service may be explained by increased exposure to extension challenges and greater confidence in using digital tools over time. More experienced practitioners may also better recognize the benefits of social media for efficient information dissemination.

Table 5. The relationship between professional social media use and selected demographic characteristics of agricultural extension practitioners

Years of Service	No	Yes
Less than 1 year	27 (25%)	29 (25%)
1 to 5 years	32 (30%)	19 (16%)
6 to 10 years	31 (29%)	25 (21%)
11 to 20 years	18 (17%)	44 (38%)

4. Conclusion

The study found that agricultural extension practitioners use social media for information dissemination. This confirms that social media has become an important component of extension service delivery. However, the use of these platforms is largely characterized by information consumption rather than active content creation and knowledge sharing. Professional experience was identified as a significant factor influencing digital engagement, suggesting that confidence gained through field exposure plays an important role in the adoption of social media for extension purposes. These results show the need for digital extension strategies and access to social media platforms. There is a need to strengthen extension practitioners' capacity to create original, context-specific agricultural content for local farmer needs. The study recommends that the Department of Agriculture in Limpopo initiate training programs that include practical skills in digital communication and content creation for online engagement. The department can further develop professional guidelines for social media use in extension services. Future research should explore farmers' perspectives on receiving advisory services through social media and assess how digital communication by farmers influences farming decisions.

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6. Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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