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Motivation and Utilization of Social Media in Agricultural Extension Performance

Adil Basir^{1*}, Sutawi Sutawi², Bambang Yudi Ariadi², Rusli Tonda³, Waris Ali Khan⁴, Sapar Sapar¹, Holid Holid⁵, Imelda Rosa¹, Marhani Marhani¹, Hadinoto Hadinoto⁶, Erni Hawayanti⁷, Nico Syahputra Sebayang⁷ and Trias Agung Pakati^{8,9}

¹Muhammadiyah University of Palopo, Palopo 91922, South Sulawesi, Indonesia; ²University of Muhammadiyah Malang, Malang 65144, East Java, Indonesia; ³Lumajang University, Lumajang 67316, East Java, Indonesia; ⁴Universiti Malaysia Sabah, 88400 Kinibalu, Sabah, Malaysia; ⁵Wiraraja University, Sumenep 69451, East Java, Indonesia; ⁶Universitas Lancang Kuning, Pekanbaru 28266, Riau, Indonesia; ⁷University of Muhammadiyah Palembang, Palembang 30263, South Sumatera, Indonesia; ⁸University of Brawijaya, Malang 65145; ⁹Mayantara School, Malang 65146, East Java, Indonesia.

Abstract | The advancement of digital technology has transformed the way agricultural extension services are delivered, with social media emerging as a crucial tool for disseminating information and connecting extension agents with farmers. However, despite the emphasis on individual characteristics and motivation in traditional extension models, their actual impact on extension performance remains uncertain. This study aims to examine the influence of extension characteristics, motivation, and social media utilization on agricultural extension performance in Luwu Utara, South Sulawesi, Indonesia. Given the increasing reliance on digital platforms, this research seeks to determine whether personal attributes and intrinsic motivation still play a significant role or if technological adoption, particularly social media utilization, serves as the primary driver of effective agricultural extension. This study employs Structural Equation Modeling (SEM) using the Partial Least Squares (PLS) approach to analyze the relationship between variables. A sample of 100 agricultural extension officers was selected from a population of 191. Data were collected through surveys and analyzed using SmartPLS 4, ensuring robust statistical evaluation. The findings indicate that characteristics ($t = 1.191$, $p = 0.234$) and motivation ($t = 0.424$, $p = 0.671$) do not have a significant effect, while social media utilization shows a strong positive impact ($t = 11.332$, $p = 0.000$). The model explains 44.7 % of the performance variance ($R^2 = 0.447$), suggesting that the effectiveness of agricultural extension is more influenced by digital engagement rather than personal attributes or motivation. These results emphasize the need for optimizing social media use as a strategic tool in agricultural extension, while policies should focus on improving digital literacy and technological access rather than solely enhancing individual characteristics or motivation.

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***Correspondence** | Adil Basir, Faculty of Agricultural Extension, Muhammadiyah University of Palopo, Jl. Jendral Sudirman KM 3 Binturu, Palopo City, South Sulawesi. 91922, Indonesia; **Email:** adil@umpalopo.ac.id

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Introduction

Expected to be the frontline in dealing with the economic crisis, agriculture is a sector with a key role in national economic development (Dutu, 2016; Prasetyo *et al.*, 2022a; Sutawi *et al.*, 2021) for its ability to provide food. While food demand elevates along with population growth (Hatfield and Walthall, 2015; Setyobudi *et al.*, 2023, 2024; Tonda *et al.*, 2022, 2023), agricultural advance is unable to keep up with the pace for various reasons the low agricultural resource quality is to name one (Adinurani *et al.*, 2021; Juswadi *et al.*, 2020; Sukorini *et al.*, 2023). As agribusiness becomes a tendency in the current agricultural development strategy, farmers as human resource is a crucial factor. Information on agribusiness tailored to the farmers' diverse conditions and needs is called for so that farmers would be able to manage their farm-based goods. Such service should be conveyed by agricultural extension institutes as the authorized body (Moojen *et al.*, 2022; Prasetyo *et al.*, 2022b) and accomplished by their agricultural extension.

Being in direct contact with farmers, agricultural extension attend to farmers for a better life. They are regarded as agents of change capable of transferring knowledge to empower society and supporting them to create and apply institutional access concerning the production, distribution, and consumption of farm-based products (Managanta, 2020). Their agricultural extension activities should be non-formal education for farmers to improve their welfare focusing on farming knowledge, mindset, and skill enhancement (Prasetyo *et al.*, 2022b; Ramzi *et al.*, 2021). Such responsibility makes their performance a priority in national agricultural development. Three indicators of preparation, execution, and evaluation of agrarian counseling assess an agricultural extension performance (Margot and Kettler, 2019).

Motivation is one of several factors that affect an agent's performance. Promoting human resource productivity and well-committed external and internal motivation should enhance an agricultural extension performance (Elliot *et al.*, 2017). Motivation, defined as a driving force (Ariadi *et al.*, 2021; Nataliningsih *et al.*, 2020), is the matter of encouraging and directing an individual's potency and ability to collaborate for a collective achievement productively. While in business, an employee's improved motivation assures sustainable profit for the company (Swafford,

2018), in agricultural extension, an agent's improved motivation should promise sustainable food provision in the long run. Salary is likely significant in an agent's performance (Roberts and Robinson, 2017) in addition to recognition of achievement, public acknowledgment, responsibility, career opportunity, and work relationships. Further, an agricultural extension is expected to motivate farmers, mainly when introducing unfamiliar farming methods or coping with problems. For this purpose, an agent might need to act as an innovator, a facilitator, a consultant, or a communicator such skills require high competence and performance.

However, chances exist that there are agents with less than adequate competence. Since competence affects performance, an agent's low competence consequently gives low performance (Ramesh and Krishnan, 2020). Training programs can be the answer, and it is made easy by the Internet. Copious research and advancements in agriculture and agricultural technology have been published on various social media, and they are accessible for agents (Thakur and Chander, 2018) wishing to upgrade their performances by expanding their horizons of knowledge. Social media utilization is measurable through (i) Duration, (ii) Usefulness, and (iii) Results (Barau and Afrad, 2017).

Studies on motivation and social media utilization have been presented. Motivation is proven to affect the performance of agricultural extension (Dutu, 2016; Mulyana *et al.*, 2021). The Internet helps to improve the performance of agrarian counseling agents (Ramesh and Krishnan, 2020), and utilizing cyber extension is beneficial to improve the performance of agricultural extension (Sabir *et al.*, 2018). Utilization of social media has also proven influential in the performance of agrarian counseling agents (Ali-Hasan *et al.*, 2015). However, a study on the influence of motivation and social media utilization on the performance of agricultural extension has not been found.

Therefore, this study aims to examine the influence of motivation and utilization of social media on the performance of agricultural extension agents in Luwu Regency, South Sulawesi, Indonesia.

Materials and Methods

This study aimed to examine the influence of motivation and utilization of social media on the

performance of agricultural extension in Luwu Regency, South Sulawesi, Indonesia. The research was conducted between September and December 2023.

A quantitative research approach was employed, utilizing a survey method with a structured questionnaire as the primary data collection instrument. The study population consisted of 191 agricultural extension actively working in Luwu Regency. A proportional random sampling technique was applied to ensure representative sampling, resulting in a final sample of 100 respondents (Ofuoku and Isife, 2009). The selection of respondents was based on their active role in agricultural extension services, ensuring that the sample accurately reflected the target population.

The collected data were analyzed using Structural Equation Modeling (SEM) with the Partial Least Squares (PLS) method, an advanced statistical technique for examining both direct and indirect relationships between variables (Hair *et al.*, 2019; Wong, 2013). SmartPLS software was employed for data processing and analysis. The study framework is grounded in the Theory of Planned Behavior (TPB) (Ajzen, 1991) and the diffusion of innovation theory (Rogers, 2003), which explain the influence of individual characteristics, motivation, and technology utilization on behavioral outcomes.

In this study, individual characteristics (X1) represent the demographic and professional attributes of agricultural extension agents, which have been shown to influence work performance (Ajzen, 1991). Motivation (X2) is a key psychological driver that affects an individual's willingness to adopt new practices and improve job performance (Ryan and Deci, 2000). Utilization of social media (X3) is examined through the lens of the diffusion of innovation theory (Rogers, 2003), where social media serves as a communication channel that facilitates knowledge dissemination and enhances extension service effectiveness.

This methodological approach follows the guidelines of Casula *et al.* (2021) to ensure the validity and reliability of findings. The SEM-PLS model was applied to analyze the direct impact of these three independent variables on agricultural extension performance (Y), providing a comprehensive understanding of the factors influencing extension effectiveness.

Results and Discussion

Characteristics of the respondents

Out of 100 respondents (Ofuoku and Isife, 2009), the recorded characteristics are as below:

Gender: Referring to Figure 1, most respondents (52 %) were male while the rest (48 %) were female. It implies that agricultural extension activities are performed more by men than by women (Figure 2).

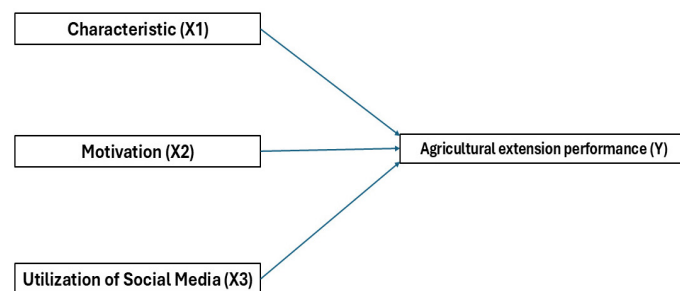


Figure 1: Concept of the study.

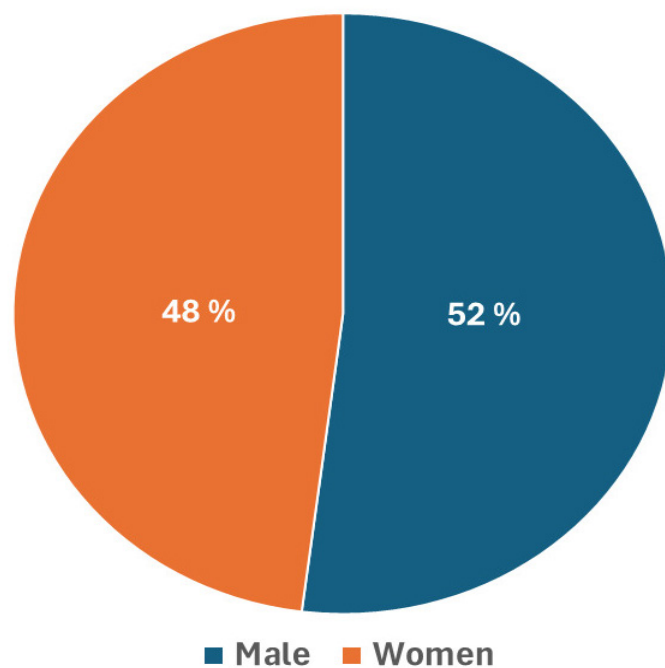
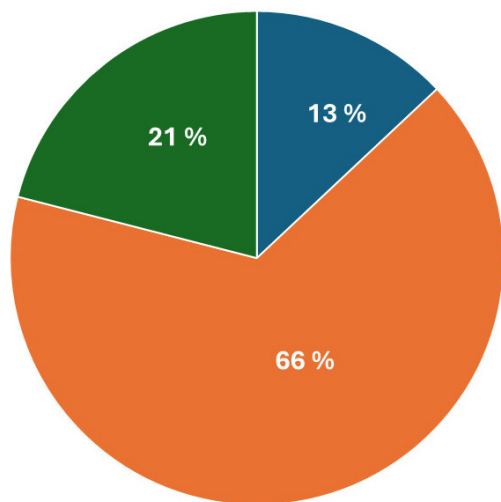


Figure 2: Characteristics of the respondents by gender.

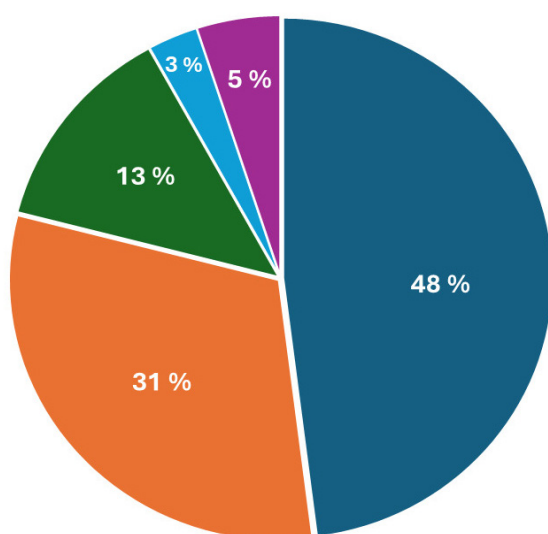
Educational background: As depicted in Figure 3, agricultural extension activities in the study area are mainly carried out by agents with Bachelor's Degrees (66 %), followed by those with Master's Degrees (21 %) and associate's Degrees (13 %).

Counselling experience: Figure 4 shows that most agents in the study area have worked in agricultural extension for over 20 yr (48 %). Meanwhile, 31 % of them are experienced in the field between 6 yr and 10 yr, and 3 % are 16 yr to 20 yr.



■ Associate's Degrees ■ Bachelor's Degrees ■ Master's Degrees

Figure 3: Characteristics of the respondents by educational background.



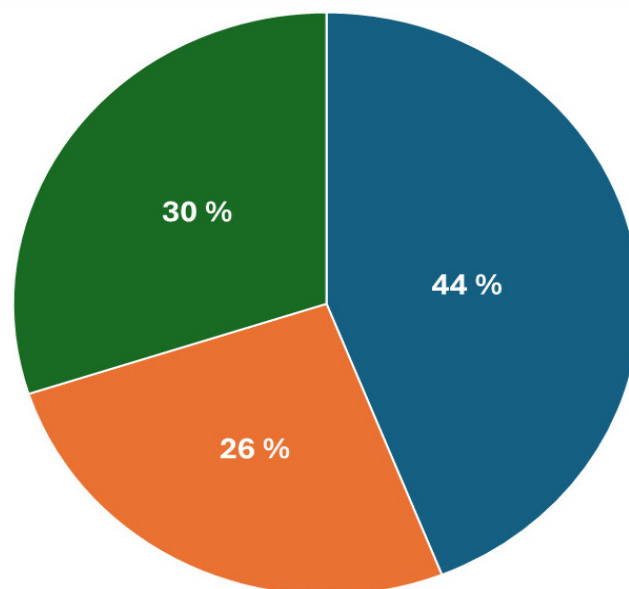
■ 1 yr to 5 yr ■ 6 yr to 10 yr ■ 11 yr to 15 yr ■ 16 yr to 20 yr ■ > 20 yr

Figure 4: Characteristics of the respondents by agricultural extension experience.

Office division: As a national program, the implementation of agricultural extension starts from the Ministry of Agriculture to be delivered by provincial, municipal, and regency offices. In the study area, as shown in Figure 5, agricultural extension is dominated by ministry officers (44 %), followed by regency ones (30 %). Agents from provincial and municipal offices make up 26 % of the respondents.

Outer model analysis (Figure 6)

Validity test: A validity test serves as a warrant that a questionnaire is valid for gaining certain data. This study ran a convergent validity calculation, where an instrument is accepted as valid when an average variant extracted (AVE) rate is > 0.5 (Suryani and Tentama, 2020; Zait and Berteau, 2011).



■ Ministry officers ■ Provincial officers ■ Regency officers

Figure 5: Characteristics of the respondents by office division.

Table 1: Average variant extracted reliability test.

Variable	AVE	Remark
Characteristic (X1)	0.663	Valid
Motivation (X2)	0.649	Valid
Utilization of Social media (X3)	0.572	Valid
Agricultural extension performance (Y)	0.573	Valid

As listed in Table 1, it is gathered that all variables of this study are valid as each of their values is of AVE > 0.5.

Reliability test: Cronbach's Alpha and Composite Reliability values determine if the variables of a study are reliable. Cronbach's Alpha value < 0.7 should serve as the bottom line, while Composite Reliability is the threshold of 0.70 to 0.95. Indicator redundancy is present if any value from the abovementioned ranges appears (Suryani and Tentama, 2020).

Table 2: Reliability test.

Variable	Cronbach's alpha	Composite reliability	Remark
Characteristic (X1)	0.791	0.854	reliable
Motivation (X2)	0.747	0.846	reliable
Utilization of social media (X3)	0.916	0.930	reliable
Agricultural extension performance (Y)	0.917	0.930	reliable

As detailed in Table 2, all variables are of Cronbach's Alpha > 0.7 and composite reliability 0.70 to 0.95.

Since no redundancy is found, all indicators are asserted as reliable.

Inner model analysis (Figure 7)

R-square test: R-square value of 0.75 is stated as substantial, while one of 0.50 is considered moderate and 0.25 insubstantial; meanwhile, an R-square value of > 0.9 is parallel to overfit (Sarstedt *et al.*, 2021; Suryani and Tentama, 2020).

Table 3: R-Square test.

Variable	R square	R-square adjusted
Agricultural extension performance (Y)	0.447	0.430

Table 4: Hypothesis test.

Variable	T statistic	P value	Remark
Characteristic (X1) → Agricultural extension performance (Y)	1.191	0.234	Not significant
Motivation (X2) → Agricultural extension performance (Y)	0.424	0.671	Not significant
Utilization of social media (X3) → Agricultural extension performance (Y)	11.332	0.000	Significant

Based (Table 3) on the R-Square value of 0.447 as seen in Table 4 it can be concluded that motivation and social media utilization are 40.80 % influential on agricultural extension performance, while 59.20 % are a factor (s) unexplored in this study.

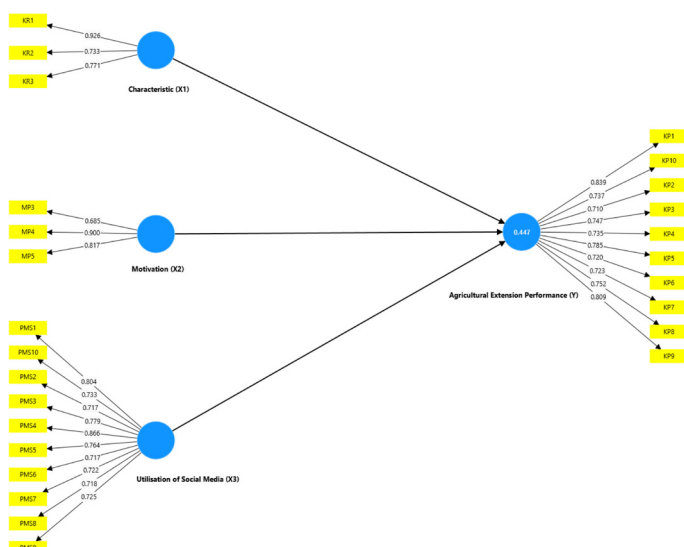


Figure 6: Outer model.

Hypothesis test

Characteristic and agricultural extension performance: The research findings indicate that the

characteristics of agricultural extension workers do not have a significant impact on extension performance. This is evidenced by the t-statistic value of 1.191, which is substantially lower than the critical t-value in standard hypothesis testing. Furthermore, the p -value of 0.234 exceeds the significance threshold ($\alpha = 0.05$ or 5 %), indicating insufficient statistical evidence to assert that the characteristics of extension workers directly influence agricultural extension performance. Theoretically, characteristics such as age, educational level, work experience, and communication skills are often considered contributing factors to extension effectiveness (Bulkis *et al.*, 2024; Managanta, 2020; Rosa *et al.*, 2024). However, in this study, these factors appear to be insufficiently strong to exert a significant influence on agricultural extension performance.

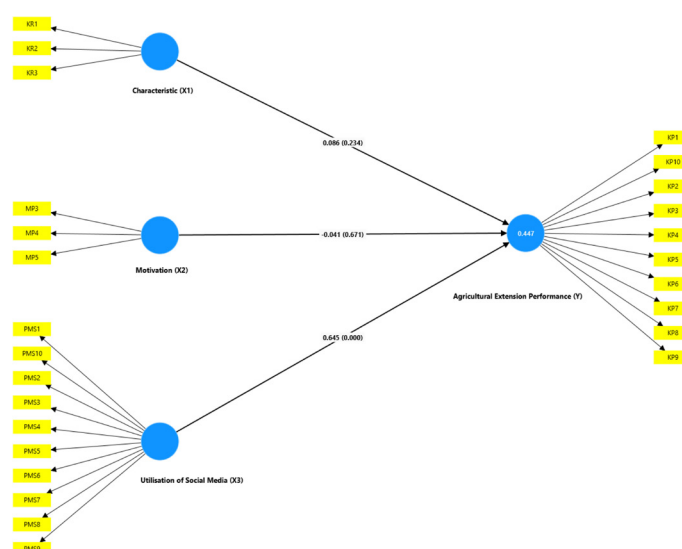


Figure 7: Inner model.

A comparison of these findings with previous studies reveals both consistent and contradictory results. Several prior studies, such as that conducted by Nwaogu and Akinbile (2018) in Oyo and Ogun state ADPs, found that the characteristics of extension workers did not have a significant relationship with extension performance. Another study by Nyairo *et al.* (2021) in Kakamega County, Kenya, similarly concluded that the work experience of agricultural extension workers did not directly impact extension effectiveness, instead, institutional factors and technological support played a more crucial role. These findings suggest that the success of agricultural extension services is more dependent on systemic support rather than the individual characteristics of extension workers themselves.

Conversely, some studies have yielded different results.

Piñeiro *et al.* (2020) reported that the educational level and work experience of extension workers had a positive and significant relationship with extension success. Similarly, a study by Danso-Abbeam *et al.* (2018) in the North-ern region of Ghana revealed that the communication skills of extension workers significantly influenced agricultural productivity. These discrepancies may be attributed to variations in research methodologies, sample characteristics, and the control variables employed. While some studies emphasize individual attributes of extension workers, others highlight the dominant role of institutional and technological factors in shaping extension performance.

Several factors may account for the non-significant influence of extension worker characteristics in this study. First, variations in extension methods may have influenced the results, particularly if digital technology played a more significant role than direct communication (Agussani and Sulasmi, 2021; Mugwisi *et al.*, 2015). Second, the increasing digitalization of agricultural extension services may have shifted the role of extension workers from direct information providers to facilitators connecting farmers with digital information sources (Steinke *et al.*, 2021). Third, adequate institutional support and resource availability may have diminished the influence of individual characteristics in determining extension effectiveness (Basir *et al.*, 2024).

These findings suggest that the characteristics of extension workers are not always the dominant factor in determining agricultural extension performance. The implications of this study highlight that policies aimed at improving extension performance should not solely focus on individual attributes but also consider more influential factors, such as optimizing technology use in extension services, enhancing resource accessibility, and developing more effective communication strategies (Danso-Abbeam *et al.*, 2018).

Motivation and agricultural extension performance

The study results indicate that motivation (X2) does not have a significant effect on agricultural extension performance (Y), with a t-value of 0.424 and a *p*-value of 0.671 (*p* > 0.05). The *p*-value greater than 0.05 suggests that the relationship between motivation and performance is not statistically significant (Table 4). These statistical results confirm that motivation

is a crucial factor in driving the performance of agricultural extension, consistent with previous research findings by Managanta (2020) and Mulyana *et al.* (2021).

The results of this study indicate that motivation does not have a significant effect on the performance of agricultural extension workers. This finding differs from several previous studies that demonstrated a positive relationship between motivation and extension performance.

For example, a study by Indraningsih *et al.* (2023) found that extension worker characteristics, working conditions, and motivation positively influenced the performance of agricultural extension workers, which in turn affected farmers' behavior in the region.

Similarly, a study by Sapar *et al.* (2015) in Palopo City, Luwu Regency, Nort Luwu dan East Luwu, South Sulawesi, Indonesia showed that motivation had a strong correlation with agricultural extension worker performance, contributing 56 %. Work culture also had a significant impact, contributing 62 %, and together, motivation and work culture had a synergistic effect of 66 % on extension worker performance.

However, some studies have presented different findings. Tamsan and Yusriadi (2022) found that factors such as age, work experience, the implementation of extension methods, and the competence of extension workers contributed more to their performance than motivation.

The differences between this study and previous research may be due to several factors. First, respondent characteristics and work environments may differ, influencing how motivation affects performance. Second, other variables such as competence, work discipline, or organizational culture may play a more dominant role in shaping agricultural extension performance. Third, variations in research methods, measurement instruments, and data analysis techniques may also contribute to differing results.

Thus, the findings of this study highlight the importance of considering multiple factors that influence the performance of agricultural extension workers. Motivation alone may not always be the primary determinant of performance, and a more holistic approach is needed to effectively understand

and improve agricultural extension performance (Kusumawati, 2015).

Utilization of social media and agricultural extension performance

This study's findings indicate that social media utilization (X3) has a significant impact on agricultural extension performance (Y). This is evidenced by a t-statistic value of 11.332 and a *p*-value of 0.000, meaning that the relationship between these two variables is statistically significant. The t-statistic, which is much higher than the critical t-value, suggests that social media has a strong influence on the effectiveness of agricultural extension. Furthermore, the very small *p*-value (less than 0.05) confirms that this effect is not due to chance but has a solid empirical basis.

The use of social media in agricultural extension offers various benefits, including improving accessibility to agricultural information for both extension workers and farmers, accelerating communication among stakeholders, and facilitating the sharing of innovations and the latest technologies in the agricultural sector (Kustanti *et al.*, 2020). However, the effectiveness of its utilization can be influenced by several factors, such as the digital literacy levels of extension workers and farmers, internet infrastructure in agricultural areas, and the type of social media platforms used (Barau and Afrad, 2017). Therefore, optimization strategies are needed, such as training programs to enhance the digital skills of extension workers, the development of specialized digital platforms for agricultural extension, and policy support to expand internet access in rural agricultural regions (Kustanti *et al.*, 2020).

Research on the impact of social media utilization on agricultural extension performance has been widely conducted, with most findings indicating a positive relationship between the two (Barau and Afrad, 2017; Kustanti *et al.*, 2020; Mustaniroh *et al.*, 2020). These studies highlight how social media can serve as an effective tool for improving extension workers' competence and the overall effectiveness of agricultural extension activities.

A study by Thakur and Chander (2018) in the state of Himachal Pradesh, found that the frequency and duration of social media use by agricultural extension workers were significantly associated with their competency improvement. Extension workers

who frequently used platforms such as WhatsApp, Facebook, and YouTube tended to have better competencies in carrying out their extension duties.

Similarly, a study by Iwuchukwu *et al.* (2019) in Enugu state, Nigeria, revealed that social media utilization by extension workers had a direct impact on enhancing their competencies. Factors such as institutional support and individual characteristics of extension workers also played a crucial role in determining the effectiveness of social media use in agricultural extension activities.

However, not all studies have found a strong positive relationship. A study by Retnaningtyas *et al.* (2021) and Putro and Muchtasib (2023) showed that exposure to digital information media was still relatively low, particularly in terms of frequency and duration of internet usage among extension workers. Furthermore, their information literacy was considered suboptimal, indicating that social media utilization had not yet effectively improved agricultural extension performance in that region.

Overall, this study reinforces the important role of social media in enhancing agricultural extension performance. With more optimal utilization, the effectiveness of agricultural extension can be further improved, ultimately contributing to increased productivity and the well-being of farmers. This discovery supports previous research conducted by Ramesh and Krishnan (2020), Sabir *et al.* (2018), and Ali-Hassan *et al.* (2015).

The role of social media in enhancing performance

According to Soelaiman and Ekawati (2021) social media plays a crucial role in enhancing the performance of agricultural extension. Extension workers can access the latest information on agricultural technologies, best practices, and relevant innovations through social media platforms. This information is invaluable in helping them provide more accurate and up-to-date advice to farmers. Additionally, social media allows extension workers to communicate and share knowledge with their peers across different regions, thereby creating a broader and stronger professional network (Ghosh *et al.*, 2021; Wang *et al.*, 2020).

The ability to access real-time information through social media also enables extension workers to respond more quickly to challenges and issues faced by farmers.

For instance, if there is a plant disease outbreak, extension workers can immediately seek information on how to handle it and quickly disseminate that information to farmers. The speed and efficiency in delivering this information can significantly impact agricultural productivity and farmers well-being.

The positive impact of social media on interaction and collaboration

Moreover, social media facilitates more effective interaction and collaboration between extension workers and farmers. Extension workers can build online communities through social media platforms where they and farmers can discuss, share experiences, and support each other. This interactive and two-way communication can strengthen the relationship between extension workers and farmers, increase trust, and encourage active farmer participation in extension activities (Barau and Afrad, 2017).

Social media also enables extension workers to reach a wider audience, including younger generations who may be more interested and active in using digital technology. By involving more young farmers in extension activities through social media, extension workers can help ensure that good agricultural knowledge and practices are continuously applied and improved from generation to generation (Kustanti et al., 2020).

Conclusions and Recommendations

This study concludes that motivation and social media utilization influence agricultural extension performance. Boosting the agents motivation and expanding social media use should optimize the spread of agrarian information among farmers, which, in due course, will support farmers productivity and increase the nation's agricultural sustainability. Other factors for improving agricultural extension' performance are recommended to examine in the following studies. The same research should also apply to samples in different areas. Considering the pivotal role of social media in advancing agricultural extension services, structured training programs are necessary to enhance the digital competencies of extension agents. These programs should be designed to develop proficiency in content creation, audience engagement, and the dissemination of verified agricultural information. By ensuring the accuracy and practicality of shared knowledge, such initiatives can improve the effectiveness of digital

communication and support informed decision-making among farmers.

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Novelty Statement

This study uniquely investigates the combined impact of motivation and social media utilization on the performance of agricultural extension in the Luwu Regency. While previous research has individually established the influence of motivation (Linda and Riswani, 2021; Serang et al., 2023; Warsana et al., 2024) and social media on agricultural agents' performance (Andriani et al., 2023; Chepkirui, 2021; Mamgain et al., 2020), this study is the first to explore their synergistic effect using a multiple linear regression approach. By integrating these two critical factors, the research provides novel insights into how enhancing both motivational levels and social media engagement can significantly improve the effectiveness of agricultural extension. This dual-focus approach offers a comprehensive understanding of performance determinants. It proposes actionable strategies for optimizing agrarian extension services in Luwu Regency and beyond.

Author's Contribution

Adil Basir: Conceptualized and designed the study, elaborated on the intellectual content, performed a literature search, and prepared and revised the manuscript.

Sutawi Sutawi and Bambang Yudi Ariadi: Research supervision and elaborate the intellectual content

Rusli Tonda: Performed literature search, manuscript preparation, and manuscript revision

Sapar Sapar and Imelda Rosa: Statistical analysis

Waris Ali Khan, Marhani Marhani and Hadinoto

Hadinoto: Performed the literature search and manuscript review.

Erni Hawayanti: Administration, Turnitin check, Grammar check, rewrite

Trias Agung Pakarti: English scientific writing and

Conflict of interest

The authors have declared no conflict of interest.

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