Journal of Urban Sociology
ISSN 2620-5211 (Print) ISSN 2656-3339 (Online)

Volume 8, Issue 2, October 2025
DOI: https://doi.org/10.30742/jus.v8i2.5052
Received: 1 December 2025
Received in revised form: 13 December 2025
Accepted: 16 December 2025
Published online: 20 December 2025

The Effect Of Digital Capability And Individual Absorptive Capacity On The Performance Of Agricultural Extension Workers In Ngawi Regency

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Abstract

The advancement of digital technology in the Industrial Revolution 4.0 era has significantly transformed agricultural extension services, particularly in improving information delivery to farmers. This study aims to examine the effects of Digital Capability and Individual Absorptive Capacity on the performance of agricultural extension workers in Ngawi Regency. A quantitative approach was applied using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS. The outer model was evaluated through convergent validity, discriminant validity, and construct reliability, while the inner model was assessed using multicollinearity analysis, path coefficients, t-statistics, and p-values. The results indicate that Digital Capability has a positive and significant effect on extension performance ($\beta = 0.492$; $p = 0.002$). Individual Absorptive Capacity also shows a positive and significant effect ($\beta = 0.305$; $p = 0.049$). Simultaneously, both variables significantly contribute to improving extension performance. These findings highlight that strengthening digital skills and absorptive capacity is essential for enhancing the quality of agricultural extension services in the digital era.

Keywords: *absorptive capacity; agricultural extension; digital capability; extension performance; SmartPLS*

Abstrak

Kemajuan teknologi digital pada era Revolusi Industri 4.0 telah membawa transformasi signifikan dalam layanan penyuluhan pertanian, khususnya dalam meningkatkan penyampaian informasi kepada petani. Penelitian ini bertujuan untuk mengkaji pengaruh Digital Capability dan Individual Absorptive Capacity terhadap kinerja penyuluh pertanian di Kabupaten Ngawi. Pendekatan kuantitatif diterapkan menggunakan Partial Least Squares–Structural Equation Modeling (PLS-SEM) dengan perangkat lunak SmartPLS. Evaluasi outer model dilakukan melalui uji validitas konvergen, validitas diskriminan, dan reliabilitas konstruk, sementara inner model dinilai menggunakan analisis multikolinearitas, koefisien jalur, nilai t-statistik, dan p-value. Hasil penelitian menunjukkan bahwa Digital Capability berpengaruh positif dan signifikan terhadap kinerja penyuluh ($\beta = 0.492$; $p = 0.002$). Individual Absorptive Capacity juga menunjukkan pengaruh positif dan signifikan ($\beta = 0.305$; $p = 0.049$). Secara simultan, kedua variabel memberikan kontribusi signifikan dalam meningkatkan kinerja penyuluhan. Temuan ini menegaskan bahwa penguatan keterampilan digital dan absorptive capacity sangat penting untuk meningkatkan kualitas layanan penyuluhan pertanian di era digital.

Kata Kunci: *absorptive capacity; penyuluhan pertanian; digital capability; kinerja penyuluh; SmartPLS*

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Citation Suggestion:
Ramadhan, Dhika Yogi Exsananda. (2025). The Effect Of Digital Capability And Individual Absorptive Capacity On The Performance Of Agricultural Extension Workers In Ngawi Regency. *Journal of Urban Sociology*, 8(2), 144-154. DOI: https://doi.org/10.30742/jus.v8i2.5052

Introduction

The development of digital technology in the era of the Industrial Revolution 4.0 has had a significant impact on various sectors, including agriculture. The use of information and communication technology has become a key factor in supporting the duties of agricultural extension workers to improve the effectiveness, efficiency, and accuracy of information delivery to farmers. Agricultural extension workers are required to integrate digital capability into every extension activity in order to accelerate the dissemination of agricultural knowledge and innovation (Setiadi & Lestari, 2022). Therefore, mastery of digital technology is an important aspect in enhancing the professionalism and performance of extension workers in the field.

However, several studies indicate that most agricultural extension workers in Indonesia still face challenges in optimizing the use of digital technology. Limited digital literacy, a lack of technology-based training, and insufficient infrastructure support are the main obstacles to the implementation of digital-based extension systems (Rahman et al., 2021). This phenomenon is also evident in Ngawi Regency, where a number of agricultural extension workers have not fully utilized the Cyber Extension platform to support extension activities. This condition suggests that digital capability has not yet been fully internalized in the daily work practices of agricultural extension workers.

In addition to digital capability, another factor that influences the effectiveness of extension activities is individual absorptive capacity, which refers to an individual's ability to recognize the value of external knowledge, assimilate the information, and apply it in a work context (Cohen & Levinthal, 1990). Extension workers with a high level of absorptive capacity tend to be more adaptive to change and more capable of creatively implementing agricultural innovations. The findings of Puspitasari and Hidayat (2022) also show that individual absorptive capacity plays an important role in strengthening extension workers' ability to adapt to new technologies and digital extension methods.

Previous studies have demonstrated a positive relationship between digital capability and individual performance across various sectors. Nugroho et al. (2023) found that digital capability can enhance work effectiveness and individual innovation, while Rachmawati and Prasetyo (2022) emphasized that absorptive capacity is a key factor in supporting knowledge-based performance. Nevertheless, studies that examine these two variables simultaneously in the context of agricultural extension are still limited, especially in regions with different institutional characteristics and levels of digital infrastructure, such as Ngawi Regency.

Based on this research gap, the present study aims to analyze the relationship between digital capability and individual absorptive capacity on the performance of agricultural extension workers in Ngawi Regency. The novelty of this study lies in the simultaneous examination of both variables within the context of agricultural extension in a region that has received limited attention in digitalization studies, namely Ngawi Regency, as well as in strengthening the practical implications for improving extension workers' competencies through the integration of digital capability and knowledge absorptive capacity. Therefore, this study is expected to provide both empirical and practical contributions to the strengthening of agricultural extension systems in the digital era.

This study is also relevant to the efforts of the Ngawi Regency Government, which has begun implementing the SIKETAN application as a digital-based system for reporting and monitoring agricultural activities. The implementation of this application requires agricultural extension workers to possess adequate digital capability and absorptive capacity in order to optimally utilize the features of SIKETAN. Thus, this study is expected to contribute empirically and practically to strengthening the agricultural extension system in the digital era while also supporting the effectiveness of regional agricultural digitalization programs.

Method

This study employed a quantitative correlational research design to examine the relationship between digital capability, individual absorptive capacity, and the performance of agricultural extension workers in Ngawi Regency. The correlational approach was

chosen because it allows the identification of the degree and direction of relationships among the variables without manipulating them (Creswell, 2014). This method has also been widely used in previous studies analyzing the relationship between technological capability and employee performance (Nugroho et al., 2023; Rachmawati & Prasetyo, 2022).

The population of this study consisted of all agricultural extension workers working in Ngawi Regency. A total sampling technique was applied, considering the limited number of extension workers and the feasibility of collecting data from the entire population. Data were collected using a structured questionnaire distributed both offline and online to ensure higher accuracy and validity of responses.

The research instrument was developed by adapting measurement indicators from previous validated studies. Digital capability was measured based on the dimensions proposed by Westerman et al. (2014), which include digital skills, digital integration, and digital agility. Individual absorptive capacity was measured using indicators developed by Cohen and Levinthal (1990), covering knowledge acquisition, assimilation, transformation, and exploitation. The performance of agricultural extension workers was assessed using indicators of task performance, service quality, and work effectiveness as suggested by Bernardin and Russell (2013).

All questionnaire items were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Prior to data collection, validity and reliability tests were conducted. Validity was assessed using Pearson's product-moment correlation, while reliability was tested using Cronbach's Alpha coefficient with a minimum threshold of 0.70.

The collected data were analyzed using descriptive and inferential statistical methods. Descriptive analysis was used to describe respondents' characteristics and the distribution of each variable. Inferential analysis was conducted using Pearson correlation and multiple linear regression to determine the strength and significance of the relationships among variables. Data analysis was carried out with the assistance of SPSS version 26.

In addition to basic statistical analysis, the data were also processed using SmartPLS to strengthen the examination of relationships among latent variables. SmartPLS was chosen because it is capable of analyzing models involving latent constructs with multiple indicators and does not require strict data distribution assumptions. In the initial stage, an outer model evaluation was conducted, including tests of convergent validity, discriminant validity, and construct reliability through loading factor values, Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's Alpha. This stage aimed to ensure that the indicators consistently and accurately explained the constructs. After the outer model met the required criteria, the analysis proceeded to the inner model to examine the structural relationships among latent variables.

The inner model evaluation was conducted by assessing path coefficients, t-statistics, and p-values obtained through the bootstrapping procedure, as well as R-square values to determine the predictive power of the model. Through these stages, SmartPLS provided a more comprehensive understanding of the effects of digital capability and individual absorptive capacity on the performance of agricultural extension workers in Ngawi Regency.

Hypothesis testing in this study was conducted using the bootstrapping procedure in SmartPLS to obtain t-statistics and p-values as the basis for decision-making. Each hypothesis was accepted if the p-value was less than 0.05 and the t-statistic exceeded 1.96 at a 5% significance level. This testing enabled the researcher to determine whether digital capability and individual absorptive capacity had a significant effect on the performance of agricultural extension workers. In addition, SmartPLS provided information on the magnitude of the effects through path coefficients, allowing the direction and strength of the relationships among variables to be identified. The results of hypothesis testing complemented the findings of the inner model analysis and formed the basis for drawing conclusions regarding the structural relationships in the research model. Thus, the use of SmartPLS provided more comprehensive and accurate empirical support for hypothesis testing in this study.

Results And Discussion

Respondent Characteristics

The respondents in this study were Field Agricultural Extension Workers (Penyuluh Pertanian Lapangan/PPL) assigned in Ngawi Regency. A total of 137 respondents participated in the study, each representing one assisted village. Therefore, the data obtained were able to comprehensively represent the overall condition of agricultural extension services in the region. Data were collected through an online questionnaire and analyzed descriptively to describe the profile of agricultural extension workers in the study area.

In terms of gender, the profession of agricultural extension workers is still dominated by males, accounting for 62.8% of respondents, while female extension workers represent 37.2%. This indicates that extension work, which requires high field mobility, is still more commonly undertaken by men. Nevertheless, the relatively substantial proportion of female extension workers reflects the increasing contribution of women in agricultural extension activities.

With regard to age, most respondents belong to senior and experienced age groups. The largest age group was 51–55 years (27.7%), followed by those aged 41–45 years and 46–50 years, each accounting for 22.6%. Meanwhile, extension workers under 30 years of age were relatively few (9.5%). This condition indicates the dominance of experienced extension workers, while also highlighting the need for continuous regeneration of younger extension personnel.

The educational background of the respondents indicates that the quality of human resources among extension workers is relatively high. The majority of respondents hold a bachelor's degree (65.7%), followed by a diploma (D4) at 13.9% and a master's degree at 12.4%, while only 6.6% graduated from senior high school or vocational high school. This high level of education supports extension workers' ability to understand and adopt digital technologies in agricultural extension activities.

Based on length of service, most extension workers have extensive work experience. Respondents with more than 10 years of service dominated the sample (54.7%), followed by those with 6–10 years of experience at 16.8%. Meanwhile, extension workers with less than 5 years of service accounted for 25.5%. This composition indicates that most extension workers possess strong experiential depth in assisting farmers, while the presence of younger extension workers also represents an important potential for accelerating the digitalization of agricultural extension services.

Results

This section presents the main results of the data analysis along with a discussion that explains the research findings in greater depth. The results are organized according to the research objectives and the predefined hypothesis testing, thereby providing a systematic overview of the relationships among the variables examined. Each finding is critically analyzed by comparing it with relevant theories and previous research in order to strengthen the interpretation and provide a more comprehensive scientific context. Through the presentation of these results and discussions, readers are expected to gain a clear understanding of the empirical and theoretical implications of the study.

1. Measurement Model Evaluation (Outer Model)

The evaluation of the outer model, or measurement model, aims to assess the quality of the indicators in representing the measured latent variables. At this stage, the analysis focuses on ensuring that each indicator demonstrates adequate validity and reliability so that the constructs can be interpreted accurately. The outer model evaluation was conducted through the following steps:

a. Convergent Validity Test

Convergent validity in this study was assessed based on the loading factor values of each indicator. An indicator is considered to meet convergent validity if it has a loading factor value of ≥ 0.70. For the Digital Capability variable, most indicators showed loading values above 0.70, such as DC3 (0.713), DC5 (0.730), and DC10 (0.717), and were therefore considered valid. However, several indicators, including DC11 (0.219), DC12 (0.392), DC13 (0.464), and DC14 (0.426), exhibited values below the minimum threshold and should be considered for elimination because they do not optimally represent the construct.

For the Individual Absorptive Capacity variable, almost all indicators demonstrated strong loading factor values, such as IAC3 (0.808), IAC4 (0.863), IAC5 (0.829), and IAC6 (0.809), indicating good convergent validity for this construct. Some indicators, such as IAC7 (0.630) and IAC8 (0.641), were below the ideal value but may still be retained if the construct's Average Variance Extracted (AVE) meets the required criteria.

Regarding the Agricultural Extension Workers' Performance variable, most indicators showed high loading factor values, including KPP5 (0.836), KPP7 (0.801), and KPP10 (0.811), indicating strong convergent validity. Only a few indicators were below the 0.70 threshold, such as KPP1 (0.691) and KPP9 (0.621), and therefore require further consideration. Overall, the majority of indicators across the three variables met the convergent validity criteria, indicating that the constructs were well explained by the indicators used.

a. Discriminant Validity Test

	Cronc alpha	Composite reliability (rho_a)	Average variance extracted (AVE)
Digital Capability	0.717	0.742	0.630
Individual Absorptive Capacity	0.918	0.926	0.638
Agricultural Extension Workers' Performance	0.939	0.944	0.621

Discriminant validity in this study was evaluated using the Average Variance Extracted (AVE) values and construct reliability through Cronbach's Alpha and Composite Reliability. A construct is considered to meet discriminant validity if its AVE value exceeds 0.50, indicating the construct's ability to adequately distinguish itself from other constructs.

Based on the test results, all variables—Digital Capability, Individual Absorptive Capacity, and Agricultural Extension Workers' Performance—showed AVE values that met the required criteria, with values of 0.630, 0.638, and 0.621, respectively. These AVE values indicate that each construct is able to explain a substantial proportion of the variance of its indicators while maintaining sufficient distinction from other constructs. Therefore, it can be concluded that the measurement model in this study satisfies discriminant validity, confirming that each construct is unique and does not overlap with others in explaining the phenomena under investigation.

b. Construct Reliability Test

Construct reliability in this study was assessed by examining the values of Cronbach's Alpha, Composite Reliability (CR), and rho_A to ensure the internal consistency of each variable. In general, a construct is considered reliable if it has Cronbach's Alpha and Composite Reliability values above 0.70. Based on the analysis results, all three research constructs—Digital Capability, Individual Absorptive Capacity, and Agricultural Extension Workers' Performance—demonstrated very good reliability.

Digital Capability showed a Cronbach's Alpha value of 0.717 and a Composite Reliability value of 0.836. Individual Absorptive Capacity had a Cronbach's Alpha of 0.918 and a Composite Reliability of 0.934, while Agricultural Extension Workers' Performance achieved a Cronbach's Alpha value of 0.939 and a Composite Reliability of 0.947. All of these values exceed the recommended minimum threshold, indicating that each construct has a high level of internal consistency and is able to measure the intended concept in a stable and reliable manner. Therefore, the research instrument used in this study meets the criteria for construct reliability.

1. Structural Model Evaluation (Inner Model)

The evaluation of the structural model (inner model) was conducted to determine the strength and direction of the relationships among the latent variables, as well as to assess the model's ability to explain the endogenous variables. This evaluation was carried out using the bootstrapping procedure in SmartPLS, which provides statistical evidence regarding the significance and magnitude of the relationships specified in the research model.

a. Multicollinearity Test

	DC	IAC	KPP
DC		1.000	1.450
IAC			1.450
AEWP			

Uji multikolinieritas dilakukan untuk This test was conducted to ensure that there is no very high correlation among the predictor variables that could interfere with the estimation of the structural model. The evaluation was performed by examining the Variance Inflation Factor (VIF) values for each construct. Based on the analysis results, the VIF values for Digital Capability and Individual Absorptive Capacity in relation to the Agricultural Extension Workers' Performance variable were both 1.450. These values are far below the commonly used tolerance threshold of VIF < 5 and even fall within the stricter and safer category of VIF < 3. This indicates that there is no evidence of multicollinearity among the constructs in the research model. Therefore, both predictor variables Digital Capability and Individual Absorptive Capacity can be considered statistically independent and appropriate for use in further structural analysis.

b. Uji Hipotesis

	Original sample (O)	**Sample mean (M)**	**T statistics (|O/STDEV|)**	**P values**
Digital Capability -> Agricultural Extension Workers' Performance	0.492	0.508	3.191	0.002
Individual Absorptive Capacity -> Agricultural Extension Workers' Performance	0.305	0.328	1.977	0.049

1) Effect of Digital Capability on Agricultural Extension Workers' Performance (Hypothesis 1)

The analysis results indicate that Digital Capability (X1) has a positive and significant effect on Agricultural Extension Workers' Performance (Y). This is evidenced by an original sample value of 0.492, indicating that extension workers' digital capability contributes positively to improving their performance. The t-statistic value of 3.191 (> 1.96) and a p-value of 0.002 (< 0.05) confirm that this effect is statistically significant. Therefore, the hypothesis stating that Digital Capability has a positive and significant effect on Agricultural Extension Workers' Performance is accepted. This finding implies that the higher the extension workers' ability to utilize digital technology, the better the performance they achieve in extension activities.

2) Effect of Individual Absorptive Capacity on Agricultural Extension Workers' Performance (Hypothesis 2)

Individual Absorptive Capacity (X2) is also proven to have a positive and significant effect on Agricultural Extension Workers' Performance (Y). The original sample value of 0.305 indicates that extension workers' capacity to acquire, understand, assimilate, and apply new knowledge contributes to improved performance. The t-statistic value of 1.977 (≥ 1.96) and a p-value of 0.049 (< 0.05) show that this effect is at the threshold of statistical significance but still meets the criteria for hypothesis testing. Thus, the hypothesis stating that Individual Absorptive Capacity has a positive and significant effect on Agricultural Extension Workers' Performance is accepted.

3) Simultaneous Effect of Digital Capability and Individual Absorptive Capacity on Agricultural Extension Workers' Performance (Hypothesis 3)

Simultaneously, both variables X1 and X2 are shown to have a significant effect on Y. This is reflected in the significance and positive coefficients of both structural paths, indicating that Digital Capability and Individual Absorptive Capacity together enhance Agricultural Extension Workers' Performance. This simultaneous contribution is further supported by the overall structural model results, which

demonstrate that extension workers' performance can be explained by the combined effects of digital capability and knowledge absorptive capacity. Therefore, the hypothesis stating that Digital Capability and Individual Absorptive Capacity jointly have a significant effect on Agricultural Extension Workers' Performance is accepted. These findings suggest that optimal performance is determined not only by the ability to use technology but also by the capacity to absorb and effectively utilize new knowledge.

Discussion

1. Effect of Digital Capability on Agricultural Extension Workers' Performance (Hypothesis 1)

The results of this study indicate that Digital Capability has a positive and significant effect on the performance of agricultural extension workers. This finding suggests that the higher the extension workers' ability to understand and operate digital technologies, the better the quality of services they provide to farmers, particularly in terms of information delivery, communication, and activity reporting. This result not only demonstrates a statistical relationship but also confirms that changes in extension work patterns in the digital era have made digital capability a basic requirement rather than merely a complementary skill.

Extension workers who are accustomed to using digital tools are able to work more quickly and effectively in managing data and accessing up-to-date agricultural information. This strong effect can also be explained by contextual factors in the field, such as the increasing demand for the use of Cyber Extension applications and agricultural information systems. Therefore, improvements in digital capability must be accompanied by institutional support, including continuous training and the provision of adequate technological infrastructure, to ensure that its impact on performance remains optimal and sustainable.

These findings are consistent with previous studies. For example, Ramdani and Wicaksono (2021) found that digital capability plays a significant role in improving the performance of public sector employees, particularly in the implementation of technology-based services. Suryanto et al. (2022) also reported that digital capability enhances productivity and work effectiveness in government organizations by facilitating data processing and accelerating information flow. In addition, Putra and Nurfadilah (2020) showed that agricultural extension workers with high digital capability are better able to provide consultation services to farmers through online communication platforms, especially during the pandemic period. The consistency of these findings strengthens the conclusion that Digital Capability is a key factor in improving agricultural extension workers' performance, particularly in carrying out extension tasks that increasingly require adaptation to technological developments and service digitalization.

2. Effect of Individual Absorptive Capacity on Agricultural Extension Workers' Performance (Hypothesis 2)

Individual Absorptive Capacity (IAC) in this study also has a positive effect on extension workers' performance; however, its level of significance is at the lower boundary (borderline significant), with a p-value close to 0.05. This condition needs to be interpreted critically. Individual Absorptive Capacity refers to extension workers' ability to acquire, understand, and apply new knowledge related to technology, agricultural innovation, and extension methods. The marginal level of significance may be attributed to several factors. First, the measurement instrument for IAC may not fully capture the complexity of extension workers' cognitive abilities, resulting in an underestimation of actual variations in the field. Second, the context of Ngawi Regency has specific characteristics, such as limited infrastructure, high administrative workloads, and uneven levels of farmer readiness, which may restrict extension workers' opportunities to optimally apply newly acquired knowledge. In other words, extension workers may possess the ability to absorb information but lack sufficient opportunities or support to implement it effectively. Therefore, efforts to enhance IAC should be supported by a work environment that enables the practical application of knowledge, not merely by increasing theoretical understanding through training programs.

The findings of this study are in line with previous research. Cohen and Levinthal (1990) emphasized that absorptive capacity is the ability

of individuals or organizations to recognize the value of new information, assimilate it, and apply it to work activities, thereby improving performance. Agustina and Pratama (2021) found that individual absorptive capacity has a significant effect on public sector employee performance because it accelerates adaptation to policy and technological changes. Furthermore, Wahyuni et al. (2022), in their study of agricultural extension workers, showed that the ability to absorb and process new information significantly improves the quality of extension services, particularly in addressing dynamic agricultural challenges in the field. The alignment of these findings reinforces the empirical evidence that Individual Absorptive Capacity is an important determinant of agricultural extension workers' performance, especially in the era of modern agriculture characterized by rapid innovation and technological advancement.

3. Simultaneous Effect of Digital Capability and Individual Absorptive Capacity on Agricultural Extension Workers' Performance (Hypothesis 3)

The findings of this study demonstrate that Digital Capability and Individual Absorptive Capacity simultaneously have a positive effect on extension workers' performance. This means that performance improvement is not determined solely by the ability to use digital technology but also by the ability to absorb and apply new knowledge. The combination of these two capabilities makes extension workers more adaptive, more creative in addressing farmers' problems, and more responsive to change. However, the results also indicate that these variables operate synergistically rather than independently. Extension workers who are proficient in technology but lack the ability to process new knowledge may not be able to maximize the use of that technology. Conversely, extension workers with high absorptive capacity but limited digital skills may face difficulties in accessing or utilizing up-to-date information.

In the context of Ngawi Regency, this synergy is also influenced by external factors such as organizational support, farmer readiness, and the availability of technological tools. Therefore, improving extension workers' performance requires an integrative approach that includes strengthening digital capability, enhancing individual absorptive capacity, and providing a supportive work ecosystem that enables the practical application of both capabilities.

These findings are consistent with previous studies. Zahra and George (2002) explained that absorptive capacity can strengthen individuals' ability to utilize technology and external knowledge to improve performance. Sujarwo et al. (2021), in the agricultural sector, found that digital capability and knowledge competence simultaneously improve the effectiveness of agricultural extension, particularly in the use of digital agricultural applications and information systems. In addition, Rustandi and Hakim (2020) showed that the combination of digital capability and the ability to absorb new knowledge significantly enhances extension workers' performance in addressing technical problems faced by farmers. Thus, this study reinforces empirical evidence that agricultural extension workers' performance is influenced by the synergy between digital capability and individual absorptive capacity, especially in the context of digital transformation in the agricultural sector.

Conclusion

Based on the results of data analysis and discussion, this study draws several important conclusions. First, Digital Capability is proven to have a positive and significant effect on the performance of agricultural extension workers. This indicates that the higher the extension workers' ability to utilize digital technology whether for accessing information, managing data, or delivering extension materials the better their performance in the field. This finding is consistent with previous studies emphasizing that the use of digital technology can improve work effectiveness, time efficiency, and the quality of extension services.

Second, Individual Absorptive Capacity is also proven to have a positive and significant effect on the performance of agricultural extension workers. Extension workers' ability to absorb, understand, process, and apply new information is an important factor in enhancing the quality of extension activities. This finding reinforces previous research stating that individual absorptive capacity plays a key role in

learning processes, innovation, and performance improvement.

Third, the simultaneous analysis shows that Digital Capability and Individual Absorptive Capacity together make a significant contribution to improving the performance of agricultural extension workers. The synergy between these two variables strengthens extension workers' ability to adopt technology, manage information, and deliver agricultural innovations to farmers more effectively.

Overall, this study confirms that enhancing digital capability and individual absorptive capacity are two strategic factors that need to be strengthened in order to improve the performance of agricultural extension workers. The findings are in line with various previous studies that emphasize the importance of technological mastery and cognitive capability as fundamental elements in improving the quality of extension services in the digital era.

Recommendations

As a follow-up to the research findings, several recommendations are proposed to strengthen the development of extension workers' performance while also contributing to studies in urban and territorial sociology. Agricultural extension institutions and local governments should provide continuous digital training programs and improve technological infrastructure to reduce the digital divide between rural and urban areas, thereby enabling more equitable implementation of technology-based extension services. Improving digital facilities can also accelerate rural social transformation, as the flow of agricultural information and innovation becomes faster and more closely connected to knowledge sources that have traditionally been concentrated in urban areas.

Furthermore, integrating digital capability and absorptive capacity into extension workers' competency development is expected to strengthen rural–urban linkages through data exchange, innovative practices, and more effective communication within modern agricultural networks. For agricultural extension workers, independently enhancing digital skills and absorptive capacity through training, professional communities, and the use of digital media in extension activities is crucial to supporting their role as agents of social change in rural areas.

For future researchers, it is recommended to expand the scope of the study by incorporating additional social variables and employing mixed-methods or longitudinal approaches in order to capture the dynamics of digitalization in agricultural extension and its impact on rural social structures more comprehensively. This includes examining how such changes shape rural–urban relationships and the distribution of access to technology in Indonesia.

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