

## Extension Management on Agricultural Quality: A Study on Food Security

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### Abstract

*This study aims to evaluate training management on agricultural quality in South Sulawesi Province, focusing on the influence of training methods and content, and the quality of extension workers in general. This study used a quantitative approach, with the analysis tool using the SEM-Amos version 23 application. The technique of collecting random samples of extension workers and farmers was carried out through questionnaires. Three hundred and fifteen extension workers and farmers filled out the questionnaire and were declared complete. The results showed that good training management has a positive impact on the development of farmers' knowledge, especially in using methods that are relevant to the current agricultural environment. The content and extension workers in the training also play an important role in the quality of training provided. This result shows the important role of agricultural extension officers and the government in providing adequate agricultural and training facilities. Training management significantly affects the quality of agriculture in South Sulawesi Province, with training methods and content, quality of extension workers, and quality of farmers as influencing factors. Therefore, agricultural providers and the government need to pay better attention to improving the quality of agricultural managers to improve crop quality.*

**Keywords:** *extension management, agricultural quality, food security, Indonesia.*

### INTRODUCTION

The Covid-19 pandemic that has hit the whole world is a frightening specter for all lines of life. This pandemic is feared to have an impact on food security which will reduce the quality of health in the future (Dwiartama et al., 2022) even in Asia (Yusriadi & Cahaya, 2022) and Africa (Ruel, 2001). This situation requires the availability of a quality pendulum so that it can overcome the post-Covid-19 pandemic. The quality of extension workers can solve problems faced by farmers, including food security. The current agricultural system needs to be optimized (Paumgarten et al., 2018; Raiten & Aimone, 2017). This system requires technological infrastructure, which is an obstacle in some countries, such as Indonesia.

The available technologies require adequate quality of extension workers to implement and use them in agriculture. Qualified extension workers with adequate characteristics have the appropriate skills, knowledge, and experience (Flax et al., 2009; Michaelsen et

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al., 2009). Therefore, qualified extension educators must be prepared to meet current and future challenges. The problem is to prepare quality extension educators, especially at the pedestal, according to current needs. Various studies have been conducted on the quality of agricultural extension workers, but research on their role in rural food security still needs to be completed.

This research will build a conceptual framework model based on extension management. Extension management is a short and quick solution to the current problem of food insecurity. However, as with the quality of extension workers, there needs to be more research on extension worker management, especially in the agricultural sector. There are also very few references that support both concepts; this can be seen from the literature search indexed by SCOPUS between 2017-2022; there are only 53 studies related to the quality of extension workers and only about 22 studies in the food security sector (Cohuet et al., 2012). Therefore, this research focuses on the quality of agriculture in the food security sector related to the management of extension workers as an important factor in the development of food security.

This study is also interesting because we analyze it from two directions, especially the extension management variable, namely by reflective measurement and normative measurement, so the discussion is comprehensive. The conceptual framework model in this study explains the relationship between extension management with three dimensions, both reflective measurement and normative measurement and its contribution in encouraging the improvement of agricultural quality, especially rural areas in Indonesia. The methodology used is quantitative method with SEM-Amos, and the respondents are agricultural extension workers and farmers in rural Indonesia. Data will be collected through questionnaires distributed to extension workers and farmers in rural areas with lower middle economic levels.

## **LITERATURE REVIEW**

### Theoretical background and hypothesis development

The quality of the pendulum is very important, especially after the current COVID-19 pandemic. Although research on extension worker management has been limited in recent years, this study focuses on developing this aspect to improve the quality of agriculture in the long term. The main idea of this research is based on human capital theory, which states that personal abilities, motivation, community climate, work group performance, and individual leadership are part of human capital (Adu-Afarwuah et al., 2008; Burchi & De Muro, 2016; Keating et al., 2014). Human capital theory considers farmers' talents as agricultural assets that improve the quality of human resources and productivity (Ruel, 2001), which directly impacts the development of food security systems (Premanandh, 2011). Therefore, this study emphasizes the importance of improving the management of extension workers, which can ultimately improve the quality of agriculture.

Extension has been widely studied regarding its impact on agricultural performance (Pinstrup-Andersen, 2009a; Skøt et al., 2016). In addition, extension worker effectiveness has been a topic of interest for researchers (Pinstrup-Andersen, 2009b). These studies suggest that the type of extension worker, the environment, and the personal qualities of farmers can influence the effectiveness of agricultural extension workers (Barrett, 2010).

Extension, if done well, will be more effective and have a greater impact on agriculture. Extension management is a method of implementing extension that considers the suitability of extension methods and types, as well as the quality of agricultural materials. As stated earlier, many extension programs have been conducted, and their effects on various parameters have been studied. Extension effectiveness has been shown to be enhanced by the suitability of methods to farmers and the type of extension (Kendall et al., 1996). These three things, namely the appropriateness of extension techniques, the

quality of extension content, and the quality of extension workers, are the dimensions of extension management in this study (Barrett, 2010).

Improving these dimensions will result in effective extension and then encourage improvements in agricultural quality (Kendall et al., 1996; Marsden & Morley, 2014), competence, and agricultural innovation (Hernández et al., 2017). Good extension management will also encourage increased food security outcomes so that they have adequate to work and increase experience because they can practice new ways or methods of working (Timmermans et al., 2014). In addition, it can increase trainees' knowledge of competent trainers (Candel, 2014; Leroy et al., 2015). Trainees can also improve their skills from the insights gained from well-managed training (Sunderland et al., 2013). Conversely, reflectively, good training management will drive improvements in the appropriateness of training methods, the quality of training content, and the quality of trainers. Therefore, two hypotheses can be made as follows:

H1: Reflectively, extension management has a positive effect on the accuracy of extension methods, quality of content, and quality of instructors.

H2: Extension management can have a positive impact on improving agricultural quality.

## METHODS

### Sample and data collection

This research was conducted using a quantitative approach. The analytical tool used to achieve the research objectives was SEM-Amos (Shamsudin & Hassim, 2020) version 23. The research population consisted of 200,144 extension workers and farmers in South Sulawesi Province. Sampling was carried out using Random Sampling (Stern, 1980), namely selecting extension workers and farmers who wanted to fill out the questionnaire by taking a minimum sample of 100 people because the SEM-Amos approach would be more appropriate if used on 100-200 respondents (Shamsudin & Hassim, 2020).

Random sampling was used in this research (Shamsudin & Hassim, 2020), because after the COVID-19 pandemic, planned sampling became easy and access to samples was unlimited. So that the target population remains represented by providing extension workers and farmers with the opportunity to complete questionnaires, only complete questionnaires are included in data analysis. Within the agreed time, namely two months, only 209 extension workers and farmers took part in this survey. Overall, example data can be seen in the following table:

Table 1. Respondents Demography

Demographic Items	Frequency	%
<b>Gender</b>		
1. Male	85	40,66
2. Female	124	59,33
<b>Amount</b>	<b>209</b>	<b>100</b>
<b>Age</b>		
1. Range 20-30	18	8,61
2. Range 31-40	72	34,44
3. Range 41-50	119	56,93
<b>Amount</b>	<b>209</b>	<b>100</b>
<b>Education</b>		
1. Elementary school	12	5,74
2. Junior high school	48	22,96
3. Senior High School	72	34,44
4. Bachelor	77	36,84

<b>Amount</b>	<b>209</b>	<b>100</b>
<b>Type of counseling followed</b>		
1. Panel	28	13,39
2. Group discussion	124	59,33
3. Seminar	57	27,27
<b>Amount</b>	<b>209</b>	<b>100</b>

This research experienced many obstacles in the data collection process carried out during the post-Covid-19 pandemic. It was only because of the volunteerism of the extension workers and farmers in filling out the questionnaire that this research could be carried out. We distributed the questionnaire form through the extension community and farmers. Their awareness of each respondent who has filled out the questionnaire and sent it to their colleagues is the key to our success in obtaining data in this research. Although in the end they only got data from 209 respondents that was suitable for analysis. However, all respondents were extension workers and farmers who had participated in counseling in panels, discussion groups and seminars, so they were believed to understand the extension.

#### Variables measurement

Extension management is a planned effort in the extension system to develop the knowledge and abilities of farmers so that they become competent and become the main capital for successful food security. Extension management (EM) is formed by three dimensions, namely the Appropriateness of Extension Methods (EM1) which includes indicators of suitability of extension methods to background, suitability of methods to career paths, and suitability of extension methods and facilities (The Economist Intelligence Unit, 2017). The second dimension, Quality of Extension Content (EM2), includes completeness of material, content requirements, new skills, and organization of material (Banik, 2019; FAO et al., 2013). The third dimension, Extension Quality (EM3), includes the instructor's experience, ability to transfer material, and instructor expertise (Sasson, 2012). Meanwhile, the Agricultural Quality (AQ) variable is assessed by adjusting the indicators of skills, knowledge, experience, and education (Rosegrant & Cline, 2003; Schmidhuber & Tubiello, 2007).

The government and agricultural administrators need to have a high level of concern in improving the quality of extension management and agricultural quality to achieve food security. Within the framework of human capital theory, these variables have a relationship with individual and community productivity and performance. Therefore, investment in good extension management and agricultural quality can make a significant contribution to improving food security.

## RESULTS

Through testing with the 2nd order CFA technique, the results of this research show that overall, as the main construct, extension management can influence its dimensions significantly. QEC is the dimension that has the greatest influence on extension management with second order loading factor = 0.970 and p-value < 0.05. AEM is influenced by extension management with  $\lambda = 0.893$ ; p-value = 0.05, and QOT with  $\lambda = 0.867$ ; p value=0.05. This dimension also has good reliability values CR = 0.935, VE = 0.828.

Constructs, Dimensions, and Its Components	Loading Factor ( $\lambda$ )	Std. Error	Critical Ratio	P- Value $\leq 0.05$	Average Variance Extracted (AVE) $\geq 0.50$	Construct Reliability (CR) $\geq 0.70$
<b>Extension Management (EM)</b>						
Accuracy of Counseling Methods	0.893	reference point			0.828	0.935
Quality of Counseling Content	0.970	0.086	11.929	***		
Quality of Extension	0.867	0.092	11.098	***		
<b>Accuracy of Extension Methods (AEM)</b>						
Method suitability for the background	0.744	reference point			0.573	0.803
Method compatibility with the career path	0.674	0.076	11.503	***		
Method and counseling facility suitability	0.853	0.073	14.202	***		
<b>Quality of Extension Content (QEC)</b>						
Content as needed	0.783	0.069	14.816	***	0.651	0.848
New expertise	0.814	reference point				
Matter organization	0.823	0.065	16.628	***		
<b>Quality of Extension (QOE)</b>						
Extension Experience	0.838	0.062	15.295	***	0.673	0.861
The ability to transfer material	0.838	0.063	15.915	***		
Extension expertise	0.786	reference point				
<b>Extension Quality (EQ)</b>						
Experience	0.770	0.058	16.353	***	0.732	0.893
Knowledge	0.929	0.05	21.524	***		
Skill	0.867	reference point				

Fig.1 Statistical Result

Note: \*\*\* (Significant at Level  $p < 0.01$ )

The model suitability test shown by the goodness of fit value in Figure 2 shows that the model meets the suitability standards. CMIN/DF value = 1.885; GFI=0.950; AGFI=0.923; TLI=0.975; Finance=0.981; and RMSEA = 0.053 has met the required cut-off value; it can be stated that the test result data is in accordance with the conceptualized model.

Model Fit Testing	Cut of Value	Result	Remark
Chi-Square	df = 50, $X^2 = 67.505$	94	Marginal
Significance	$\geq 0.05$	0.000	Marginal
CMIN/DF	$\leq 2$	1.885	Fit
GFI	$\geq 0.90$	0.950	Fit
AGFI	$\geq 0.90$	0.923	Fit
TLI	$\geq 0.90$	0.975	Fit
CFI	$\geq 0.90$	0.981	Fit
RMSEA	0.03 - 0.08	0.053	Fit

Fig. 2 Hypothesis testing

Using data that has been tested in terms of measurement and suitability, the hypothesis testing in this study is shown in figure 2 and figure 3.

Construct relationship	Std. Estimate	P-Value	Result
H1a: Extension Management $\rightarrow$ Accuracy of Counseling Methods	0.893	***	Supported
H1b: Extension Management $\rightarrow$ Quality of Counseling Content	0.970	***	Supported
H1c: Extension Management $\rightarrow$ Quality of Extension	0.867	***	Supported
H2: Extension Management $\rightarrow$ Extension Quality	0.671	***	Supported

Fig. 3 Reflective Relationship

Note: \*\*\* (Significant at Level  $p < 0.01$ )

Reflectively from Figure 3, there is a positive and significant influence of extension management on the accuracy of extension methods ( $\beta = 0.893$ ;  $p$ -value  $< 0.05$ ), the quality of extension content ( $\beta = 0.970$ ;  $p$ -value  $< 0.05$ ), and the quality of instructors ( $\beta = 0.869$ ;  $p$ -value  $< 0.05$ ) so that H1a, H1b, and H1c are accepted. In terms of format, the test results show that extension management has a positive and significant effect on agricultural quality, with  $\beta = 0.671$  and  $p$ -value  $< 0.05$  so the results this study also supports H2.

## **DISCUSSION**

The influence of extension management on the accuracy of extension methods, quality of content, and quality of instructors

In this research, it was found that the better the extension management, the higher the level of accuracy in using the methods obtained from the extension services that have been followed. However, compared to the suitability of the background method and the suitability of the career path method, the suitability of the extension method and facilities is more able to clearly describe the accuracy of the extension method. These results show that counseling can be accurate if the methods used are relevant to existing conditions and supported by appropriate and adequate facilities. Considering that post-pandemic COVID-19 is still the main consideration in agricultural activities, extension workers and farmers must be able to adapt to modern agricultural patterns. This can be a tough challenge for the government as a supporter of implementing food security.

Changes in the conditions of extension in rural areas are the main thing that must be supported by mastery of extension methods which are also supported by adequate facilities to achieve accuracy in extension patterns. This is where the role of extension management comes into play, the government must ensure that extension agents are ready and able to adapt to current conditions through relevant extension and the provision of supporting facilities. Considering that several previous studies stated that the quality of extension workers and facilities in rural areas is one of the main factors influencing the level of food security (Pimbert, 2016; Tweeten, 1999), the results of this research also encourage the government and other parties providing extension services. In rural areas, to play a greater role in providing extension and agricultural facilities.

Likewise, the quality of extension content reflectively measures the greatest influence of extension management. When providing counseling, it must be ensured that the material provided is appropriate to needs, has novelty, and is provided in a clear and continuous sequence. When extension organizers have good skills in extension management, the content and instructors in extension will also have good quality in terms of experience and ability to provide material and knowledge that is in line with the current agricultural world. Likewise, the instructors used in extension are also influenced by good extension management.

Based on the results of measuring the construct and its dimensions, which in this research show a high level of influence, we are of the opinion that high awareness is needed from extension organizers to continue to improve the quality of extension management to improve the quality of food security in Indonesia, especially in this post-pandemic period. However, the size of a nation is also measured by the level of education and intelligence of its citizens.

The influence of extension management on agricultural quality

Based on formative measurements, improving extension management will encourage improvements in agricultural quality. As one of the main foundations for building food security, the quality of extension workers is determined by whether the management of the extension workers in the farming community is good. Quality extension workers can be seen from their experience, knowledge, and skills. These three things can be realized from good extension management. In line with research (Kahane et al., 2013), we also agree that instructors who have skills, knowledge and experience can convey knowledge well. The importance of agricultural quality as a key factor in the quality of food security should be an important warning for the government as a state administrator (Bosc et al., 2013). The results of this research also support the opinion that agricultural quality is not only formed but is related to climate and farming communities (Dyson, 1999). This shows the importance of the farming community in making extension a sustainable culture to improve the quality of agriculture.

The research results which show that there is a positive influence between extension management and agricultural quality also show that organizational failure to improve extension management can worsen agricultural quality. Therefore, the implementation of counseling must be tied to a clear and strong policy so that it becomes a provision that must be implemented. This is important for all parties because with effective and continuous extension, the farming community will perform well, extension workers as implementers will receive recognition, and farmers will gain quality food security. The strong and complex relationship in this research shows the need for involvement of all parties to realize effective extension results in improving the quality of food security, especially in South Sulawesi.

The results of this research prove the importance of the management role of extension workers in farming communities, both reflectively and formatively. Therefore, it is recommended to carry out further studies regarding the factors that encourage improved extension management, especially in rural areas. Knowing these factors guarantees the success of the farming community in creating and organizing quality agriculture for future generations.

#### Theoretical and managerial implications and research limitations

The results show that better extension management contributes to a higher level of accuracy in using methods obtained from extension. Therefore, it is important to ensure the suitability of counseling methods to individual backgrounds and career paths as well as adequate facilities to produce accurate counseling. In the current post-COVID-19 pandemic era, the government must play a bigger role in providing relevant counseling and supporting facilities to farmers in rural areas to improve the quality of food security in Indonesia. Content and instructors must also be tailored to needs, innovative, and delivered clearly and continuously to produce good extension management.

Human resource theory implies that investments in extension and development can improve the productivity and performance of farmers and communities. Therefore, in agriculture, investment in good extension management and agricultural quality can contribute to improving food quality and farmer skills. The government and agricultural administrators need to have high concern in improving the quality of extension services to achieve progress and glory for the nation through improving agriculture and food security.

The research findings have several managerial implications that can be applied to the implementation of food security. First, agricultural administrators, especially the government as village manager, must provide relevant counseling and facilities to adapt to current conditions. Second, extension management must become a sustainable culture to improve agricultural quality. Third, the quality of extension workers is one of the main factors in agricultural quality. Food security providers must ensure that extension workers have the necessary experience, knowledge, and skills, which can be achieved through good extension management. Lastly, the quality of extension content must be relevant and innovative to support quality agriculture. This can be realized by developing extension content that is oriented towards farmers' needs, based on the latest agriculture, and presenting extension workers who are experienced and have adequate competence. Apart from that, effective extension management must also pay attention to the periodic evaluation process of instructors so that they can continue to improve the quality of the extension delivered.

Please note that the sampling technique used in this research is random sampling. As a result, the samples taken represent a small portion of the population of extension workers and farmers in South Sulawesi Province. The sample consisted of 209 extension workers and farmers who filled out questionnaires. Therefore, the results of this study may represent a portion of the population of extension workers and farmers in South Sulawesi Province, and generalization of these findings should be done with caution.

## CONCLUSION

Human resource theory argues that investment in extension and development can improve the productivity and performance of farmers and communities. In the context of food security, investment in extension management and good agricultural quality can improve the quality of food security and farmer skills, thereby improving farmer welfare. In this case, good extension management will help improve the accuracy of extension methods and ensure the suitability of methods to farmers' backgrounds and farmer pathways to achieve more accurate extension results.

Post the current COVID-19 pandemic, when food insecurity becomes a threat, the government needs to provide relevant counseling and support facilities for instructors to convey effective knowledge. The government also needs to provide facilities and invest in good agricultural management to ensure better quality food security and increase human resources. Thus, the application of human capital theory in extension management can help achieve higher goals in improving agricultural quality and food security.

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