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Competency and Performance of Agricultural Extension Workers at Different Implementation Stages in Sorong Regency, Southwest Papua, Indonesia

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ABSTRACT

Background: Agricultural extension workers have an important role in transferring knowledge and technology to farmers, which has an impact on increasing agricultural production and overall farmer welfare. This research aims to analyse the performance of agricultural instructors at the Agricultural Extension Center (BPP) of Sorong Regency, Southwest Papua Province in order to understand the factors that influence their effectiveness in increasing productivity and the quality of life of farmers.

Methods: The research method used is a quantitative approach with survey techniques among extension workers and farmers in the research area. The collected data was analysed using tabulation and Chi-square analysis (X^2) to analyse factors that influence the performance of agricultural instructors, such as preparing regional and agroecosystem potential data, guiding supervision and assistance in preparing group needs plans, preparing extension programs and creating annual work plans for agricultural instructors.

Result: The results of this research show that the competency score at the preparation stage reached 4.40, which is in the "Very High" category. Agricultural instructors have excellent competence in preparing regional and agroecosystem potential data, compiling programs and making annual work plans. There are no significant differences between performance indicators at the preparation stage. The competency score for the implementation stage is 2.71, which is included in the "Medium" category. There are several areas that need improvement, especially in terms of technical guidance, economic institutional guidance for farmers and dissemination of extension materials according to farmers' needs, which tend to have a score of "Low" or "Very Low". There are no significant differences between the indicators at the implementation stage. The competency score at the evaluation and reporting stage is 2.30, which is in the "Low" category. There are no significant differences between performance indicators for the evaluation and reporting stages. This means that all indicators in this stage make a balanced contribution to overall performance. The performance of agricultural instructors at the preparation stage was very good, but at the implementation stage it was only at a medium level and at the evaluation stage it was at a low level.

Key words: Capacity building, Farmer welfare, Performance of agricultural extension workers, Productivity, Technology transfer.

INTRODUCTION

In the agricultural sector, extension plays an important role as a bridge between agricultural technological innovation and farmers in the field (Sunandar 2019; Arifin *et al*., 2021; Windari and Gunawan 2019; Rahim *et al*., 2021). The success of extension depends greatly on the competence of extension agents and their effectiveness in delivering material and facilitating technology adoption among farmers. In Sorong Regency, Southwest Papua Province, the role of extension workers is increasingly important in facing the challenges of sustainable agricultural development and improving the welfare of local farmers. Therefore, competency tests and performance evaluations of instructors need to be carried out to ensure that instructors have the skills, knowledge and attitudes that suit field needs. Exploring the competency testing process and achieving performance scores for agricultural instructors at the extension implementation stage in Sorong Regency is important to provide an understanding of the effectiveness and obstacles in implementing agricultural extension.

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Agricultural extension workers have a strategic role in encouraging the transformation of the agricultural sector, especially in terms of introducing new technology, environmentally friendly practices and efficient farming

business management. In Sorong Regency, agricultural potential is quite large, but still faces various challenges, including limited access to technology, lack of management skills and low knowledge about sustainable agricultural practices (Simanjuntak 2015; Bahua 2010). To answer this challenge, extension workers are needed who are not only competent, but also able to carry out their role effectively in the field. Competency testing (Lindung 2020; Harahap *et al*., 2017) and performance assessment (Hariani and Irfan 2019; Indraningsih 2013; Yunita *et al*., 2018) are important steps to ensure that extension workers have adequate standards of expertise and knowledge to support increasing farmer capacity in this region.

Even though competency tests have been applied to agricultural instructors in Sorong Regency, gaps are still found between the expected competencies and results in the field. Some extension workers face obstacles in delivering material effectively, communicating with farmers and ensuring sustainable technology adoption. Several factors that influence the achievement of performance scores include limited facility support (Sunandar 2019), varying levels of farmer acceptance of innovation, as well as geographical challenges that make access to extension areas limited. The uneven performance achievements of instructors indicate the need for further evaluation of the competency test process, extension delivery methods and the support available to instructors in remote areas such as Sorong Regency. Chi-square requires frequency counts in categories. This requirement was met because responses were tabulated into Likert scale categories (1, 2, 3, 4, 5) for each item and then analysed based on the observed distribution.

This article aims to evaluate the implementation of the agricultural instructor competency test in Sorong Regency and identify gaps that exist between the results of the competency test and implementation in the field, assess the achievement of instructor performance scores at the extension implementation stage, with a focus on factors that influence the effectiveness of extension and provide recommendations regarding strategies for increasing the competency and performance of instructors to support the success of agricultural extension programs in Sorong Regency, Southwest Papua Province.

MATERIALS AND METHODS

Time and place

The research was carried out for 2 (two) months from February to March 2023. The research location was carried out at the Agricultural Extension Center (BPP), Sorong Regency Horticulture and Plantation Food Crops Service, Sorong Regency Livestock and Animal Health Service.

Research design

The population and sampling technique in this study was the total population in this study of 73 PPL Civil Servants (PNS) in Sorong Regency consisting of 56 agricultural instructors (consisting of agricultural and plantation instructors) and 17 livestock instructors who served in The 10 BPPs in Sorong Regency can be seen in Table 1.

Selected samples

PPL sampling in this study used the method sampling saturated is a sampling method when all members of a population have been determined previously. In this research, the samples taken were all field agricultural instructors (PPL), civil servants (PNS), totalling 73 people who had different positions/groups.

Research methods

Analysis Descriptive with a quantitative approach is used in this research, to describe a research problem situation and direct activities in the field. As stated by Sunandar (2019) that quantitative research methods are research methods based on philosophy positivism which is used to research certain populations and samples where data collection uses research instruments and quantitative data analysis, which aims to carry out predetermined tests.

Research variables

The variables used in this research are the performance of field agricultural instructors in Sorong Regency. This research includes agricultural extension planning (A1), implementation of agricultural extension (A2), evaluation and reporting (A3). The operational definition of variables is useful for knowing the variables and providing a clear picture of the implementation of research which includes the PPL performance variable (A) which is the work results achieved by an instructor in accordance with the main duties and functions of the instructor. There are three indicators used to see PPL performance, namely preparation of agricultural extension, implementation of agricultural extension, evaluation and reporting (Permentan Number 91, 2013). The three indicators contain 16 questions. Each question is rated using a scale of 1 to 5. Scale 1 indicates the lowest performance and scale 5 indicates the highest performance. Preparation for agricultural extension (A1). The first stage in measuring the performance of agricultural instructors is the preparation stage. Indicators used to measure

Table 1: Sum of extension staffs in sorong regency.

No.	Name of offices	Extension distribution	
		Agricultural extension staff	Livestock extension staff
1.	Aimas	11	5
2.	Mariat	7	1
3.	Mayamuk	8	3
4.	Salawati	6	3
5.	Moisigen	6	2
6.	Makbon	7	1
7.	Klamono	5	2
8.	Klabra raya	2	-
9.	Klawak	1	-
10.	Sayosa raya	3	-
	Sum	56	17

the preparation stage for agricultural extension. b. Implementation of Agricultural Extension. The second stage of extension activities is the Extension Implementation stage. Indicators used to measure the implementation stage of agricultural extension. c. Agricultural Extension Evaluation and Reporting. The third stage in the performance of agricultural instructors is evaluation and reporting.

Data analysis

The data obtained will be analysed to test the first hypothesis using tabulation using the competency technique through two stages, namely tabulation then followed by Chi-square analysis (Hombahomba *et al.*, 2023; Sesay *et al.*, 2022). The questionnaire responses are categorical/ordinal (Likert scale 1–5), which are appropriately analysed using non-parametric methods, especially when assumptions for parametric methods are not met.

To ensure the instrument measured what it was intended to measure, content validity was applied through expert judgement. Items were assessed for relevance and clarity to reflect extension duties at each stage (preparation-implementation-evaluation/reporting). The indicators were structured directly from formal extension performance guidelines and operational definitions used by extension institutions. In addition, the questionnaire design followed a stage-based framework which supports construct validity, because each group of items represents a theoretically consistent domain: planning performance (A1), field delivery performance (A2) and evaluation/reporting performance (A3).

Reliability testing was conducted to ensure internal consistency of responses across items. The consistency of questionnaire items was evaluated using Cronbach's Alpha, where $\alpha \leq 0.70$ was considered acceptable for research reliability. Reliability was assessed both for the overall scale and for each stage-specific subscale (A1, A2 and A3). This procedure ensured that the instrument yielded stable and coherent performance measurements for agricultural extension workers in Sorong Regency.

Table 2: Competency test results and achievement of performance variable scores at the preparation stage for agricultural extension.

Performance	Respondent answer					Total	Scores					Sum	Level	Category
(A1)	5	4	3	2	1		n(5)	n(4)	n(3)	n(2)	n(1)			
A1.1 = Creating regional and agroecosystem potential data	67	4	0	2	0	73	335	16	0	4	0	355	4,86	ST
A1.2 = Guiding supervision and assistance in the preparation of RDKK	21	30	5	11	6	73	105	120	15	22	6	268	3,67	T
A1.3= Preparing village and sub-district agricultural extension programs	65	5	0	3	0	73	325	20	0	6	0	351	4,81	ST
A1.4 = Creating annual work plans for agricultural instructors (RKTP)	53	2	5	10	3	73	265	8	15	20	3	311	4,26	ST
												1285	17,60	
Competence:	4,40		ST											
n :	73		(Very High)											

Note: ST: Very high, T: High.

RESULTS AND DISCUSSION

Performance of agricultural extension instructors in the preparation stage

The performance of agricultural instructors in the preparatory stage of agricultural extension activities is presented in Table 2. The score achieved in the preparatory stage of extension in Table 1 shows an average score of 4.40 in the very high category, which means that the performance in the preparation stage of agricultural extension is very high. This shows that the ability of extension workers in the research area to assist in the preparation of extension programs starting from the creation of regional potential data and agroecosystem data, monitoring and assisting in the preparation of definitive plans for group needs, preparation of village and district extension programs and preparation of annual work plans is very good. This is in line with the opinions of Lainawa and Lenzun (2022) and Fadwiwati *et al*., (2019) revealed that the ability of agricultural instructors to plan extension programs is the key to success for instructors at the preparation stage. Statements or responses with a low score with a value of 268 are shown in the supervision and assistance in preparing the RDKK, namely with a high score of 3.67.

This is because the respondents did not prepare the RDKK properly and correctly, namely: (1) The instructors did not understand the preparation of the RDKK, (2) The instructors lived more in the city than at their place of duty. In the extension preparation stage variable, a value of 355 is seen, which shows the first very high score of 4.86, namely creating regional and agroecosystem potential data. The second highest score was 351 with a score of 4.81, namely preparing village and sub-district agricultural extension programs. Meanwhile, the third very high score was 311 with a score of 4.26, namely making an annual work plan for agricultural instructors (RKTP). This shows that the respondent has carried out these stages well. Apart from that, there is also good coordination with the regional government of the assignment so that the preparation of regional potential data, program preparation and RKTP preparation can be carried out more easily. This is also in line with the opinion of Harahap *et al*., (2017) and Sunandar (2019).

The Chi-square test based on indicators (A1.1-A1.4) shows that there is no significant difference between the respondents' answer categories for each performance item where = 5.000 (p=0.172). (Table 3) Meanwhile, the Chi-square (χ^2) value based on the association value has a significant relationship (p=0.032, p<0.05) and even a very significant effect based on the Jonckheere-Terpstra test (p=0009). This means that there are significant differences between respondents' answer categories for each performance item. In other words, the distribution of respondents' answers is uneven, indicating significant variations in performance perceptions across various performance indicators.

Significant variations in performance perceptions on various performance indicators for field agricultural instructors (PPL) at the food crops, Horticulture and Plantation Service of Sorong Regency, Southwest Papua Province can be caused by several factors. 1. Differences in PPL Competency and Experience Levels. PPL have diverse educational backgrounds, training and work experience, which influences their competence in carrying out tasks in the field (Hayer 2016; Toharmat *et al*., 2020; Verdina *et al*., 2021). PPLs with better experience and training may demonstrate more optimal performance, giving rise to differences in performance perceptions between one PPL and another. Sorong Regency has considerable geographic variation, including differences in infrastructure conditions, accessibility and agricultural characteristics. Facilities support, such as vehicles, work aids and operational budgets, also influence PPL performance. This uneven distribution of resources can cause variations in performance perceptions, because PPLs with better resource support tend to be more productive. Perceptions of performance are also influenced by how well PPL can establish relationships and communicate with farmers and local communities. Tasks and performance targets assigned to PPLs may vary based on the specific needs of each region. For example, there are PPLs that focus more on food crops, while others may focus more on horticulture or plantations. This difference in focus can influence perceptions about their performance according to achieving their specific targets. Supervision and performance assessments (Fahrorozi *et al*., 2016) carried out by leaders or evaluators are often subjective and may be based on non-uniform standards. Individual perceptions of what constitutes "good" or "poor" performance may differ, leading to variations in performance appraisals. Local social and cultural factors (Hayer 2016; Indraningsih 2013; Jafri *et al*., 2015) also influence perceptions of performance. PPLs who can adapt to the habits and culture of local

Table 3: Association of indicators (A1) of competency tests.

Groups	N	Mean Rank	Chi-Square	df	Asymp. Sig. (p-value)
A1.1 Building potential data of region and agroecosystems	5	7.90	5.000	3	0.172
A1.2. Guiding and supervising RDKK compiling	5	14.40			
A1.3. Compiling program of agricultural extension of the villages and district	5	8.50			
A1.4. Creating annual extension working plan (RKTP)	5	11.20			
Total	20				

Table 4: Competency test results and achievement of performance scores.

Performance	Respondent answers					Total	Scores					Sum	Level	Category
(A2)	5	4	3	2	1		n(5)	n(4)	n(3)	n(2)	n(1)			
A2.1= Disseminating extension materials according to farmers' needs (within 1 year)	7	14	13	26	13	73	37	56	39	52	13	195	2.67	S
A2.2= Implementing agricultural extension methods in the target area in the form of visits/face-to-face (individual/group/mass within 1 year)	46	10	13	2	2	73	230	40	39	4	2	315	4.32	ST
A2.3= Implementing agricultural extension methods in the target area in the form of demonstrations/field schools (within 1 year)	3	4	12	38	16	73	15	16	36	76	16	159	2.18	R
A2.4= Implementing agricultural extension methods in the form of meetings (field meetings, talk meetings, technical meetings, work meetings, meetings business in 1 year)	6	2	21	0	10	73	30	8	63	0	10	111	2.85	S
A2.5= Carry out the application of agricultural extension methods in the target area in the form of farming courses (in 1 year)	1	2	6	49	15	73	5	8	18	98	15	144	1.97	R
A2.6= Increase the capacity of farmers regarding access to information in developing farming	39	12	9	7	6	73	195	48	27	14	6	290	3.97	T
A2.7= Provide guidance to agricultural instructors in order to increase the class of farmer groups	18	5	7	11	32	73	90	20	21	22	32	185	2.53	R
A2.8= Provide guidance to agricultural instructors in order to grow and develop farmer economic institutions from aspects of quantity and quality	5	10	0	1	57	73	25	40	0	2	57	124	1.70	SR
A2.9= Technical guidance in increasing the production of superior commodities	4	10	12	18	29	73	20	40	36	36	29	161	2.21	R
												1684	24.4	
Competency: 2.71 S														
n : 73 (Medium)														

Note: ST: Very high, T: High, S: Medium, R: Low, SR: Very low.

communities are often rated better, while those who are less able to adapt may receive less ratings, creating differences in perception.

Performance of extension officers at the implementation stage

The performance of instructors at the implementation stage of extension activities can be explained in Table 4. The score achieved for the extension preparation stage in Table 3 shows an average score of 2.71 in the medium category. Which means that performance at the preparation stage for agricultural extension is in the medium category. This shows that field agricultural instructors are aware of their responsibilities in implementing extension methods, which is their main task. The obstacles for agricultural instructors in implementing extension methods are limited costs and several other factors, namely internal factors and external factors. So according to Permana (2019) and Arifin *et al*., (2021), the use of extension methods in carrying out good extension activities will really help farmers in implementing a technology. The score in the very low category is 124 at the stage of providing guidance to agricultural instructors in order to grow and develop farmers' economic institutions from the aspects of quantity and quality. The low score at this stage is 1.70 because of the 73 respondents, 57 respondents do not facilitate farmer cooperatives. is already a legal entity so the number is still small. This is due to a lack of coordination with relevant stakeholders in the economic and cooperative sectors (Table 4).

The score values in the low category in this study are found in four implementation stage variables, namely the first low category at the stage of implementing agricultural extension methods in the target area in the form of farming courses (A2.3), the second low category at the implementation stage of implementing agricultural extension methods in the region assistance in the form of demonstrations, the third low category is at the stage of implementing technical guidance in increasing the production of superior commodities and the fourth low category is at the stage of providing guidance to agricultural instructors in order to increase the class of farmer groups. This low score is because many agricultural extension workers do not carry out courses/training for farmers due to limited costs to purchase the materials needed to carry out training/ courses and lack of cooperation with related agencies. For this reason, good cooperation and support is needed between extension workers and activity holders at the official office (Shalini *et al*., 2025). Yunita *et al*., (2018), said that the extension method in the form of SLPTT-Padi activities from the government through the District Agriculture Service and Provincial Agriculture Service can overcome cost limitations.

The highest score was 315 at the stage of implementing agricultural extension methods in the target area in the form of visits/face-to-face in the last year, the high score at this stage was 4.32 because of the 73 respondent agricultural extension workers were 46 respondents implementing agricultural extension methods in the form of visits or face-to-face either individually, in groups and masse to farmer groups in the past year. This is because

Table 5: Association of indicators (A2) of competency tests with performance.

Indicators	N	Mean Rank	Chi-square	Df	p-value
A2.1.	5	29.60	5.488	8	0.709
A2.2.	5	22.10			
A2.3.	5	24.70			
A2.4.	5	14.50			
A2.5.	5	20.80			
A2.6.	5	24.50			
A2.7.	5	26.40			
A2.8.	5	17.30			
A2.9.	5	27.10			
Total	45				

Table 6: Results of performance description analysis at the evaluation and reporting stage.

Performance	Respondent answer					Total	Scores					Sum	Level	Category
(A3)	5	4	3	2	1		n(5)	n(4)	n(3)	n(2)	n(1)			
A3.1= Evaluating the implementation of agricultural extension	1	4	19	36	13	73	5	16	57	72	13	163	2.23	R
A3.2 = Evaluating the impact of agricultural extension	0	0	11	28	34	73	0	0	33	56	34	123	1.68	SR
A3.3= Making a report on the implementation of agricultural extension	11	14	26	8	14	73	55	55	78	16	14	219	3.00	S
												505	6.91	
Competency: 2.30 R														
n : 73 (Low)														

Note: S = Medium, R = Low, SR = Very low.

there is an awareness of the sense of responsibility that some agricultural instructors have in carrying out face-to-face visits either individually, in groups or in mass.

Performance of extension officers at the evaluation and reporting stage

The performance of extension workers at the evaluation and reporting stage of extension activities can be explained in Table 5. The score achieved at the evaluation and reporting stage of extension activities in Table 5 shows an average score of 2.30 in the low category, which means that performance at the evaluation and reporting stage of agricultural extension activities is low. This shows that agricultural extension workers are still low in evaluating and reporting agricultural extension activities due to a lack of supervision, coaching from the local service and the extension workers are not at their place of duty. According to Yunita *et al*. (2018) and Hayer (2016), stated that agricultural extension evaluation is a decision-making tool and compiles considerations from the results of agricultural extension evaluations so that they can find out changes in farmer behaviours, obstacles faced by farmers, the effectiveness of agricultural extension programs and the extent of understanding of problems. aims to perfect the activities carried out (Rani and Rampal, 2016).

The score in the very low category is 123 at the stage of evaluating the impact of agricultural extension (Table 6). The low score at this stage is 1.68 due to the instructor's lack of knowledge about making evaluations of the impact of agricultural extension in reporting extension activities and the lack of instructors on duty. Meanwhile, the score in the medium category is 219 at the stage of making a report on the implementation of agricultural extension, the high score at this stage is 3.00 because it is related to compensation for payment of Extension Operational Costs.

Indicator Y3.3 (8.50) has the highest performance response compared to other indicators (Table 7). Based on the results of the analysis, there is no significant difference between the indicators (Y3.1, Y3.2 and Y3.3) in the performance values of the PPL evaluation and reporting stages. This indicates that the performance on the three indicators is relatively balanced and there are no indicators that are significantly better or worse than the others.

Policy and extension practice implications

Strengthening field delivery to match planning capacity

A key implication is that extension strengthening should no longer concentrate mainly on planning and administrative readiness. Instead, capacity-building policies need to prioritize effective field delivery, including facilitation skills, farmer engagement strategies and problem-solving approaches that respond to real-time constraints in farming households. This shift is important to ensure that well-prepared extension plans are translated into meaningful learning processes and behavior change at farm level, rather than remaining as planning documents with limited practical impact.

Institutional and economic facilitation as a core extension function

The study highlights a critical gap in extension support for farmers' economic institutions, with the score for this indicator being very low (1.70). This suggests that extension workers may be functioning primarily as technical advisors, while farmers require stronger support in collective economic organization, market linkages and institutional strengthening. Therefore, local government policies and BPP operational guidelines should explicitly position extension workers as facilitators of institutional and economic empowerment, including the development of legally recognized farmer groups, cooperative strengthening and partnerships with relevant development agencies and value-chain actors (Sukhna *et al*., 2022).

Institutionalizing practical, routine evaluation for learning and accountability

Weak performance in evaluation is especially evident in the indicator of assessing extension impacts, which scored very low (1.68). This finding implies that monitoring and evaluation systems may not yet function as tools for continuous improvement in extension practice (Singh *et al*., 2010). In response, extension governance in Sorong Regency should promote simple, routine and field-relevant evaluation mechanisms-such as short farmer outcome indicators, periodic reflection meetings and mentoring-based supervision-so that reporting becomes useful for

Table 7: Association of competency test indicators (Y3) with performance response values.

Indicator	N	Mean Rank	Chi-square	Df	Asym.Sig.
Y3.1 Evaluating the implementation of agricultural extension	5	8.20	0.196	2	0.907
Y3.2= Evaluating the impact of agricultural extension	5		7.30		
Y3.3= Making a report on the implementation of agricultural extension	5		8.50		
Total	15				

learning and program refinement rather than being viewed mainly as an administrative burden.

CONCLUSION

The competency score at the preparatory stage reached 4.40, which is in the "Very High" category. Agricultural instructors have excellent competence in preparing regional and agroecosystem potential data, compiling programs and making annual work plans. The contribution of each indicator to preparation performance is relatively even. The competency score for the implementation stage is 2.71, which is included in the "Medium" category. There are several areas that need improvement, especially in terms of technical guidance, economic institutional guidance for farmers and dissemination of extension materials according to farmers' needs, which tend to have a score of "Low" or "Very Low". Every aspect at the implementation stage provides a balanced contribution to the overall implementation performance. The competency score at the evaluation and reporting stage is 2.30, which is in the "Low" category. Performance in evaluating and reporting extension activities needs to be improved, especially in terms of evaluating the impact of agricultural extension, which has a very low score. All indicators in this stage make a balanced contribution to overall performance.

The performance of agricultural instructors at the preparation stage was very good, but at the implementation stage it was only at a medium level and at the evaluation stage it was at a low level. There is a need to increase the capacity of extension workers, especially at the implementation and evaluation stages. The focus of improvement should be given to implementation and evaluation aspects, especially in terms of dissemination of extension materials, technical guidance and evaluation of the impact of extension activities.

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Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper. The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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