Proficiency in Informatics and Communication Technology Application to Improve Agricultural Counseling Performance in Luwu Regency, Indonesia

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Abstract. Informatics and Communication Technology (ICT) provides relevant agricultural information, which is essential in agricultural development attempts, in timely fashion. Aiming to find out if it is able to improve the efficiency of agricultural counseling agents, this study examined agricultural counseling agents in Luwu Regency, South Sulawesi, Indonesia. As explanatory quantitative research, simple random sampling was applied to respondents of google form questionnaire and the data were analyzed as per Structural Equation Model (SEM) and supported by smart PLS application. The result came out with R^2 value of 0.868, representing the agricultural counseling agent's proficiency and ICT application signified agricultural counseling agent's efficiency at 86.8 %. It is therefore conclusive that agricultural counseling agent's efficiency in extension activities relies on both their proficiency and ICT application.

Keywords: Agricultural development, advanced and independent farmers, farmer welfare, improve agriculture productivity

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1 Introduction

Human resource management, involving extension institution development and agricultural counseling, has been regarded as a major contributor to the flourishing agriculture in Indonesia [1, 2]. A number of studies have also stated that investing in agricultural extension should grant considerably high chances of revenue, which makes agricultural counseling an essential aspect in agricultural development of an area.

In 2018, Luwu – a regency in South Sulawesi, Indonesia with an overall agricultural field of 28 404.01 ha – owned a total planting area of 43 640.40 ha and was able to reap up to 248 280.02 t (5.79 t ha^{-1}) yield. In 2019 up to October, the planting area was raised to 43 713.30 ha and gave it 231 631.33 t (5.81 t ha^{-1}) yield [3, 4]. However, the regency was not able to uphold such output in the next 2 yr – COVID-19 pandemic strike led to decline in various sectors including agriculture [5]. The head of the agricultural department of the regency confirmed that agricultural counseling programs had been put to a halt accordingly, and they should resume as regulated once the pandemic was solved. The above case underlines the role of agricultural counseling agents in maintaining agricultural productivity [6, 1].

Being prominent figure in agricultural extension process [7, 2], agricultural counseling agents – later referred to as agent – have the main task of providing agricultural information to farmers so that they can assist them in the success of agricultural development programs set by the government. This calls for an ability to become a teacher, an advisor, and an organisator [8, 9] depending on the subject to deal with. Therefore, proficiency is key to effective agricultural extension.

Technology, specifically in informatics and communication, is no less important as it helps to provide relevant information in a timely fashion. Researches and innovations on agriculture are beneficial in promoting commodity growth purposed to agricultural development [10, 4] as they should spark advancement opportunities in both agriculture and economy which, in the long run, answer poverty problems. Informatics and communication technology – later will be referred to as ICT – provides relevant, efficient information for farmers that should facilitate their business decision making in productivity, production quality, and profit improvement. Constructive agricultural information found on the internet are often presented in interesting ways, so learning from it should be effective to improve human resources. Most agricultural institutions and offices own websites containing significant information on agricultural research and management where farmers can learn from.

A study in Pontianak Regency, West Kalimantan, Indonesia, stated that agents in Sungai Pinyuh and Anjongan Districts were influential in the rice production growth and that their educational backgrounds as well as their counselling skills determined the production values [11]. Another research in South Bolaang Mongondow Regency, North Sulawesi Province, Indonesia, affirmed the good potential of smartphones to be counseling media, yet it called for a strategy to help less-educated farmers operate smartphones more easily [12]. However, no research on the implication of agent's skills and ICT towards their competence has been found.

2 Materials and method

Aiming to reveal whether agricultural counselling agent's proficiency and ICT affect extension efficiency, this study was held in Luwu Regency, South Sulawesi, Indonesia between July 18 and August 8, 2022. As the population quantity of agents in the area was unknown, simple random sampling in that every member of population had the same chance

to be chosen was applied. Data obtained from 104 respondents over google form questionnaire distributed via whatsapp group was quantitatively analyzed by employing Structural Equation Model (SEM) supported by PLS smart application [13–16], and the results were presented in an explanatory discussion to determine the correlation between two or more variables.

2.1 Outer model analysis

2.1.1 Validity and reliability test

To ensure the measurement feasibility, four indicating steps were conducted. Firstly, convergent validity established the correlation between component score and construct score in the form of standardized loading factor. The individual reflexive significance is considered high if the correlation value is of > 0.7 [17, 18]. Secondly, discriminant validity assessed the crossloading of measurement and construct by comparing the square root rate of Average Variance Extracted (AVE) where regarded as valid if the score is of > 0.5. Thirdly, composite reliability indicates the construct's value in view latent variable coefficients and regarded as highly reliable if the value is of > 0.70. Fourthly, Alpha Cronbach was run to support the result of composite reliability. A variable is taken as reliable when the Alpha Chronbach value is of > 0.7.

2.1.2 Instrument test

Convergent Validity is one of the most common instrument tests [19, 20] exercised to evaluate if a research instrument, i.e., questionnaire, is valid and reliable as in Table 1. AVE determines whether items in the instrument are related to and support each other, while Alpha Chronbach Composite Reliability estimates if an instrument is consistent in measuring certain construct.

Table 1. Instrument test.

Instrument test	Test
Validity	Convergent validity AVE
Reliability	Alpha chronbach composite reliability

2.1.3 R square test

R-square for dependent construct assessed the impact of certain independent latent variable towards dependent latent one to determine the impact percentage.

2.2 Inner model analysis

Also known as structural model, it evaluates inter-variable causal correlation tested in the model. This analysis involves smart PLS in hypothesis assessment [21], and the results are shown in t-statistic rate and probability rate. Using statistical value in hypothesis assessment, alpha 5 % of t-statistic rate is of 1.96 while beta score directs to inter-variable correlation effect. A hypothesis is acceptable if Ha = t-statistic > 1.96 with *P* values < 0.05 and is unacceptable if H0 = t-statistic < 1.96 with *P* values > 0.05.

3 Result and discussion

3.1 Result

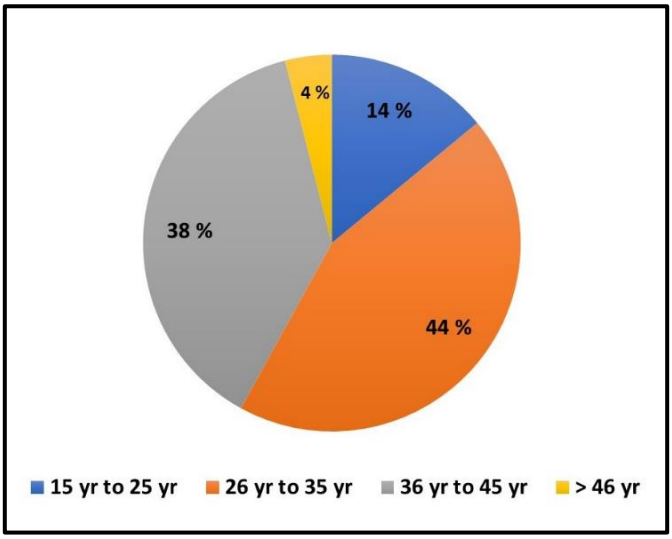

Fig. 1. Agricultural counselling agents by age.

It can be inferred from Figure 1 that most agents were of 26 yr to 35 yr old (44 %), followed by of 36 yr to 45 yr old (38 %), 15 yr to 25 yr old (14 %) and > 46 yr old (4 %).

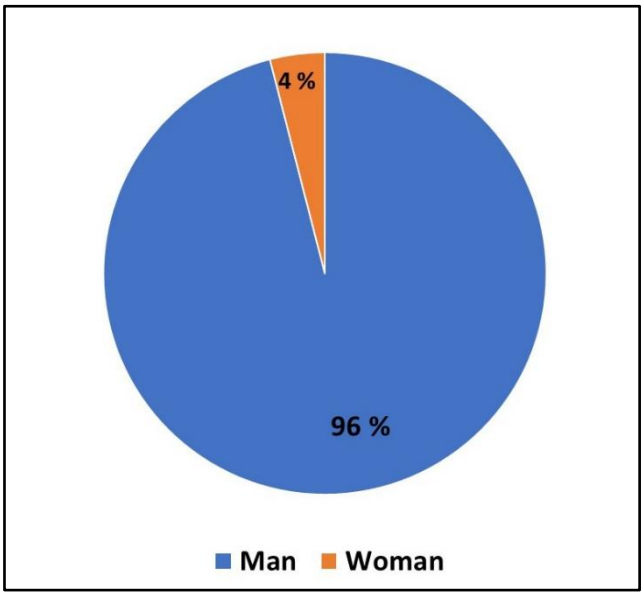

Fig. 2. Agricultural counselling agents by gender.

From Figure 2, it is clear that most agents were men (96 %) and only 4 % were women.

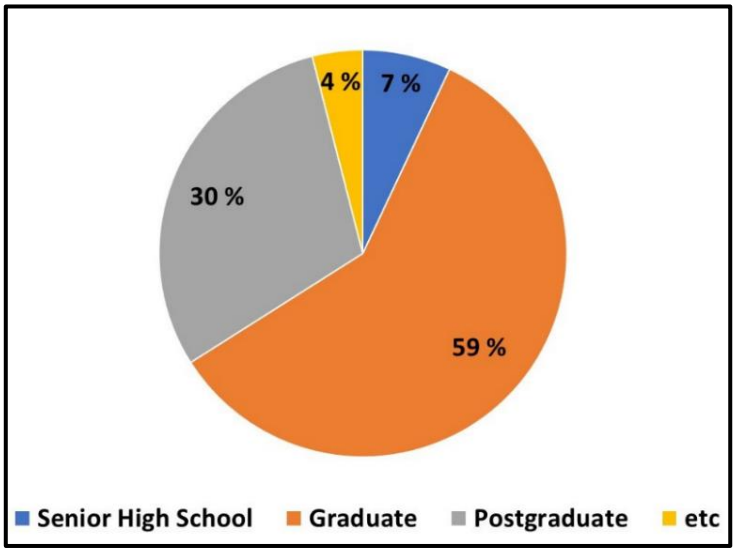

Fig. 3. Agricultural counselling agents by educational background.

Figure 3 shows that most agents had obtained graduate education (59 %) followed by postgraduate one (30 %). Only 7 % were of lower education, while 4 % did not provide their educational background.

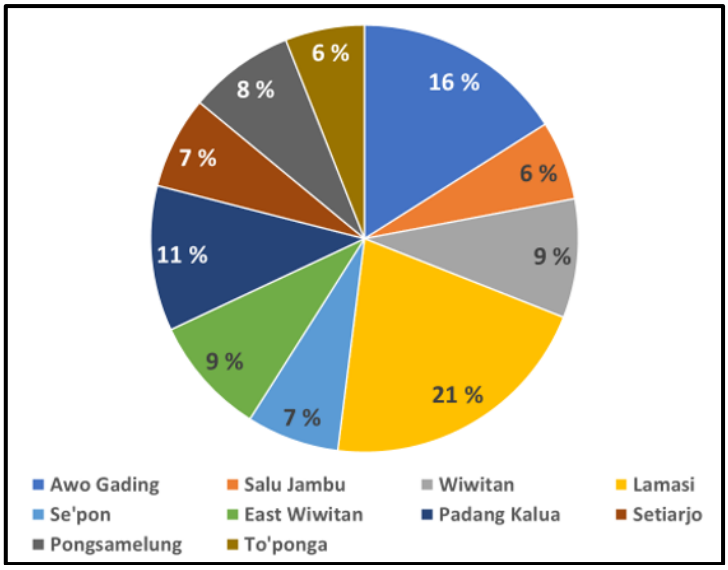

Fig. 4. Agricultural counselling agents by village as operational field.

Figure 4 reveals that most agents worked in Lamas Village (21 %). Awo Gading, Padang Kalua, Wiwitan, Wiwitan Timur, Pongsamelung, Ses'pon, Setiarejo, and To'pongo villages follow at 16 %, 11 %, 9 %, 9 %, 8 %, 7 %, 7 %, and 6 %, respectively.

3.1.1 Outer model

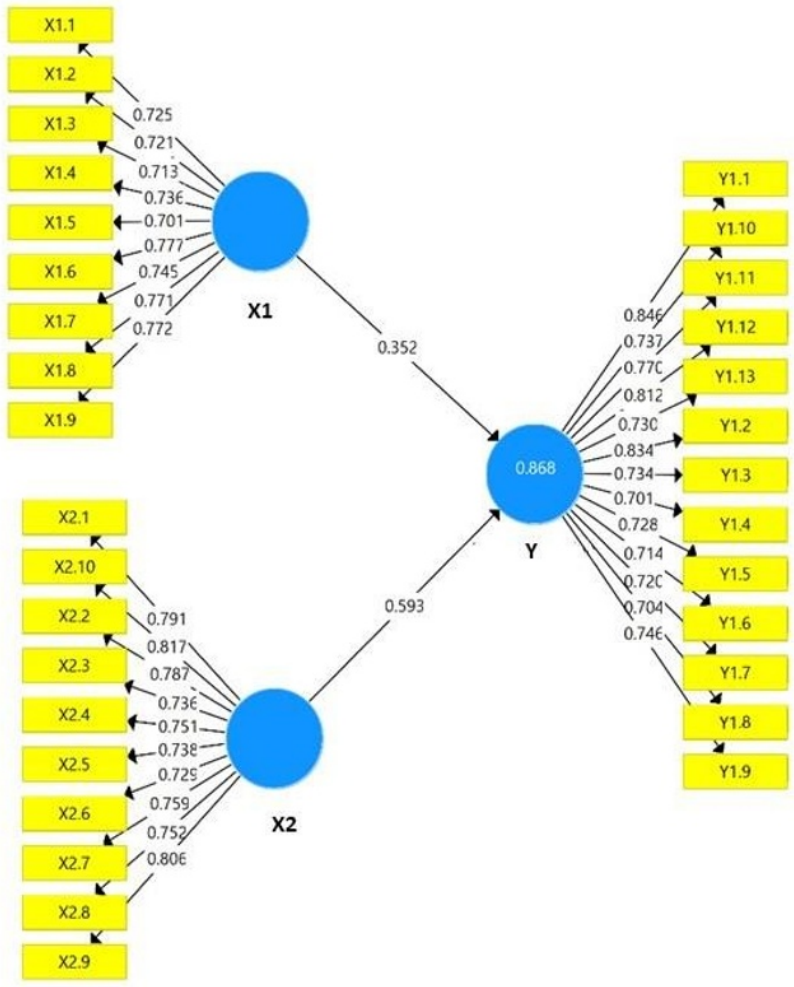

Fig. 5. SEM outer model (output smart PLS).

Figure 5 illustrates that the instruments used were decisively valid and reliable with outer loading value of > 0.7 and AVE value of 0.5. Data of the study were also reliable with Alpha Cronbach value and composite reliability of > 0.7.

3.1.2 Coefficient test result of R^2 determination

To measure how far other variables induce the endogen variables, R square test was employed once the series of reliability tests were gained from smart PLS. The analysis results show the R-Square value as shown in Table 2.

Table 2. Reliability test results.

	Cronbach's alpha	Composite reliability	Average Variance Extracted (AVE)
Agricultural counseling agent efficiency (Y)	**0.936**	**0.944**	**0.568**
Agricultural counseling agent proficiency (X1)	**0.897**	**0.916**	**0.548**
ICT application (X2)	**0.922**	**0.935**	**0.589**

As of R^2 test result in Table 3, the agent efficiency value of 0.868 means that agent proficiency and ICT application are 86.8 % influential towards agent's efficiency.

Table 3. R square test result.

	R square	R square adjusted
Agricultural counseling agent efficiency (Y)	0.868	0.866

The results of the hypothesis test as shown in Table 4 show that the competence of extension agents (X1) influences the performance of agricultural extension agents (Y). Likewise, the application of ICT (X2) affects the performance of agricultural extension workers (Y).

Table 4. Hypothesis test results.

	β	T statistics	*P* value
Agricultural counseling agent proficiency (X1) ⇨ agricultural counseling agent efficiency (Y)	0.352	3.100	0.002
ICT application (X2) ⇨ agricultural counseling agent efficiency (Y)	0.593	5.181	0.000

3.2 Discussion

3.2.1 Agent proficiency is significant towards agent efficiency

P value of 0.002 ($P < 0.05$) and β value of positive represents how agent proficiency positively influences agent efficiency. Skillful agents have the potential to utilize their work in order to empower farmers. Through discussion and field practice, information and tips from agents are expected to not only elicit realization among farmers on their needs or on their poor farming system but also urge them to take steps of improvement which, in due course, enable farmers to make their own decision for a better life. Conclusively, proficient agents allow agricultural education for independent farmers. This result is in sync with studies claiming that agent proficiency positively signified agent efficiency [22–24].

3.2.2 ICT application is significant towards agent efficiency

P value of 0.000 ($P < 0.05$) and β value of positive articulates how ICT application positively influences agent efficiency. The internet supports sustainable agricultural development by providing access to agricultural information, promoting local and national scale agricultural

information network, encouraging marginal land management, and facilitating agricultural indigenous knowledge. ICT not only spreads agricultural extension far and wide despite limited agents and interaction chances, but also offers various novel presentations to make the activities more appealing. Expanding the farmers' horizon on agriculture is virtually simpler. This finding is resonant with studies asserting that ICT involvement should enhance agent's efficiency [25–27].

4 Conclusion and recommendation

This study convinces that agricultural counseling agent's proficiency and ICT application are prominent towards agricultural counseling agent's efficiency. An aggressive strategy for nationwide sustainable agriculture should be reasonable with cooperation among agricultural counseling agents, farmers, agricultural extension organizations, and the government.

As the variables of this study are limited, further research on other variables that may improve agricultural counseling agent's efficiency is called for. Additionally, ones involving more samples are recommended in order to obtain more realistic answers.

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