

Agricultural Extension Performance Through the Use of Internet Media

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Abstract. The presence of information technology is a challenge for field agricultural extension to master computer skills and utilize the internet. The purpose of this study was to determine the performance of field agricultural extension and the effect of internal and external characteristics of extension on the utilization of internet media in Deli Serdang Regency. The population and research sample were 139 people using the census method. This study uses descriptive analysis, Pearson product moment correlation, multiple regression analysis, and effective contribution testing. The results showed that the measurement of the performance of agricultural extension with the highest value of 44.6 % was in the good category. The results of simultaneous correlation and regression tests through the F test show that there is a significant relationship and influence between each variable. Partially in multiple regression tests, the variables of age, education level, internet media ownership, perception of the internet, and internet usage patterns have a significant effect, while the variable of agency support has no significant effect on internet media utilization for extension. Based on the calculation of effective contribution, the variable internet usage pattern shows the largest effective contribution of 19.87 % with a relative contribution of 39.15 %.

Keywords: Agricultural development, characteristic, field agricultural extension, information and communication technology

1 Introduction

The world has changed a lot in terms of communication. Today, human no longer use landlines. Everyone has a cell phone that stays connected to the world at large, from 1G to 2.5G and from 3G to 5G. Telecommunications is evolving and advancing as performance

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and user capabilities improve. The arrival of 5G technology changes the way users access the internet [1].

The re-emergence of the global recession has caused ripples across developed and developing economies. The agricultural sector needs to be much more efficient and resilient to ensure global food security. Information and Communication Technology (ICT) can mitigate some of the problems facing farmers. After the World Wide Web or WWW (at 1990s) and the mobile internet (at 2000s), human are now heading into the third and potentially most "disruptive" phase of the internet revolution, the "Internet of Things" (IOT), also known as "Ubiquitous Computing". IOT applications cover a wide range of fields, including agriculture, healthcare, retail, transportation, the environment, supply chain management, infrastructure monitoring, and others [2].

Extension are the spearhead of agricultural development in Indonesia, which means that one of the successes of agriculture is in the hands of extension because extension can interact directly with farmers so that agricultural programs can be directly applied to or delivered to farmers. In addition to delivering development programs, extension also encourage farmers to be more advanced, broad-minded, and market-oriented [3].

Performance comes from the notion of performance, which means work results or work achievements, but performance has a broader meaning, not only the results of work but also the ongoing work process. Performance is the result of work that has a strong relationship with the organization's strategic goals, contributes to customer satisfaction, and contributes to the economy [4, 5].

A person's performance is a combination of ability, effort, and opportunity that is assessed from the results of his work. The work system of field agricultural extension in carrying out their main tasks as field agricultural extension, which include both direct dealing with the target audience (farmers-fishermen) and other supporting elements such as aspirations of farmers-fishermen and their families, agricultural development policies, agricultural extension programs, sources of technological information, socio-economic innovations, and approaches to agricultural methods and techniques [6, 7].

The performance of field agricultural extension is an individual's response or behavior to the actual success of work achieved by individuals in an organization according to the duties and responsibilities given to them, which are carried out effectively and efficiently over a certain period of time in order to achieve organizational goals. Agricultural development urgently needs the role of field agricultural extension to assist farmers in agricultural cultivation technology oriented to their knowledge, abilities, and attitudes toward adopting agricultural technology. Achieving this requires good agricultural extension performance in helping farmers achieve quality farm productivity levels. Good agricultural extension performance has an impact on improving the performance of farmers and increasing their production. The performance of these extension is directed at solving problems faced by farmers in carrying out their farms. Problems faced by farmers can be technical or non-technical [8].

The presence of information technology is a challenge for field agricultural extension to master computer skills and utilize the internet. In line with the era of utilization of information and communication technology, it is necessary to deliver technological information and the latest extension materials quickly and cheaply to field agricultural extension throughout Indonesia without being limited by space and time. The use of information and communication technology as a new medium for extension is considered more effective and efficient in organizing extension to increase access to information for extension so that the process of transforming knowledge for the main actors, farmers, becomes updated [9, 10].

Internet media is one form of information and communication technology that can be utilized by agricultural development actors, including extension, as disseminators of agricultural information and innovations. Utilization of the internet in agricultural

development requires the competence of the users of information and communication technology. In connection with this, it is increasingly emphasized that the internet plays a role as a key technology [11].

The advancement of the internet has the potential to become a huge opportunity for agricultural development actors, including extension, to access the information they need. The availability of information through the internet helps make the agricultural extension process faster and more effective. The amount of information that is easily accessed quickly and cheaply is utilized by extension to increase their knowledge so as to improve their performance, and the internet has become one of the most popular communication tools to this day [12].

Appropriate information dissemination strategies can improve farmers' ability to seek information and lead to changes in information dissemination behavior [13, 14]. In Deli Serdang Regency, some extension still use and rely on printed media as a source of information for extension activities. The purpose of this study was to determine the performance of field agricultural extension and to determine the effect of internal characteristics (age, level of education, and ownership of internet media) and external characteristics (agency support, perceptions about the internet, and patterns of internet use) on the utilization of internet media in Deli Serdang Regency. The hypothesis of this study is that there is an influence of internal characteristics [age (X1), education level (X2), internet media ownership (X3)], and external characteristics of extension [agency support (X4), perceptions (X5), and internet usage patterns (X6)] on the dependent variable, namely internet media utilization (Y).

2 Methods

The population and sample of this research are all agricultural extension serving in Deli Serdang Regency, North Sumatera, Indonesia as many as 139 people, so the sampling method used is the census method, namely, population members are used as samples [15]. This study uses descriptive analysis methods, Pearson product moment correlation, multiple regression analysis, and effective contribution testing [16, 17]. Descriptive analysis involves describing or describing the data that has been collected in the study. Measurement of the performance of field field agricultural extension based on PERMENTAN No. 91 of 2013 concerning Guidelines for Evaluating the Performance of Field Agricultural Extension is done by looking at the implementation of the performance of field field agricultural extension here are three indicators used to measure the performance of field agricultural extension: agricultural extension preparation, agricultural extension implementation, and evaluation and reporting [18]. Each question is scored on a scale of 1 to 5. Scale 1 indicates the lowest performance, and scale 5 indicates the highest performance. The total value of the performance measurement of field agricultural extension is called the self-evaluation value (NEM), which is a measure of work performance based on PERMENTAN No. 91 of 2013. Indicators and parameters are analyzed using an assessment scoring system. Scoring follows a Likert scale with a scale of 1 to 4 [19, 20].

Pearson's product moment correlation analysis was used to determine the relationship between the independent variables, namely: age (X1), level of education (X2), internet media ownership (X3), agency support (X4), perception of the internet (X5), and internet usage patterns (X6), and internet media utilization for extension (Y). Multiple linear regression analysis is used to see how much influence the independent variables have while testing the effective contribution to determine the contribution of each independent variable to the dependent variable.

3 Results and discussion

3.1 Field agriculture extension characteristics

The following description of field agricultural extension in Deli Serdang Regency can be seen in the Table 1.

Table 1. Characteristics respondents of field agricultural extension in Deli Serdang Regency.

Description	Frequency	Percentage (%)
Age		
a. 20 yr to 29 yr	18	12.9
b. 30 yr to 39 yr	63	45.3
c. 40 yr to 49 yr	35	25.2
d. 50 yr to 59 yr	23	16.5
Sex		
a. Man	69	49.6
b. Women	70	50.4
Education level		
a. High school	23	16.5
b. Associate degree	5	3.6
c. Bachelor	111	79.9
Position		
a. PNS (<i>Pegawai Negeri Sipil</i> or government employee)	93	66.9
b. THL (<i>Tenaga Harian Lepas</i> or freelance)	46	33.1
Length of service		
a. 1 yr to 5 yr	21	15.1
b. 6 yr to 10 yr	21	15.1
c. 11 yr to 15 yr	69	49.6
d. 16 yr to 20 yr	4	2.9
e. > 20 yr	24	17.3
Ownership of internet media		
a. One unit	60	43.2
b. Two unit	61	43.9
c. Three unit	12	8.6
d. Four unit	6	4.3
Frequently accessed media		
a. Smartphone	62	44.6
b. Smartphone and laptop/computer	59	42.4
c. Smartphone, laptop, and computer	13	9.4
d. Smartphone, laptop, computer, and tablet/iPad	5	3.6

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Table 1. Continued.

Description	Frequency	Percentage (%)
Types of services frequently accessed		
a. Website and social media	5	3.6
b. Website, social media, and e-mail	24	17.3
c. Website, social media, e-mail, and video call	110	79.1
Have participated in ICT training		
a. Yes	139	100.0
b. No	0	0

Based on Table 1, it can be seen that out of 139 agricultural extension respondents, for age, there are 12.9 % aged between 20 yr to 29 yr, 45.3 % aged between 30 yr to 39 yr, 25.2 % aged between 40 yr to 49 yr, and 16.5 % aged between 50 yr to 59 yr. For the gender of the 139 agricultural extension respondents, there were 49.6 % male field agricultural extension and 50.4 % female field agricultural extension. For education level, 16.5 % were high school graduates, 3.6 % were associate degrees graduates, and 79.9 % were bachelor graduates. For position status, 66.9 % were civil servants, and 33.1 % were casual workers. For the working period of respondents, there are 15.1 % who have worked for 1 yr to 5 yr, 15.1 % have worked for 6 yr to 10 yr, 49.6 % have worked for 11 yr to 15 yr, 2.9 % have worked for 16 yr to 20 yr, and 17.3 % have worked for more than 20 yr.

Then, for information regarding internet media ownership from 139 agricultural extension respondents, 43.2 % who have one unit, 43.9 % have two units, 8.6 % have three units, and 4.3 % have four units of media for the internet. As for the media that are often used for internet access, 44.6 % only use smartphones, 42.4 % use smartphones and laptops or computers, 9.4 % use smartphones, laptops, and computers, and 3.6 % use smartphones, laptops, computers, and tablets or iPads. For the types of services that are often accessed, there are 3.6 % who access the website and social media, 17.3 % access the website, social media, and email, and 79.1 % access the website, social media, email, and video call.

3.2 Agricultural extension performance

The existence of field agricultural extension officers is currently needed to support agricultural development, especially in order to maintain national food stocks. The performance of field agricultural extension officers in Deli Serdang Regency is based on PERMENTAN No. 91 of 2013, which consists of three indicators measured through 16 parameters, which can be seen in Table 2 below.

Table 2. Average measurement of agricultural extension performance in Deli Serdang Regency.

Item	Score 1		Score 2		Score 3		Score 4		Score 5	
	n	%	n	%	n	%	n	%	n	%
Agricultural extension preparation										
KPP.1	2	1.4	12	8.6	15	10.8	73	52.5	37	26.6
KPP.2	2	1.4	10	7.2	28	20.1	84	60.4	15	10.8
KPP.3	0	0.0	26	18.7	30	21.6	62	44.6	21	15.1
KPP.4	0	0.0	8	5.8	21	15.1	67	48.2	43	30.9
Implementation of agricultural extension										
KPP.5	3	2.2	12	8.6	29	20.9	82	59.0	13	9.4
KPP.6	1	0.7	6	4.3	36	25.9	83	59.7	13	9.4
KPP.7	4	2.9	0	0.0	40	28.8	0	0.0	95	68.3

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Table 2. Continued.

Item	Score 1		Score 2		Score 3		Score 4		Score 5	
	n	%	n	%	n	%	n	%	n	%
KPP.8	20	14.4	0	0.0	49	35.3	0	0.0	70	50.4
KPP.9	11	7.9	0	0.0	52	37.4	0	0.0	76	54.7
KPP.10	0	0.0	3	2.2	52	37.4	63	45.3	21	15.1
KPP.11	2	1.4	13	9.4	52	37.4	51	36.7	21	15.1
KPP.12	0	0.0	10	7.2	40	28.8	76	54.7	13	9.4
KPP.13	0	0.0	21	15.1	40	28.8	67	48.2	11	7.9
KPP.14	0	0.0	15	10.8	43	30.9	65	46.8	16	11.5
Evaluation and reporting										
KPP.15	0	0.0	9	6.5	39	28.1	70	50.4	21	15.1
KPP.16	1	0.7	3	2.2	31	22.3	63	45.3	41	29.5

In assessing the overall agricultural extension performance variable from the 16 items of the questionnaire instrument, the analysis used is based on the total score of each variable. The total score is obtained by summing the data for each question and overall, in each variable, then calculating the percentage score of each respondent on each variable, as in Equation (1).

$$\text{Percentage score} = \frac{\text{Total score of each respondent}}{(\text{number of items per variable} \times \text{maximum score})} \times 100 \% \quad (1)$$

Furthermore, based on the following range for the percentage score of respondents' answers above, categorization is carried out for the variable scale of agricultural extension performance, with categories according to PERMENTAN No. 91 of 2013 concerning Standard Work Achievement Value of Field Agricultural Extension as follows in Table 3.

Table 3. Categories of agricultural extension performance.

Category	Frequency	Percentage (%)
Bad	0	0.0
Insufficient	6	4.3
Quite good	51	36.7
Good	62	44.6
Very good	20	14.4
Total	139	100

Based on the Table 3, information was obtained that out of 139 respondents, there were six respondents (4.3 %) who considered that the performance of agricultural extension regarding agricultural extension preparation, agricultural extension implementation, and evaluation and reporting was still classified as insufficient, 36.7 % of respondents who considered that the performance of agricultural extension regarding agricultural extension preparation, agricultural extension implementation, and evaluation and reporting was classified as quite good, 44.6 % of respondents who considered that the performance of agricultural extension officers regarding agricultural extension preparation, implementation of agricultural extension, and evaluation and reporting was classified as good, and 14.4 % of other respondents considered that the performance of agricultural extension regarding agricultural extension preparation, implementation of agricultural extension, and evaluation and reporting was classified as very good.

3.3 Agricultural performance through internet media utilization

3.3.1 Correlation tests

Before regression analysis is carried out, it is necessary to conduct a correlation test using Pearson's product moment correlation to determine the relationship between age (X1), education level (X2), internet media ownership (X3), agency support (X4), perception of the internet (X5), and internet usage patterns (X6) with internet media utilization for extension (Y).

Table 4. Pearson's product moment correlation test.

	Correlation (r)	Sig. (p)
Correlation between age (X1) and internet media utilization for extension (Y)	-0.252	0.001
Correlation between level of education (X2) and utilization of internet media for extension (Y)	0.294	0.000
Correlation between internet media ownership (X3) and internet media utilization for extension (Y)	0.417	0.000
Correlation between agency support (X4) and internet media utilization for extension (Y)	0.172	0.022
Correlation between perception of the internet (X5) and utilization of internet media for extension (Y)	0.513	0.000
Correlation between internet usage pattern (X6) and internet media utilization for extension (Y)	0.557	0.000

Based on Table 4, it shows that the significance value of the six independent variables is smaller than alpha 0.05, namely between age (X1) ($r = -0.252$ with $p = 0.001$), education level (X2) ($r = 0.294$ with $p = 0.000$), internet media ownership (X3) ($r = 0.417$ with $p = 0.000$), agency support (X4) ($r = 0.172$ with $p = 0.022$), perception of the internet (X5) ($r = 0.513$ with $p = 0.000$), and internet usage patterns (X6) ($r = 0.557$ with $p = 0.000$), with internet media utilization for extension (Y), so it can be concluded that there is a significant relationship between age (X1), education level (X2), internet media ownership (X3), agency support (X4), perceptions of the internet (X5), and internet usage patterns (X6) with internet media utilization for extension (Y). This means that the younger the age (X1) of the respondent, the higher the level of education (X2), the more internet media ownership (X3), the better the agency support (X4), the better the perception of the Internet (X5), and the better the internet usage pattern (X6), the greater the utilization of internet media for extension (Y). Vice versa, the older the age (X1) of the respondent, the lower the level of education (X2), the less internet media ownership (X3), the less agency support (X4), the less perception of the internet (X5), and the fewer internet usage patterns (X6), the lower the internet media utilization for extension (Y).

The high or low utilization of internet media for extension (Y) is influenced by many factors, which in this study are thought to be influenced by factors of age (X1), education level (X2), internet media ownership (X3), agency support (X4), perceptions of the internet (X5), and internet usage patterns (X6), as previously explained. Then this will be further investigated to determine the effect of the factors age (X1), level of education (X2), internet media ownership (X3), agency support (X4), perceptions of the internet (X5), and internet usage patterns (X6) on internet media utilization for extension (Y) using multiple linear regression analysis.

3.3.2 Multiple regression tests

Based on the test results, the regression results can be arranged in Table 5 below.

Table 5. Regression analysis results.

Variable	Coefficient Regression (b)	Std. Error	Beta	T _{count}	Sig.	
Constant	20.690	4.095		5.052	0.000	Significant
Age (X1)	-0.075	0.033	-0.146	-2.291	0.024	Significant
Level education (X2)	0.821	0.403	0.132	2.040	0.043	Significant
Internet media ownership (X3)	1.269	0.405	0.214	3.131	0.002	Signifikan
Agency support (X4)	0.071	0.059	0.075	1.203	0.231	Not significant
Perceptions of the internet (X5)	0.253	0.069	0.256	3.664	0.000	Significant
Internet usage patterns (X6)	0.363	0.069	0.357	5.290	0.000	Significant
R (Multiple R)	= 0.713					
R Square	= 0.508					
R Square (Adjusted)	= 0.485					
F _{count}	= 22.685					
Sign. F	= 0.000					
α	= 0.05					

Based on Table 5, the coefficient of determination (R square) shows 0.508, which states the magnitude of the influence of age (X1), education level (X2), internet media ownership (X3), agency support (X4), perceptions of the internet (X5), and internet usage patterns (X6) on the utilization of internet media for extension (Y), while the coefficient of determination that has been corrected from the error factor or bias with the aim of being closer to the accuracy of the model in the population used (ad R square = R₂) is 0.485. From the value of the coefficient of determination (R square) showing 0.508 above, it can be interpreted that 50.8 % of the diversity of internet media utilization for extension (Y) is influenced by age (X1), education level (X2), internet media ownership (X3), agency support (X4), perception of the internet (X5), and internet usage patterns (X6). While the remaining 49.2 % is determined by other factors outside the variables studied.

Hypothesis testing using multiple regression has the aim of knowing whether the age variable (X1), education level (X2), internet media ownership (X3), agency support (X4), perception of the internet (X5), and internet usage patterns (X6) affect the utilization of internet media for extension (Y). Based on the table above, the hypothesis carried out with the F test, namely simultaneous testing, shows a significance value of 0.000 (*P* 0.05), so it can be concluded that there is a simultaneous significant effect of the variables age (X1), education level (X2), internet media ownership (X3), agency support (X4), perceptions of the Internet (X5), and internet usage patterns (X6) on internet media utilization for extension (Y).

In other words, the regression model produced is feasible to use to make predictions in the future. So, it can be concluded that the utilization of internet media extension (Y) is determined by the age factor (X1), level of education (X2), internet media ownership (X3), agency support (X4), perceptions of the internet (X5) and internet usage patterns (X6), which are described in the regression equation as in Equation (2).

$$Y = 20.690 - 0.075 X1 + 0.821 X2 + 1.269 X3 + 0.071 X4 + 0.253 X5 + 0.363 X6 \quad (2)$$

To show whether the independent variables individually have a significant effect on the dependent variable, the t test (partial test) is used to show the significance of the regression coefficient on the regression model formed. Based on the table above, by taking the real level (significance) of 5 % (0.05), the constant obtained a significance value (p) of 0.000, which is smaller than 0.05. It can be concluded that the constant has a significant effect on the regression model. For the variables age (X1), level of education (X2), internet media ownership (X3), perceptions of the internet (X5), and internet usage patterns (X6), which show significance values of 0.024, 0.043, 0.002, 0.000, and 0.000, respectively, which are smaller than alpha 0.05, it can be concluded that the variables age (X1), level of education (X2), ownership of internet media (X3), perceptions of the internet (X5), and internet usage patterns (X6) have a partially significant effect on the utilization of internet media for extension (Y).

In other words, the younger the age (age coefficient is negative), the higher the level of education (X2) (coefficient is positive), the more internet media ownership (X3) (coefficient is positive), the better the perception of the internet (X5) (coefficient is positive), and the better the internet usage pattern (X6) (coefficient is positive), it will have a significant (real) effect in increasing the utilization of internet media for extension (Y). Vice versa.

As for agency support (X4), with a significance value of 0.231, which is greater than alpha 0.05, it can be concluded that agency support (X4) has no significant effect partially on the use of internet media for extension (Y). Furthermore, from the regression model obtained at Equation 2, it can be implied as follows:

i) $b_0 = 20.690$

This constant value indicates that if there is no influence from the variables of age (X1), education level (X2), internet media ownership (X3), agency support (X4), perception of the internet (X5), and internet usage patterns (X6) (X1, X2, X3, X4, X5, and X6 = 0), then the utilization of internet media for extension (Y) is predicted to remain constantly high (because the constant value is positive) (X1, X2, X3, X4, X5 and X6 = X6 = X6 = X6 = X6).

ii) $b_1 = -0.075$

The value of the parameter or regression coefficient b_1 indicates that the younger the age of the respondent, it is estimated to increase the utilization of internet media for extension (Y), and conversely, the older the age of the respondent, it is estimated to decrease the utilization of internet media for extension (Y) (because the coefficient X1 is negative), assuming that the other variables are constant (X2, X3, X4, X5, and X6 = 0) or *ceteris paribus* and vice versa.

iii) $b_2 = 0.821$

The value of the parameter or regression coefficient b_2 indicates that the higher the level of education (X2), the more this can significantly increase the utilization of internet media for extension (Y), and conversely, the lower the level of education (X2), the more this is estimated to reduce the utilization of internet media for extension (Y) (because the X2 coefficient is positive), assuming that the other variables are constant (X1, X3, X4, X5, and X6 = 0) or *ceteris paribus* and vice versa.

iv) $b_3 = 0.421$

The value of the parameter or regression coefficient b_3 indicates that the higher the internet media ownership (X3), the higher the utilization of internet media for extension (Y) (because the coefficient of X3 is positive), assuming that the other variables are constant (X1, X2, X4, X5, and X6 = 0) or *ceteris paribus* and vice versa.

v) $b_4 = 0.421$

The value of the parameter or regression coefficient b_4 indicates that the better the agency support (X4), the higher the utilization of internet media for extension (Y) (because the coefficient of X4 is positive), assuming that the other variables are constant (X1, X2, X3, X5, and X6 = 0) or *cateris paribus* and vice versa.

vi) $b_5 = 0.421$

The value of the parameter or regression coefficient b_5 indicates that the better the perception of the internet (X5), the higher the utilization of internet media for extension (Y) (because the coefficient of X5 is positive), assuming that the other variables are constant (X1, X2, X3, X4, and X6 = 0) or *cateris paribus* and vice versa.

vii) $b_6 = 0.421$

The value of the parameter or regression coefficient b_6 indicates that the better the internet usage pattern (X6), the higher the utilization of internet media for extension (Y) (because the coefficient of X6 is positive), assuming that the other variables are constant (X1, X2, X3, X4, and X5 = 0) or *cateris paribus* and vice versa.

3.3.3 Effective contribution

Effective contribution testing is carried out to determine the contribution of each independent variable to the dependent variable. In this study, the effective contribution test was used to determine the contribution of age (X1), education level (X2), internet media ownership (X3), agency support (X4), perception of the internet (X5), and internet usage patterns (X6) to the utilization of internet media for extension (Y). According to Yasri [21], the formula used to calculate the effective contribution is as in Equation (3).

$$SE = R \times B \times 100 \tag{3}$$

In this study, the effective contribution test was used to determine the contribution of age (X1), education level (X2), internet media ownership (X3), agency support (X4), perception of the internet (X5), and internet usage patterns (X6) to the utilization of internet media for extension (Y). Relative contribution is used to determine the amount of contribution of each independent variable or predictor to the prediction or dependent variable based on the amount of R square (coefficient of determination), where the total of this relative contribution is 100 %.

Table 6. Calculation of effective contribution and relative contribution.

Variable	r	X	Beta	SE	SR
Age (X1)	-0.252	X	-0.146	3.68 %	7.25 %
Level education (X2)	0.294	X	0.132	3.86 %	7.61 %
Internet media ownership (X3)	0.417	X	0.214	8.92 %	17.57 %
Agency support (X4)	0.172	X	0.075	1.29 %	2.55 %
Perceptions of the internet (X5)	0.513	X	0.256	13.14 %	25.88 %
Internet usage patterns (X6)	0.557	X	0.357	19.87 %	39.15 %
Total				50.77 %	100 %

Based on the results of these calculations, it turns out that the variable internet usage pattern (X6) shows the largest effective contribution (SE) of 19.87 % with a relative contribution (SR) of 39.15 % of R square 50.77 %. As for age (X1), level of education (X2),

internet media ownership (X3), institutional support (X4), and perception of the internet (X5), they provide an effective contribution (SE) and a lower relative contribution (SR) with varying magnitudes.

Furthermore, from the results of these calculations, it can be seen that age (X1), level of education (X2), internet media ownership (X3), agency support (X4), perceptions of the internet (X5), and internet usage patterns (X6) were able to provide an effective contribution of 50.77 % to the utilization of internet media for extension (Y). The magnitude of this total effective contribution is the same as the magnitude of the coefficient of determination (R^2), which is 50.8 %. The implication is that there are several other variables that also affect the utilization of internet media for extension (Y) besides age (X1), level of education (X2), internet media ownership (X3), agency support (X4), perception of the internet (X5), and internet usage patterns (X6).

4. Conclusions

The measurement of the performance of field agricultural extension in Deli Serdang Regency, with the highest value of 44.6 %, is in the good category. The results of simultaneous correlation and regression tests through the F test show that there is a significant relationship and influence between each variable, with a significance value of 0.000 ($P < 0.05$). Partially with the t test obtaining a significance value (P) of 0.000, which is smaller than 0.05, the variables age (X1), level of education (X2), ownership of internet media (X3), perception of the internet (X5), and internet usage patterns (X6) have a significant effect on the utilization of internet media for extension (Y). While the variable agency support (X4) with a significance value of 0.231, which is greater than alpha 0.05, has no significant effect. In the calculation of effective contribution, the variable internet usage pattern (X6) shows the largest effective contribution of 19.87 % with a relative contribution of 39.15 %.

References

1. S. Patil, V. Patil, P. Bhat, Int. J. Eng. Innov. Technol., **1**,1: 26–30 (2012). https://www.ijeit.com/vol%201/Issue%201/IJEIT1412201201_06.pdf
2. V.C. Patil, K.A. Al-Gaadi, D.P. Biradar, M. Rangaswamy, Agro-Informatics Precis. Agric., **i**: 292–296 (2012). https://www.researchgate.net/publication/342144510_INTERNET_OF_THINGS_IOT_AND_CLOUD_COMPUTING_FOR_AGRICULTURE_AN_OVERVIEW
3. N.A. Purwatiningsih, A. Fatchiya, R.S.H. Mulyandari, J. Penyuluhan, **14**,1: 79–91 (2018). [in Bahasa Indonesia]. <https://doi.org/10.25015/penyuluhan.v14i1.17173>
4. A. Sunandar, *Peranan penyuluh pertanian dalam peningkatan kompetensi petani padi sawah (Oryza sativa L.) (studi kasus: apoktan sri rezeki Desa Pasar Baru Kecamatan Teluk Mengkudu Kabupaten Serdang Bedagai)* [The role of agricultural extensioners in increasing competence of pad rice farmers (*Oryza sativa* L.) (Case Study: Gapoktan Sri Rezeki Pasar Baru Village, Teluk Mengkudu District Serdang Bedagai Regency)]. [Undergraduate Thesis]. Fakultas Pertanian, Universitas Muhammadiyah Sumatera Utara (2019). [in Bahasa Indonesia]. p.92. <http://repository.umsu.ac.id/handle/123456789/1176>
5. M. Armstrong, A. Baron, *Managing Performance: Performance Management in Action*. CIPD, London (2005). p.182. https://books.google.co.id/books/about/Managing_Performance.html?id=qWR_SZPm_Qh8C&redir_esc=y

6. H.E. Bilali, M.S. Allahyari, *Inf. Process. Agric.*, **5**,4: 456–464 (2018).
<https://doi.org/10.1016/j.inpa.2018.06.006>
7. G. Danso-Abbeam, L.J.S. Baiyegunhi, T.O. Ojo, *Heliyon*, **6**,5: e04012 (2020)
<https://doi.org/10.1016/j.heliyon.2020.e04012>
8. M.I. Bahua, A. Jahi, P.S. Asngari, A. Saleh, I.G.P. Purnaba, J. Ilmiah Agropolitan, **3**,1: 293–303 (2010). [in Bahasa Indonesia].
<https://repository.ung.ac.id/hasilriset/show/1/36/faktor-faktor-yang-mempengaruhi-kinerja-penyuluh-pertanian-dan-dampaknya-pada-perilaku-petani-jagung-di-provinsi-gorontalo.html>
9. A. Ahmadi, A. Ansyor, S. Suharyanto, Z. Hidayat, *Effectiveness of digital-based agricultural extension implementation in central bangka regency*. 2nd International Conference on Agribusiness and Rural Development, (Yogyakarta, Indonesia, 2021). E3 Web Conf., **316**,02022: 1–7 (2021) <https://doi.org/10.1051/e3sconf/202131602022>
10. Y. Yahumri, E. Fauzi, W.E. Putra, A. Ishak, A. Alfayanti, M. Miswanti, et al., *Knowledge improvement of agricultural extender through technical guidance of paddy soil test kit*. The 3rd International Seminar on Promoting Local Resources for Sustainable Agriculture and Development, (Bengkulu, Indonesia, 2022). E3S Web Conf., **373**,04028: 1–7 (2023). <https://doi.org/10.1051/e3sconf/202337304028>
11. M. Boyaci, O. Yildiz, *J. Food Agric. Environ.*, **9**,1: 618–623 (2011)
https://www.academia.edu/37360991/ICTs_usage_tendencies_of_public_extension_workers_in_Turkey
12. N. Elian, D.P. Lubis, P.A. Rangkuti, *J. Komunikasi Pembangunan*, **12**,2: 104–109 (2014) [in Bahasa Indonesia] <https://core.ac.uk/download/pdf/230405220.pdf>
13. R.S.H. Mulyandari, S. Sumardjo, D.P. Lubis, N.K. Pandjaitan, *J. Komunikasi Pembangunan*, **8**,2: 1–16 (2010) [in Bahasa Indonesia]
<https://doi.org/10.46937/820105698>
14. A.K. Malik, K. Yadav, *Int. J. Curr. Microbiol. App. Sci.*, **7**,9: 2102–2108 (2018)
<https://doi.org/10.20546/ijcmas.2018.709.256>
15. N. Nuryadi, T.D. Astuti, E.S. Utami, M. Budiantara, *Dasar-dasar statistik penelitian*. [Fundamentals of research statistics]. Yogyakarta: Sibuku Media (2017). p.170. [in Bahasa Indonesia].
http://lppm.mercubuana-yogya.ac.id/wp-content/uploads/2017/05/Buku-Ajar_Dasar-Dasar-Statistik-Penelitian.pdf
16. S. Azwar, *Reliabilitas dan Validitas*. [Reliability and Validity]. 4th ed. Pustaka pelajar, Yogyakarta (2015). p.181. [in Bahasa Indonesia].
http://library.ukdw.ac.id/main/opac/index.php?p=show_detail&id=43454
17. S. Santoso, *Statistik multivariat*. [Multivariate statistics]. Elex Media Komputindo, Jakarta (2010). p.339. [in Bahasa Indonesia].
<https://opac.perpusnas.go.id/DetailOpac.aspx?id=158299>
18. Ministry of Agriculture, *91/Permentan/OT.140/9/2013* [Online] from
<https://peraturan.bpk.go.id/Home/Details/160383/permentan-no-91permentanot14092013-tahun-2013> (2013) [Accessed on May 2023] [in Bahasa Indonesia]
19. S. Sugiyono, *Statistika untuk penelitian*. [Statistics for research]. Alfabeta, Bandung (2007). p.390. [in Bahasa Indonesia].
https://www.academia.edu/36006415/Dokupdf_com_ebook_statistik_untuk_penelitian_by_prof_dr_sugiyono
20. S. Santoso, *Statistik parametrik*. [Parametric statistics]. Elex Media Komputindo, Jakarta (2010). p.227. [in Bahasa Indonesia].
<https://books.google.co.id/books?id=fVNbamuPVugC&printsec=copyright#v=onepage&q&f=false>

21. Yusri, *Statistika sosial: aplikasi dan interpretasi*. [Social statistics: application and interpretation]. Graha Ilmu, Yogyakarta (2009). p.431. [in Bahasa Indonesia]. <https://opac.perpusnas.go.id/DetailOpac.aspx?id=190309>