Cyber Extension in Strengthening the Extension Workers' Readiness in the Regencies of Bekasi and Kuningan, West Java Province

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Abstract

Objectives of this research were to: (1) analyze the level of agricultural extension workers' readiness in cyber extension utilization for the implementation of agricultural extension activities, (2) analyze the dominant factors that influence agricultural extension workers' readiness in cyber extension utilization, (3) formulate an appropriate strategy in developing agricultural extension workers' readiness in cyber extension utilization to support their duties as extension workers. Dominant factors influencing in strengthening of agricultural extension workers' readiness in cyber extension utilization are: perception of extension workers on the institutional support of cyber extension, and perception of extension workers on the characteristic of cyber extension innovation. Perception of extension workers on the characteristic of cyber extension innovation has greater influence on extension workers' readiness in cyber extension utilization.

Keywords: cyber extension utilization; institutional support; extension workers; innovation; readiness

1. Introduction

In the sector of agriculture, information via electronic media and internet system have spread over villages. Information development and agricultural innovation that are based on Information and Communication Technology (ICT) are carried out using a programmed computer network, which is connected by internet and is known as *Cyber Extension*. *Cyber extension* is one of the mechanisms of developing information communication network of agricultural innovation that is programmed effectively [7]. It is carried out by implementing ICT in the agricultural extension system that is punctual and relevant to supporting the process of the extension workers' decision making, so that s/he can deliver data and information about agriculture to farmers and their farmer groups.

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Cyber extensión, especially the one mentioned by the Ministry of Agriculture, is "a system of management of information about agricultural extension that is established in the form of extension gate, which is focused on data and information of agriculture in the form of extension materials (based on sub-sectors of food-crop, horticulture, farming, plantation, and agricultural human resources), specific-location materials, and news about national as well as regional agricultural development**".**

Cyber extension approach is oriented to the receivers, individual in nature, cost-efficient, time-efficient, and energy-efficient [1]. The results of the research conducted by Otomayo [6] showed that the main users of information and communication technology of *cyber extension* were agricultural extension workers. They were, apart from being a spearhead of the extension implementation, directly related to and facilitating the farmers' routine activities, and the success of extension was positively correlated with the extension workers in the field. Therefore, it was necessary to anticipate it with appropriate agricultural extension strategies [8], which in turn gave an implication to the needs for a change in the extension system to make it more dynamic, which was relevant to the needs of the people's development.

Indonesia, as an archipelago country that covers a wide area, considers *cyber extension* utilization as important in order to give education to everybody [4]. The existence of *cyber extension* is expected to be able to improve productivity of the extension workers and the extension itself when giving service concerning data and information of agriculture efficiently, easily, accurately, quickly, cheaply, safely, integratively, and accountably. *Cyber extension* is also one of the agricultural innovations that can function to make institution of research and development, studying and service meet with the innovation disseminators (extension workers), educators, farmers, and other stakeholders that have different types and forms of information needs, so that they can function synergically and complete one another mutually [10].

The readiness of the extension workers to welcome sustainable agricultural development can be measured from their ability and knowledge that become the basis of carrying out the task and its function. The readiness is a prerequisite of someone to learn and later on to interact in a special way [9]. The individual readiness means how far an individual can utilize and access *cyber extension* wares and personal skills needed to make himself keep up with the technological development [2].

In line with that, the synergy of ICT application in the agricultural extension system through *cyber extension* is one effort of the extension worker to actualize his job by utilizing the access of information from various sources, analyzing and repackaging the information to meet the needs of the stakeholders, and communicating the information needed for their farm-business.

Questions that need to be answered are: (1) how far the readiness of the agricultural extension workers for *cyber extension* utilization to support their role as extension worker; how far the dominant factors can influence the level of *cyber extension* utilization by the extension workers to develop their readiness to utilize *cyber extension* in order to carry out their duties as agricultural extension workers?; what appropriate strategy is used to develop the extension workers' readiness for *cyber extension* utilization to support their duties as agricultural extension workers?

This research was aimed at: (1) analyzing the level of readiness of the agricultural extension workers for *cyber extension* utilization in order to carry out activities concerning agricultural extensions, (2) analyzing dominant factors that can influence the readiness of the extension workers for *cyber extension* utilization, (3) formulating an appropriate strategy to develop the readiness of the extension workers for *cyber extension* utilization to support their duties as extension workers.

2. Research Methodology

This research used a quantitative paradigm, namely the researcher searched for the correlation between related variables and the characteristics of the extension workers, institutional support, nature of the innovation of the cyber extension, the extension workers' competency on cyber extension, and the readiness of the extension workers for *cyber extension* utilization. To reach the goal, the research outline was carried out by survey, which combined explanatory research and descriptive research.

The research locations were Regency of Kuningan and Regency of Bekasi, West Java Province, Indonesia with the following considerations: (1) these regencies owned extension institutions in accordance with Regulation No 16 Year 2006 concerning Extension System of Aagriculture, fishery and forestry (Sistem Penyuluhan Pertanian, Perikanan dan Kehutanan/SP3K), (2) these regencies were facilitated by data processing units like computers, modems, printers, and scanners. The field research was carried out from October to December 2012.

Respondents of the research were government agricultural extension workers and freelancers of agricultural extension workers (Tenaga Harian Lepas Tenaga Bantu Penyuluh Pertanian/THL-TBPP), whose total number was 328 extension workers.

Instrumental testing was carried out through validity test using content validity and construct validity. Reliability testing used Cronbach alpha method. The statistical analysis includes: (1) descriptive statistic analysis, (2) different test analysis [3], and structural equation model/SEM [5].

3. Theoretical Framework and Research Hypothesis

3.1. Theoretical Framework

The utilization of cyber extensión as an effort to improve the readiness of the extension workers is influenced by the following factors: personal characteristics of the related extension workers, institutional support, that can be given in the form of the government policy, operating cost, and the nature of the innovation of cyber extension itself, as well as the extension workers' competency. Some variables that are expected to to be able to explain the readiness of the extension workers for cyber extension utilization in the Regency of Kuningan and the Regency of Bekasi, West Java Province, can be seen in Figure 1.
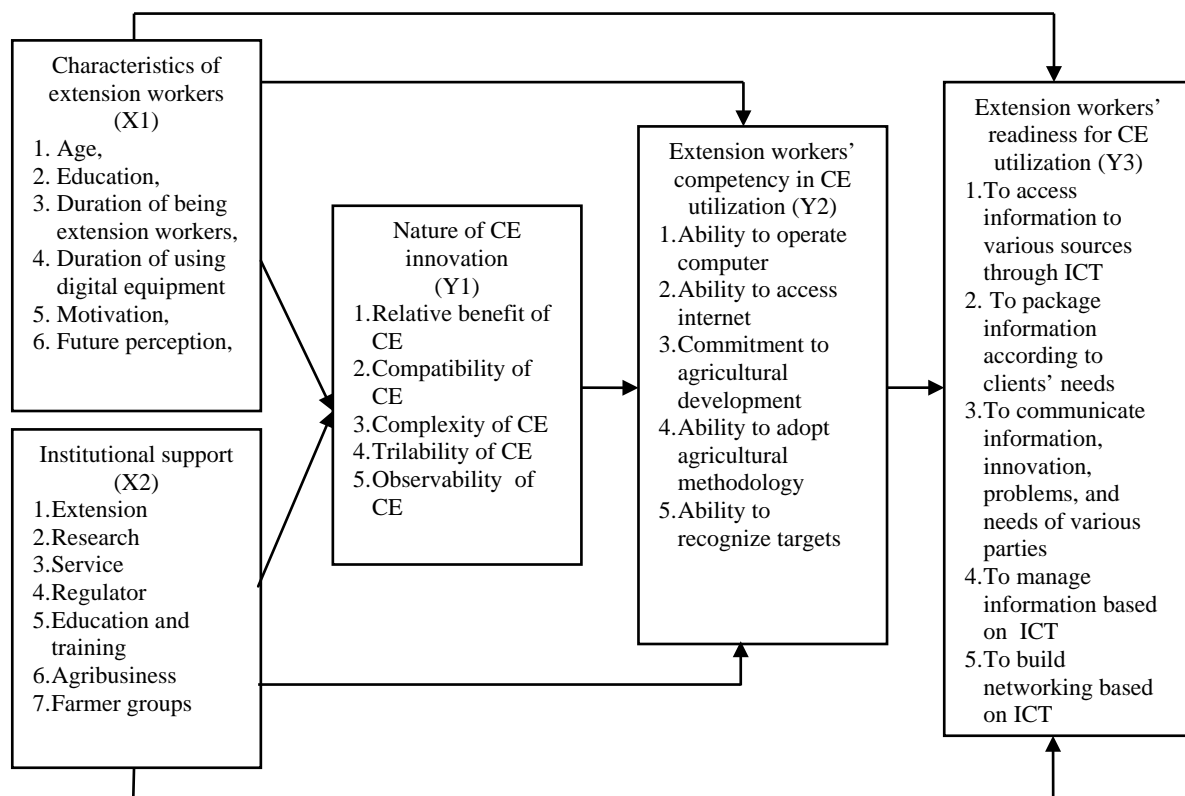

Figure. 1. Diagram of the Theoretical Framework of the Operation of *Cyber Extension*
in Strengthening the Extension Workers' Readiness

3.2. Research Hypothesis

There are some significant direct and indirect influences of the extension workers' characetristic factors, factors of institutional support, nature of innovation, and the extension workers' competency to utilize *cyber extension* on the extension workers' readiness to utilize *cyber extension*.

4. Results and Discussion

4.1. Personal Characteristics of the Extension Workers in Utilizing Information and Communication Technology (ICT) of Cyber Extension

The results of the research showed that the agricultural extension workers in the two locations, namely the Regency of Bekasi and the Regency of Kuningan were not ready to utilize *cyber extension* as one of the model alternatives of agricultural extension system. This is because the extension workers were not yet able to operate the computer and to utilize internet, which beccame the basis of *cyber extension* utilization. The government extension workers in the Regency of Bekasi and the Regency of Kuningan whose age was not relatively young, nearly retired, even tended to avoid using *cyber extension* for the agricultural extension system.

As one of the new paradigms in the agricultural extension system, *cyber extension* was not yet able to give a strong motivation to encourage the agricultural extension workers to adopt it well to download data and information about agriculture as well as to publish data and information that had been prepared by the extension workers in the extension materials.

Based on the results of *Mann-Whitney* U-test, it was found out that there were some significant differences on the variables of age, work experience, and future perception of the extension workers in the Regency of Bekasi, who were relatively better than those in the Regency of Kuningan, whose mean scores were between 42.24 and 68.80, belonging to categories of medium and high.

Based on the age of the extension workers as can be seen in Table 1, in the Regency of Kuningan and the Regency of Bekasi, 25.85 percent of the extension workers were nearly retired, or 82.71 percent belonged to less productive age, namely those aged > 46 years old, unlike the age of the extension workers of THL-TBPP, where 95.58 percent belonged to productive and very productive age ($\leq$ 45 years old). In relation to the *cyber extension* utilization, THL-TBPP extension workers were relatively higher compared to the government extension workers. Seen from the Mann-Whitney U-test based on the category of the respondents' age, the *cyber extension* utilization by THL-TBPP extension workers in the Regency of Bekasi (98.30 percent) was better than that in the Regency of Kuningan (96.00 percent), with the mean score of 42.24.

When seen from the work experience, as much as 68.03 percent of the government extension workers had more than 20 years' work experience. However, this was not proportional to their readiness for *cyber extension* utilization. This is because their work experience was more on the applied skills in agricultural culture, while the information and communication technology of *cyber extension* that has been developed by the Ministry of Agriculture to support the agricultural extension system was started to be developed at the end of 2010. The details of the testing results of personal characteristics of the extension workers are presented in Table 1.

Table 1. Personal Characteristics of Extension Workers based on the categories of the research variables, the mean scores and *Mann-Whitney* U-test in the Regency of Kuningan and the Regency of Bekasi

Personal charateristics /Measurement	Category	Kuningan (n=223)			Bekasi (n=105)			Total			Sign (*Mann-Whitney* U test)
		PNS (%)	THL (%)	Rata-rata	PNS (%)	THL (%)	Rata-rata	PNS (%)	THL (%)	Rata-rata	
Age (X1.1) years	$\leq$ 35	13.54	61.00	39.39	1.96	66.67	42.24	9.52	62.43	40.82	0.003**)
	36 - 45	32.29	35.00		1.96	29.63		21.77	33.15		
	46 - 55	37.50	5.00		52.94	3.70		42.86	4.42		
	$\geq$ 56	16.67	0.00		43.14	0/00		25.85	0.00		
Formal education (X1.2) years	SLTA	10.42	48.82	58.12	11.76	40.74	58.80	10.88	46.41	58.46	0.889
	D-3	29.17	14.96		45.10	14.81		34.69	14.92		
	Strata-1	57.29	36.22		37.25	44.44		50.34	38.67		
	Strata-2	3.13	0.00		5.88	0.00		4.08	0.00		
work experience (X1.3) years	$\leq$ 10	34.37	100.0	46.00	3,92	100.0	68.80	23.81	100.0	57.40	0.000**)
	11 - 15	4.17	0.00		0.00	0.00		2.72	0.00		
	16 - 20	5.21	0.00		5.88	0.00		5.44	0.00		
	$\geq$ 21	56.25	0.00		90.20	0.00		68.03	0.00		
Computer owning (X1.4)	$\leq$ 5	57.29	57.48	24.00	52.94	51.85	25.96	55.78	55.80	24.98	0.625
	6-10	20.83	21.26		47.06	25.93		23.13	22.65		
	11-15	16.67	12.60		27.45	20.37		15.65	14.92		

years	≥16	5.21	8.66		13.73	1.85		5.44	6.63		
Future perception (X1.5) score	low	22.92	27.17		18.63	20.37		21.43	25.14		
	medium	59.38	62.99	47.55	55.39	31.02	55.00	57.99	53.45	51.28	0.000**)
	high	15.36	9.45		23.04	43.06		18.03	19.48		
	very high	2.34	0.39		2.94	5.56		2.55	1.93		
Motivation (X1.6) score	low	50.00	54.33		45.10	53.70		48.30	54.14		
	medium	27.08	25.20	58.75	23.53	25.93	59.25	25.85	25.41	59.00	0.660
	high	19.79	14.96		21.57	14.81		20.41	14.92		
	very high	3.13	5.51		9.80	5.56		5.44	5.52		

Note: * significant at P < 0,05 dan   ** significant at P < 0,01
Mean score: 0-25= low   26-50= medium   51-75= high   76-100= very high

The results of the depth-interview showed that *cyber extension* had not given any solution to the problems of materials and information on agriculture to the extension workers and the farmers in the field, whether it was of commodity cultural technology, post-harvest, marketing or materials and information on improving the capacities of the extension workers, farmers and their farm insitution. This is due to the fact that the extension materials and other agricultural information presented was relatively unrenewable and tended to quote from guide books or technical manuals published by research and development institutions, from the central office as well as local office and/or from other sources from publications found in the bookshops which were published 5 to ten years ago. The detailed results of the U-test of the institutional support on the readiness of the extension workers to utilize *cyber extension* are presented in Table 2.

Table 2. Distribution of Percentage and Mean Scores of Institutional Support
on the Readiness of the Extension Workers for *Cyber Extension* Utilization

Perception of instituional support/ measurement/ category	Kuningan (n=223)			Bekasi (n=105)			Total			Sign
	PNS (%)	THL (%)	Mean	PNS (%)	THL (%)	Mean	PNS (%)	THL (%)	Mean	(Mann-Whitney U test)
Extension(X2.1) score										
low	42.01	42.65		53.59	58.02		46.03	47.24		
medium	42.01	43.83	25.57	30.72	28.40	40.00	38.10	39.23	32.79	0,. **)
high	11.28	8.92		12.42	10.49		11.68	9.39		
very high	4.69	4.59		3.27	3.09		4.20	4.14		
Research (X2.2) score										
low	13.54	6.69		19.61	27.31		15.65	12.85		
medium	66.15	67.13	32.33	57.84	40.74	42.24	63.27	59.25	37.29	0.359
high	17.97	23.03		18.14	29.63		18.03	25.00		
very high	2.34	3.15		4.41	2.31		3.06	2.90		
Service (Tech.) (X2.3) score										
low	12.50	10.43		34.56	41.90		20.15	19.82		
medium	64.97	68.01	22.30	48.77	35.88	63.54	59.35	58.43	42.92	0.000 **)
high	20.83	19.39		14.22	21.30		18.54	19.96		
very high	1.69	2.17		2.45	0.93		1.96	1.80		
Regulator (Gov.) (X2.4) score										
low	44.79	42.78		52,29	55.56		47.39	46.59		
medium	42.36	46.06	28.48	35,29	30.86	50.40	39.91	41.53	39.44	0.048**)
high	11.46	9.45		7,84	11.73		10.20	10.13		
very high	1.39	1.71		4,58	1.85		2.49	1.75		
Education & training (X2.5) score										
low	25.63	22.20		54.12	54.44		35.51	31.82		
medium	63.13	66.30	18.15	34.12	32.59	72.34	53.06	56.24	45.35	0.000**)
high	10.83	10.55		10.59	11.11		10.75	10.72		
very high	0.42	0.94		1.18	1,85		0.68	1.22		
Agribusines (X2.6) score										
low	7.64	10.10		29.74	29.32		15.31	15.84		
medium	65.97	69.42	21.28	60.78	46.91	65.71	64.17	62.71	43.50	0.000**)
high	22.22	18.37		7.52	21.30		17.12	19.24		
very high	4.17	2.10		1.96	2.47		3.40	2.21		
Farmer groups (X2.7) score										
low	14.93	13.25		31.70	36.73		20.75	20.26		
medium	66.32	67.06	24.98	53.27	39.20	57.58	61.79	58.75	41.28	0.003**)
high	18.75	16.40		12.09	22.84		16.44	18.32		

very high	0.00	3.28		2.94	1.23		1.02	2.67

Note:* significant at P < 0.05 and   ** significant at P < 0.01
Mean score   0-25 = low   26-50= medium   51-75= high   76-100= very high

Institutional support played an important role in encouraging the extension workers' readiness for *cyber extension* utilization. In general, the institutional support belonged to the category of medium with the mean scores between 32.79 and 45.35. The support from education and training services (sign=0.00**) belonged to the highest score, that is 45.35. This showed that the extension workers' readiness to utilize *cyber extension* was very much determined by whether or not there was an education and training or technological guidance for the extension workers, operators, and the *cyber extension* information system management in utilizing the *cyber extension*.

The extension workers' readiness for *cyber extension* utilization was also determined by the followings: the availability of suports from agribusiness institutions (sign=0.000**) that gave information about markets and marketing products, service institutions (sign=0.000**), that is technical services of agriculture as the provider of agricultural development programs by giving facilities to be accessed by the extension workers, farmer group institutions (sign=0.003**), as the innovation technology users, and extension institution (sign=0.005**) that functioned to package data and information, to provide operational room and networking, and to provide budget.

Results of *Mann Whitney* U-test showed that institutional support to the readiness of the extension workers for the *cyber extension* utilization in the Regency of Bekasi were relatively higher (mean scores were 40.00 to 72.34) compared to that in the Regency of Kuningan (mean scores were 18.15 to 32.33). As can be seen from Table 2, support from the education and training institution (mean scores were 63.54), in the Regency of Bekasi was relatively higher compared to that in the Regency of Kuningan, whose mean scores were 22.30 and 18.15.

The high support given by institutions in the Regency of Bekasi can be seen from the increase of budget in the Agency of Extension and Food Security Implementation (Badan Pelaksana Penyuluhan dan Ketahanan Pangan) over the past two years, namely from 5 billion rupiah in 2010 to 7 billion rupiah in 2012 (an increase of 28.57 percent), and to 12 billion rupiah in 2013 (an increase of 41.67 percent). The target was focused on provision of extension facilities, activities of study on technological application, provision of printed media, trainings for extension workers, such as Field School, demonstration and in terms of utilization of information technology, such as training for Participation of Agricultural Extension Methodology, and apprenticeship.

Based on the processed data, list of forms in the Regency of Bekasi, there was 37.14 percent respondents did an access to *cyber extension* in their offices, and 31.84 percent did it in the internet stalls. In the Regency of Kuningan, however, the percentage was lower, that is 17.04 percent did an access to *cyber extension* in their offices and 30.48 percent in the internet stalls.

The results of depth interview showed that support from education and training services and services was relatively better, because it was related to the extension workers' ability to operate *cyber extension* and the availability of agricultural development program in the technical institutions. In the implementation process this always involved agricultural extension workers, so that they understood their duties better when they gave control and assistance to farmers and their farmer groups.

On the other hand, the results also showed that the extension workers still considered "extension" as a "transfer of technology/information", and not as "extension" as stated in Law No. 16/2006 concerning Extension System of Agriculture, Fishery and Forestry (SP3K), which says that extension is a process of learning for the main actors and business doers so that they want and are able to help and organize themselves in accessing market information, technology, capitalization, and other sources, as an effort to improve productivity, business efficiency, income, and their welfare, and also to improve their awareness to restore the function of living space.

Support in the form of the provision of *cyber extension* was not followed by an appropriate number of units and infra-structure, such as special rooms for operation and networking of stable internet connection, so that the extension workers would become interested to try to adopt the system in order to look for information for the extension they gave to farmers and their farmer groups. Although there were a great number of government extension workers who owned computers (62.59 percent), these computers were only used by their children for their school tasks. Furthermore, lack of socialization and appreciation/ technical guidance in the form of training for the operators of *cyber extension* or technical training of article writing (journalism) for the extension workers as a material writer team caused a bad impact, namely lack of motivation of the management officers and extension workers to adopt the system. In addition, due to the absence of routine budget for management and operationalization of the system, in some districts *cyber extension* was only used as a means of making an administrative activity report.

The level of readiness of the extension workers for *cyber extension* utilization was at the medium category. This was measured according to how they accessed information, how they packaged information, how they communicated information, how they managed information, and how they developed networking. Results of *Mann-Whitney* U-test showed that there was a significant difference between the Regency of Kuningan and the Regency of Bekasi, especially in the readiness of the extension workers for building networking (sig=0.002**). The Regency of Bekasi, based on the mean scores was at a high category (mean score = 58.75), whereas the Regency of Kuningan was at a low category (mean score = 24.55).

4.2. Factors that Influenced the Readiness of the Extension Workers for Cyber Extension Utilization

Based on the results of CFA test on the model appropriateness with the *loading factor* value, age and work experience as an extension worker were the most dominant indicator variables. Support from education and training services and technical service institutions that included agricultural services (services of food-crop agriculture, horticulture, plantation, and farming) were also the most dominant factors that could push the readiness of the extension workers for *cyber extension* utilization. According to measurement of *goodness of fit statistics* a model established for cyber extension in strengthening the readiness of the extension workers was feasible, with a value of p=values = 0.08569 (. 0.05), RMSEA 0.026 (, 0.08), CFI 0.99 ($\geq$ 0.90), IFI 0.99 ($\geq$ 0,90), and AGFI 0.94 (0.8-0.9). Details of dominant factors that influenced the readiness of the extension workers for *cyber extension* utilization can be seen in Figure 2.

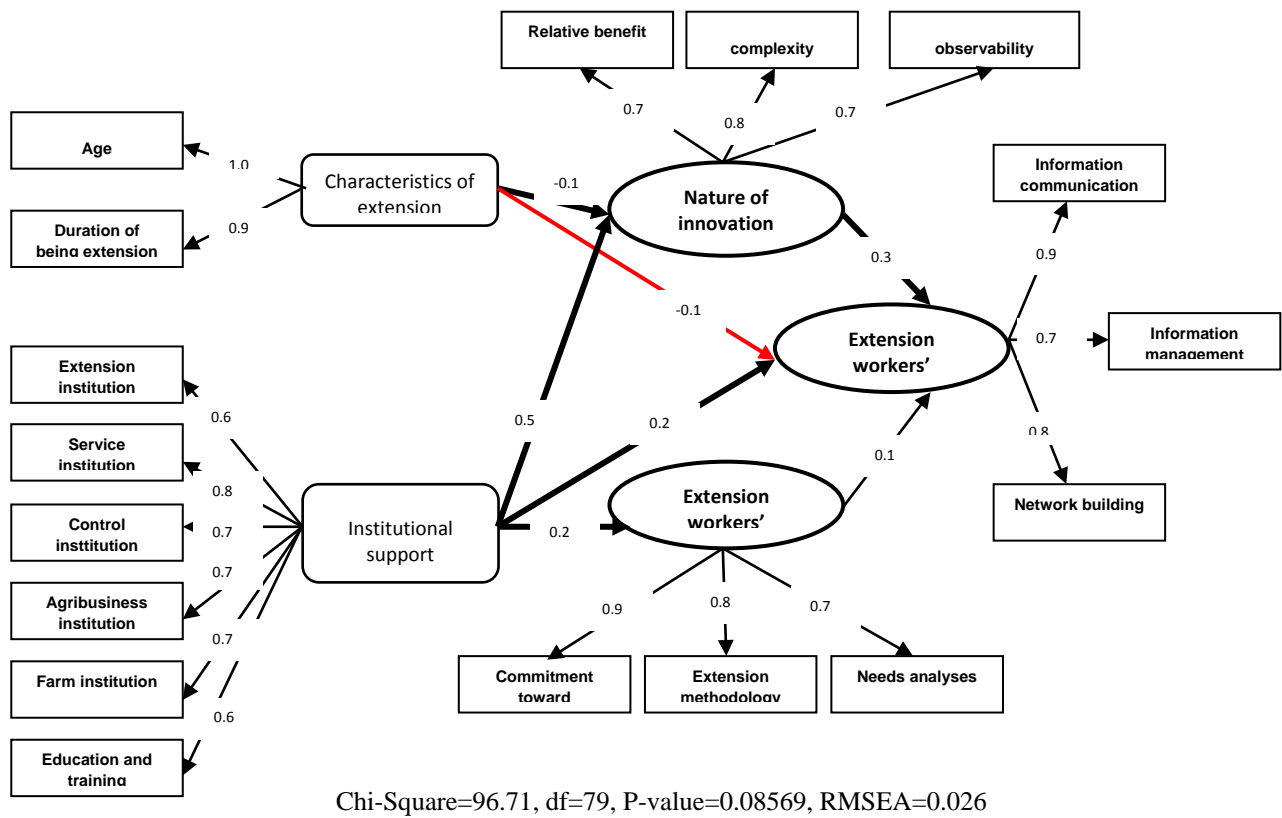Chi-Square=96.71, df=79, P-value=0.08569, RMSEA=0.026

Figure 2. Structural Model of Analytical Relation of the Dominant Factors that Influenced the Readiness
of the Extension Workers for *Cyber Extension* Utilization

Based on Figure 2, from the estimation of structural model parameter it can be said the institutional support was the most dominant variable for encouraging the readiness of the extension workers for cyber extension utilization. Service institutions with a loading factor as much as 0.8 could reflect the readiness of the extension workers for *cyber extension* utilization by providing facilities for access and easiness to obtain agricultural data and information. Furthermore, based on the depth interview it was found out that the facilities could attract the extension workers, since the technical service isntitutions supported the availability of information through a real program in the farmers' level.

Technical service institutions played an important role in the sustanance and performance of the extension workers in the field. This was due to a real program support, namely increasing productivity of commodities in the field, whether it was by developing the plantation area or a demplot program, or demfarm. Cyber extension had the following features, such as relative benefit (LF=0.7), complexity (LF=0,8) and observability (LF=0.7), are endogen variables that could reflect the extension workers' readiness for *cyber extension* utilization.

Endogen latent variables of the extension workers' competency in cyber extension could be reflected by the extension workers' ability to maintain their commitment to agricultural development (LF=0.9), extension methodology (LF=0.8), and to identify and formulate the farmers' needs (LF=0.7). the extension workers' ability to keep their commitments to agricultural development was the most dominant endogen variable. That could reflect the extension workers' competency on *cyber extension*. This could be verified by the continuation of the training system and the extension workers' routine, sustainable and scheduled visits to the farmer groups, the materials of which were downloaded from *cyber extension*.

Furthermore, the endogen latent variable of the extension workers' readiness for cyber extension utilization could be reflected from the readiness of the extension workers to communicate information, innovation, problems, and needs to various parties (LF=0.9). This variable was the most dominant one. This was then followed by other variables, namely the readiness of the extension workers for building networking (LF=0.8) and for managing information (LF=0.7).

Based on the figure of estimation of structural model parameter, it can be seen that there were direct and indirect impacts of between the research latent variables and the value-t as a statistical test. The details of this relationship are presented in Table 3 below.

Table 3. Decomposition of the influence of each variable on the Readines of the Extension Workers
for *Cyber Extension* Utilization (in Standardized)

Relation among variables	Coeffici-ent Value of Direct Impact	Coefficient Value of Indirect Impact through		Total	t Value at α=0,1	R^2
		Innova-tion	Compe-tency			
Characetristics →Innovation	-0.12			-0.12	-2.09*	0.72
Institution → Innovation	0.53			0.53	6.26*	
Characetristics →Competency	0.05	0.00		0.05	0.87	0.53
Institution → Competency	0.19	0.02		0.21	2.86*	
Innovation → Competency	0.01			0.01	0.25	
Characetristics →Readiness	-0.07	-0.03		-0.1	-1.18	0.42
Institution → Readiness	0.20			0.20	2.84*	
Competency → Readiness	0.11			0.11	1.25	
Innovation → Readiness	0.24		0.01	0.25	2.82*	

Note : * significant at alpha real level= 0.05 (t table value=1,645)

The SEM analytical results from the relation among research variables, direct and indirect, as is presented in Table 3 showed that the endogen latent variables of the innovation nature of cyber extension utilization was influenced significantly by characteristics of the extension workers with an absolute value t is a much as -2.09 (smaller than -1.645) and perception of the extension workers of institution with t calculated as 6.26 (bigger than 1.645). This result showed that the characteristics of the extension workers, especially in terms of age and duration of work that was getting bigger and bigger, would reduce their readiness for *cyber extension* utilization.

The endogen latent variable of the extension workers' competency was significantly influenced by institutional support. This can be seen from the t value as much as 2.86, which was bigger than t table with a 5% level (1.645). On the other hand, the extension workers' characteristics did not give a significant influence on their competency in the cyber extension, with the t value as much as 0.87. The innovation nature did not give a significant influence either on the extension workers' competency in the cyber extension (the t value = 0.25). The endogen latent variable of the extension workers' readiness for *cyber extension* utilization, however, was indeed influenced significantly by the extension workers' perception on institutional support and on the nature of innovation. This can be seen from each t value, which is 2.84 and 2.82.

5. *Cyber Extension* Strategies in Strengthening the Extension Workers' Readiness

The research results showed that the extension workers' readiness for *cyber extension* utilization was influenced significantly by institutional support and the innovation nature of the *cyber extension* itself. Therefore, the agricultural extension system through *cyber extension* in order to strengthen the extension workers' readiness can be carried out through developing a *cyber extension* model nationally and integratively, namely by building an information system that can provide mechanisms among information sub-systems, whether it is built by government, private companies, higher education, or research and study institutions on agriculture. For this reason, data and information on agriculture can flow routinely from one system to another, so that they can be utilized by all stakeholders. The strategy of developing cyber extension models to strengthen the extension workers' readiness that is developed based on these synthetic research results is as follows:

a) **Determining the Regulation and Policy**

One effort to harmonize and integrate *cyber extension* in strengthening the extension workers' readiness is the necessity to issue a regulation or policy that can control the utilization and management in the form of standardized guidelines. These guidelines must be arranged using an information management system pattern of agricultural extension that has been set up in the *cyber extension* as an interactive communication tool, whether it is a manual, transition or computerization.

The policy and standardization that have been developed are tightly related to each level of governmental offices, from the central to regencies, and each user related to *cyber extension* utilization, from planning, implementation, costing to human resources. Therefore, it can be concluded that all stakeholders will be aware of the new information system model and their role in the system.

b) **Socialization and Advocation to Regional Governments**

Nowadays managing agricultural information and data is carried out by various entities. This is because there is not yet standardization. This Agricultural information and data is the one coming from tracing the manual, technical guidance, that is obtained from research results and/or the result of the farmers' application and development. Therefore, it is necessary to make an operational procedure standard (OPS) concerning mechanisms and work relation of the flow and

exchange of agricultural data and information with related stakeholders. This operational procedure standard can describe the mechanism of the latest coordination that needs to be socialized to all stakeholders. Then there needs to be an agreed decision between the ministry and the services about mechanisms and work relation in relevant to the flow and exchange of data and information on agriculture. To ensure the sustainability of computerized cyber extension, the Ministry of Agriculture needs to carry out advocation to the regional government in order to get operational budget allocation routinely for *cyber extension*.

c) Training for Materials Designers and *Cyber Extension* Management

The quality of *cyber extension* management can be improved by strengthening the *cyber extension* resources, increasing the human resource capacity, allocating budget, and facilitating infra-structure. The *cyber extension* resource must be provided so that it will work well. Continuous budget allocation is also important, in the central as well in the region. Human resource efficiency includes distribution, utilization and development, building and quality control by classifying age, educational background, and competency in using information and communication technology equipment.

In order that the strengthening of *cyber extension* resources can be carried out, it is important to give advocation to stakeholders, especially in relation to budget allocation that is supported by the presence of Regional/Governor/Regent/Mayor regulation about *cyber extension*. Budget availability becomes very important because *cyber extension* needs supporting infra-structure, such as electricity, telephone lines, or internet, and also maintenance. Advocation to stakeholders concerning the increase of *cyber extension* human resource capacity is carried out by institutionalizing the *cyber extension* management.

The next step is strengthening the *cyber extension* human resources in all levels, which is carried out through short courses and improved coordination with related stakeholders. Routine trainings need to be strengthened by improved coordination with the training management in the central as well as in the region. Developing a short course program can be carried out by building a cooperation with a higher education that will become the "center of excellence" of *cyber extension*. This is aimed at providing standardized extension materials for the agricultural extension workers that are working in the field of *cyber extension*.

Improving knowledge and understanding about *cyber extension* can be carried out by conducting workshops or trainings on *cyber extension* utilization. In this case, the *cyber extension* management institution must work together with training services to strengthen education and training curriculum on materials design of *cyber extension*.

Besides, it is necessary to conduct a study on optimization of *cyber extension* network in regencies or towns to improve infra-structure by expanding and maintaining network lines to all extension institutions and agricultural services in regencies and towns, and extension service units in district level (BP3K). This can be carried out through a cooperation with the Ministry of Communication and Informatics in order to make use of the national communication backbone.

To make use of the existing information and provide appropriate information to users, it is important to choose and then repackage the information obtained from research institutions, higher education, and other resources. This information package is one of the efforts to accelerate information delivery and utilization.

d) Setting-up a Pilot Project of *Cyber Extension* in Some Locations

Testing on the technological innovation of *cyber extension* must be carried out through developing the sample location or pilot project in several sites that can start from the district level. This is considered important so that an effective *cyber extension* model can be obtained, according to regional characteristics and culture structure, and can be operationalized by agricultural extension workers, main actors, stakeholders, or agricultural observers in order to gain production and productivity, and later on give impacts on the increased income and welfare, especially of the main actors.

For this reason, the stratification of the sample location according to superior commodity regions or according to topographic structure and production center becomes very important in determining the sample area. This can be followed up by opening a *cyber extension* day at certain time, which is open not only to field workers but also to main actors or other stakeholders.

e) Facilities and Infra-structure of *Cyber Extension* in the Districts by Strengtening Networking and Provision of Data Processing Equipment

In order that strengthening the *cyber extension* resources can be carried out, it is necessary to give advocation to stakeholders especially in relation to budget that is supported by the presence of Regional/Governor/Regent/Mayor Regulation concerning *cyber extension*. The availability of budget becomes very important because *cyber extension* needs supporting infra-structure, such as electricity and telephone lines or internet and its maintenance. Advocations to stakeholders related to improving the human resource capacity of *cyber extension* is carried out by institutionalizing the *cyber extension* management.

In addition, it is necessary to carry out study on optimization of *cyber extension* network in the regencies or towns to improve the infra-structure through expanding and maintaining network connection to all extension institutions and agencies of agriculture in the regencies or towns, and district extension service units (Badan Pelaksana Penyuluhan Pertanian, Perikanan dan Kehuhatan/BP3K). Expansion of network connection can be carried out through cooperative work with the Ministry of Communication and Informatics in order to utilize the backbone network of national communication.

6. Conclusion and Recommendations

6.1. Conclusion

The readiness of the extension workers for *cyber extension* utilization is relatively low, in the mean category, and it is very much influenced by institutional support and the innovation nature of *cyber extension*.

The dominant factor that influence the readiness of the extension workers for *cyber extension* utilization, especially in communicating information, innovation, problems and needs to various parties, building networking and managing information, is institutional support, especially institutions of services, agribusiness, extension, and farmers' institution, and education and training services.

The strategy of *cyber extension* in strengthening the readiness of the extension workers was carried out by publishing regulations that control the management system of agricultural information that includes aspects of planning, organization, costing, facilities and infra-structure, monitoring and evaluation.

6.2. Recommendations

Strengthening and developing *cyber extension* as one of the alternative systems of information on agricultural extension can be carried out by considering the followings: (1) increasing the quality of agricultural extension institutions from the central to districts through facilitation and infra-structure that support building the *cyber extension* as a management system of agricultural information; (2) increasing the quality of agricultural human resources (the management offficers of *cyber extension*) in terms of knowledge about computer and internet through trainings and technical assistance intensively and continuously; (3) increasing the extension workers' ability to look for (access networking) data and information on agriculture tailored to the needs of the main actors, and ability to publish results of data and information searching through information package that is understandable, renewable, and accountable, (4) carrying out trial and error of innovation in some locations by applying standardization of management system of agricultural extension information through *cyber extension* and opening the first *cyber extension* day to all stakeholders, and (5) carrying out further research by correlating the effectiveness of *cyber extension* utilization with productivity of the farmers' agribusiness.

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