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The Roles of Cyber Extension Communication Media in Strengthening Horticulture Farmers in Facing Globalization in Lampung Province, Indonesia

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Abstract

The problems of this research were (1) how far the existence of horticulture farmers in facing globalization era, and (2) how did the model of horticulture farmers strengthening by using cyber extension communication media. Based on the research problems, the objectives of this research were (1) to describe individual characteristics of horticulture farmers who used cyber extension communication as an alternative to fulfil their information needs, (2) to analyze the correlation between individual characteristic indicators of horticulture farmers, (3) to analyze differences of individual characteristics of horticulture farmers in two regions of horticulture production centers in Lampung Province, and (4) to find out horticulture farmers strengthening model by using cyber extension media. This was a quantitative research and this research was conducted in Tanggamus District and West Lampung District in Lampung Province. Population was the horticulture farmers in Lampung Province. 180 samples were vegetable farmers in Tanggamus District and West Lampung District who were taken by using quota sampling. Data were analyzed with descriptive inferential analysis by using Mann Whitney, Spearman's Rank, and Structural Equation Modeling (SEM) tests.

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The results showed that (1) individual characteristics of horticulture farmers were in low categories except courage to take risks and motivations to use cyber extension communication which were in higher categories; (2) there were significant correlations between indicator variables of individual characteristics; (3) there was no difference of individual characteristics of horticulture farmers in both central of horticulture production regions in Lampung Province; (4) there was a correlation between individual characteristics and communication behaviors by using information sources based in information and communication technology, but there was no correlation between individual characteristics and communication behavior by using conventional information sources; and (5) horticulture farmers strengthening model by using cyber extension communication media was conducted by educating how to use information sources based on information and communication technology by involving stakeholders in rural areas.

Keywords: communication media; cyber extension; horticulture; globalization.

1. Introduction

Horticulture sector in Lampung Province should be developed by considering challenges in economy globalization era such as AFTA (Asean Free Trade Area) and APEC (Asia Pacific Economic Cooperation). In line with this, Indonesia position information and communication technology (ICT) as one of main focuses in science and technology development. Communication and information technology (ICT) development provides wide opportunities for farmers to obtain real time agricultural information according to their needs.

Cyber extension communication is one of mechanisms in developing communication network of agricultural information with an objective to improve farmer's empowerment in accessing real time information according to required information types [27]. Studies on cyber extension abilities in fulfilling farmers' necessities on agricultural information and their problems have been widely conducted in Indonesia, Asia, and all over the world ([27,20,32,22,29,1,12,30]). The current information sources available in rural areas are varying enough besides internpersonal information sources coming from conventional mass media and hybrid media [30]. Extension (education) is a variable that is able to change farmers' behaviors [10]. The farmers' behavioral changes as the receiver of extension benefits are required to improve quality and quantity of agricultural business product. Horticulture farmers' characteristics vary and these influence their behaviors in accepting and applying received information from available sources. Work results of [19] suggests that the dominant factor which significantly influence vegetable farmers' behaviors in using information technology is individual characters.

Horticulture farmers' behaviors in using information sources based in information and communication technology (ICT) in rural areas are so much required, because rural areas have rights to enjoy accessing facilities and using information through ICT. The existence of internet used to save, process and access information can affect agricultural information necessity fulfilment which is able to cause changes in many life aspects.

ICT roles are required in agricultural sectors to improve agricultural business productivity. Farmers need

varying agricultural information such as government policies, research results from multi discipline sciences, experiencers of other farmers, current information about market prospects related to production equipment and agricultural products. ICT use can overcome lack of information access about agricultural innovations used to be obtained from conventional information sources. Using ICT can replace some of conventional communication forms. ICT in agricultural fields can prepare real time agricultural information needed by farmers according their needs. The work of [17] suggests that using internet can influence someone's image. Another research shows that information and communication technology development in Asia results in changes in many fields including industries, religions, organizations, and occupations, in which all of them affect social changes in interpersonal relationships ([2,3,8,27]).

Someone's behavior in doing communication activities comes up because of a motivation coming from inside of this individual in doing an action through interaction with environment according to his/her want. [18] says that some of communication behaviors from individuals are overtly seen (overt behavior) and some others are covertly seen (covert behavior). The work of [18] suggest that the relationship between farmers' characteristics and agricultural business competences are highly connected, but aspects of knowledge, attitude, and skill are independent in assessing many fields in agribusiness.

The meeting point between one's need and information obtained from media can be explained with the theory of *Uses and Gratification* [31]. This theory suggests that active people choose and use a particular media to fulfill a particular need. Horticulture farmers see the internet as a tool to fulfil needs of agricultural information. Internet has limited influences because the horticulture farmers are able to select and control it. This *Use and Gratification* theory focuses on a question of: what does one do with the media? [31]. This theory provides a working frame to fulfil when and how horticulture farmers will be more or less active in searching agricultural information.

The problems of this research were (1) how far the existence of horticulture farmers in facing globalization era, and (2) how did the model of horticulture farmers strengthening by using cyber extension communication media. Based on the research problems, the objectives of this research were (1) to describe individual characteristics of horticulture farmers who used cyber extension communication as an alternative to fulfil their information needs, (2) to analyze the correlation between individual characteristic indicators of horticulture farmers, (3) to analyze differences of individual characteristics of horticulture farmers in two regions of horticulture production centers in Lampung province, and (4) to find out horticulture farmers strengthening model by using cyber extension media.

2. Research Methodology

This was a quantitative research [26]. Data were collected with survey method by collecting data from horticulture farmers with questionnaires. This research was conducted in 16 villages which were able to reach internet accesses; five villages in Sumberrejo Sub District, three villages in Gisting Sub District of Tanggamus District, four villages in Balik Bukit Sub District, and four villages in Sekincau Sub District of West Lampung District in Lampung Provinces. These locations were purposively selected by considerations that locations in

these two districts were that they were the central production of horticulture products (fruits, vegetables, and ornamental plants), they had biggest harvesting areas [4] and they received cyber extension data processing equipment from Extension Centre of Ministry of Agriculture of Republic of Indonesia in 2010-2011 [4]. This research was conducted from October 2014 to January 2015.

Research population was all horticulture farmers cultivating vegetables in Lampung Province. Vegetables are seasonal plants so that information received from information sources are possible to apply. Samples were horticulture farmers cultivating vegetables in Tanggamus and West Lampung Districts, and samples were taken by quota sampling. This quota sampling technique is a sampling technique that does not open any same opportunity to all of population members to be selected as samples, but only those samples with particular characteristics; where farmers ever searched agricultural information through cyber network [26]. 180 respondent samples had satisfied minimum requirements for SEM test; five times of indicators ([13,25,11]).

This research used primary and secondary data. Primary data were collected with interviews by using questionnaires. Questions had closed and open answers. Questionnaires used ordinal and ratio scales.

Data were analyzed descriptively and inferentially by using Mann Whitney Test, Spearman's Rank Test and SEM analysis. Mean of data having ratio measurement scale was conducted by seeing normal data distribution and Kolmogorov-Smirnov test. Normally distributed data had mean and ± sd, while abnormally distributed data had mean the same as median (25th, 75th) ([28,7,5] and [15]). The first research problem would be answered by the first, second, and third research objectives, while the second research problem would be answered by the fourth research objective.

3. Result and Discussion

3.1. Descriptions of individual characteristics

Individual characters and conditions of horticulture farmers in facing globalization can be seen in Table 1.

Globalization demands preparedness of horticulture famers, however, the farmers are not yet ready to face it. This can be seen from low characteristics of horticulture farmers including indicators of formal education level, informal education level, ages, width of cultivation field, cosmopolitan level, and length of conducting agricultural business. However, horticulture farmers have higher levels courage of taking risks and motivations (Table 1).

Seeing from social economy characteristics of horticulture farmers, the information sources based on ICT through cyber extension are very supportive as alternatives for agricultural information supplies. Therefore, the role of information source based on ICT should be improved by providing services which are adapted with varying information needs especially for young aged farmers. In line with this, [23] suggests that in implementing program of technology extension for communities of farmers and, motivation and ability to use and distribute technology innovation need to cultivate. A research by [14] concludes that lower formal education levels of horticulture farmers make them not yet understanding the benefits of ICT in common.

Table 1: Descriptive data of research variables.

No	Variables	Mean	The largest percentage	Category
1	Individual characteristics (score)	-	72,78	Low
2	The level of formal education (years)	10 (9;12)	-	Low
3	The level of informal education (day/ month)	4,589	-	Very low
4	Age of horticulture farmer (year)	37,387±8,860	-	Young
5	Acreage (hectare)	0,5(0,28;1)	-	Very narrow
6	Cosmopolitan level (score)	-	51,10	Very low
7	Horticulture farming experience (year)	9(4;16,5)	-	New
8	Courage to take risks (score)	-	57,80	High
9	Motivation (score)	-	60,60	High

3.2. The correlations between indicators of horticulture farmers' individual characteristic variables

The strategy for horticulture farmers strengthening by using cyber extension media is obtained by seeing correlations between indicators of horticulture farmers' individual characteristic variables (Table 2)

Table 2: The Spearman's Rank coefficient value of correlations between indicators of individual characteristic variables

Var	X1.1	X1.2	X1.3	X1.4	X1.5	X1.6	X1.7	X1.8
X1.1	1,00	0,16*	0,08	0,04	-0,15*	-0,23**	0.13*	0,22**
X1.2	0,16*	1,00	0,13	-0,01	-0,04	0,10	0,07	-0,04
X1.3	0,08	0,13	1,00	-0,11	-0,04*	-0,64**	0,10	-0,25**
X1.4	0,04	-0,01	-0,11	1,00	0,16*	0,09	0,67	0,02
X1.5	-0,15*	-0,04	-0,04	0,16*	1,00	0,12	0,01	0,05
X1.6	-0,23**	0,10	-0,64**	0,09	0,12	1,00	0,05	-0,18**
X1.7	0.13*	0,07	0,10	0,67	0,01	0,05	1,00	0,31**
X1.8	0,22**	-0,04	-0,25**	0,02	0,05	-0,18*	0,31**	1,00

Note:

X1.1: The level of formal education, X1.2: The level of informal education, X1.3: Age of horticulture farmer, X1.4: Acreage, X1.5: Cosmopolitan level, X1.6: Horticulture farming experience., X1.7: Courage to take risks , X1.8: Motivation, **very significant at α=0,01, *significant at α=0,10

The higher the formal education level of the farmer, the higher is the courage to take risk and motivation, but the levels of cosmopolitan and experience in conducting agricultural business are lower. Farmers with higher level of education are likely to look for living out of agriculture fields, so that their experiences in conducting agricultural business are lower. The research results show that agriculture field is enthused by farmers with lower level of education. Higher formal education level causes a person to rely on their knowledge from formal education to and he/she is inclined not to seek knowledge from other people. The older the age of a farmer, the lower is his/her cosmopolitan level, experience in conducting agricultural business and his/her motivation in using information source from ICT. Oppositely, the younger the age of a farmer, then the higher is his/her experience in conducting agricultural business and his/her motivation in using information source from ICT.

The higher level of a farmer's education will make the farmer to be more mature in his/her pattern of thinking, so that he/she has good knowledge about positive and negative values of everything. This encourages the farmer to take risk on making decision and to have bigger motivation to use information sources from ICT as a new media has just been recognized by the farmer.

The research results show that information sources from ICT have commonly been used by younger farmers. The wider the width of field cultivated by the farmer, the bigger agricultural information is needed, so that the farmer will look for needed information from inside and outside of his/her village and this makes his/her cosmopolitan level to be higher. The narrower is the width of cultivated field for the farmer, the lesser is the needed information and the lower is the cosmopolitan level (Table 2).

3.3. The correlation between variable indicators of horticulture farmers' individual characteristics and communication behaviors in using ICT based information sources

The test result of correlation between variable indicators of individual characteristics and communication behaviors can be seen in Table 3.

The communication behaviors of cyber extension users correlate to variable indicators of individual characteristics such as formal education, width of cultivated field and courage to take risk. In accumulation, the individual characteristics of horticulture farmers totally correlate to communication behavior and communication behavior in using ICT based information sources (Table 3). A research by [16] concludes a positive and significant correlations of age, sex, social economy conditions including education, occupation type, and income to environment conservation behavior. Cross-tabulation analysis result shows correlations between characteristic variables and communication behavior in Table 4.

The biggest percentage of horticulture farmers with very low individual characteristics have very low communication behaviors in using ICT based information sources. This is also the same with horticulture farmers with low individual characteristics who also have low communication behaviors in using ICT based information sources (Table 4).

Table 3: Spearman's Rank values of correlation between variable indicators of individual characteristics and communication behaviors

No	Indicators of individual characteristics variables	Communication behavior of the use ICT-based resources information	Communication behavior of the use conventional resources information	Communication behaviors
1	Individual characteristics	0,150*	0,101	0,130*
2	The level of formal education	0,250**	0,113	0,187*
3	The level of informal education	0,041	0,084	0,052
4	Age of horticulture farmer	0,015	-0,206**	-0,093
5	Acreage	0,184*	0,160*	0,224**
6	Cosmopolitan level	0,055	-0,030*	0,018
7	Horticulture farming experience	-0,096	0,099	-0,30
8	Courage to take risks	0,188**	0,820	0,211**
9	Motivation	0,009	-0,131	-0,058

Note: **very significant at α=0,01, *significant at α=0,10

Table 4: The cross tabulation of farmers' characteristic indicators and communication behaviors to ICT

Individual characteristics	Communication behavior of the use ICT-based resources information (number of farmers)				Total (number of farmers)
	Very Low	Low	High	Very High	
Very Low	12	11	2	1	26
Low	35	45	18	5	103
High	14	15	9	5	43
Very High	2	3	1	2	8
Total	63	74	30	13	180

3.4. The individual characteristic differences of horticulture farmers

Knowledge on individual characteristics is required to develop cyber extension in the research locations. Individual characteristic differences in two horticulture production centers, Tanggamus and West Lampung Districts, were analyzed with Mann Whitney Test and the result values are presented in Table 5.

In accumulation, there is no individual characteristic difference in two regions of horticulture production centers in Tanggamus and West Lampung Districts (Table 5). The research results show that the average of formal education length in Lampung Province is 10.62 years with the least and the longest ranges of 3 years and 22

years respectively. The average of formal education length in Tanggamus District is 11.12 years with the least and the longest ranges of 4 years and 22 years respectively. The average of formal education length in West Lampung District is 10.26 years with the least and the longest ranges of 3 years and 19 years respectively. This is in accordance with Mann Whitney test results suggesting that there is no difference on formal education between horticulture farmers in Tanggamus and West Lampung Districts. Their average of formal educations are graduates from junior high schools.

Table 5: Mann Whitney Differential Test values of individual characteristic variables and their indicators in Tanggamus and West Lampung Districts

No	Indicators of individual characteristics variables	P value (Mann Whitney Test)
1	Individual characteristics	0,21
2	The level of formal education	0,19
3	The level of informal education	0,34
4	Age of horticulture farmer	0,01**
5	Acreage	0,00**
6	Cosmopolitan level	0,08*
7	Horticulture farming experience	0,06*
8	Courage to take risks	0,49
9	Motivation (score)	0,00**

Note: **very significant at α=0,01, *significant at α=0,10

The average of informal education of horticulture farmers in Lampung Province is 6.92 days of each three months with the ranges of 0-90 days per of each three months. Tanggamus District has higher informal education average of 10.67 days with ranges of 0-90 days of each three months. West Lampung District has smaller informal education average of 4.25 days with ranges of 0-90 days of each three months. This difference is statistically not significantly different.

The research results show that average age of horticulture farmers in Lampung Province is 35.41 years old. The youngest age and the oldest are 18 and 66 years old respectively. This indicates that horticulture farmer's age is in productive age category. The average age of horticulture farmers in Tanggamus District is older (37.79 years old). The youngest age and the oldest are 19 and 66 years old respectively. The average age of horticulture farmers in West Lampung District is 33.71 years old. The youngest age and the oldest are 18 and 65 years old respectively.

The average width of land area cultivated by horticulture farmers in Lampung Province is 0.20 hectares with ranges of 0.04-4 hectares. The average width of land area cultivated by horticulture farmers in Tanggamus District is 0.054 hectares with ranges of 0.12-1 hectare. The average width of land area cultivated by horticulture farmers in West Lampung District is 0.31 hectares with ranges of 0.04-4 hectares.

Descriptive analysis result indicates that horticulture farmers in Lampung Province has not yet been long

conducting horticulture agribusiness. The average of horticulture agribusiness experience of horticulture farmers in Lampung Province is 11.41 years with lowest and longest experiences of 1 year and 45 years respectively. The average of horticulture agribusiness experience of horticulture farmers in Tanggamus District is 11.36 years with lowest and longest experiences of 1 year and 43 years respectively. The average of horticulture agribusiness experience of horticulture farmers in West Lampung District is 10.27 years with lowest and longest experiences of 1 year and 45 years respectively.

3.5. *The influences of individual characteristics to communication behaviors in fulfilling agricultural information needs*

To find out a good model in illustrating the influences of individual characteristics to communication behaviors in fulfilling agricultural information needs, indicators of formal education level, informal education level, age, width of cultivating land area, and experience in doing horticulture agribusiness are excluded in SEM analysis, because these indicators are inherent to the horticulture individual farmers and these cannot be more developed. SEM analysis results are presented in Figure 1 and Figure 2.
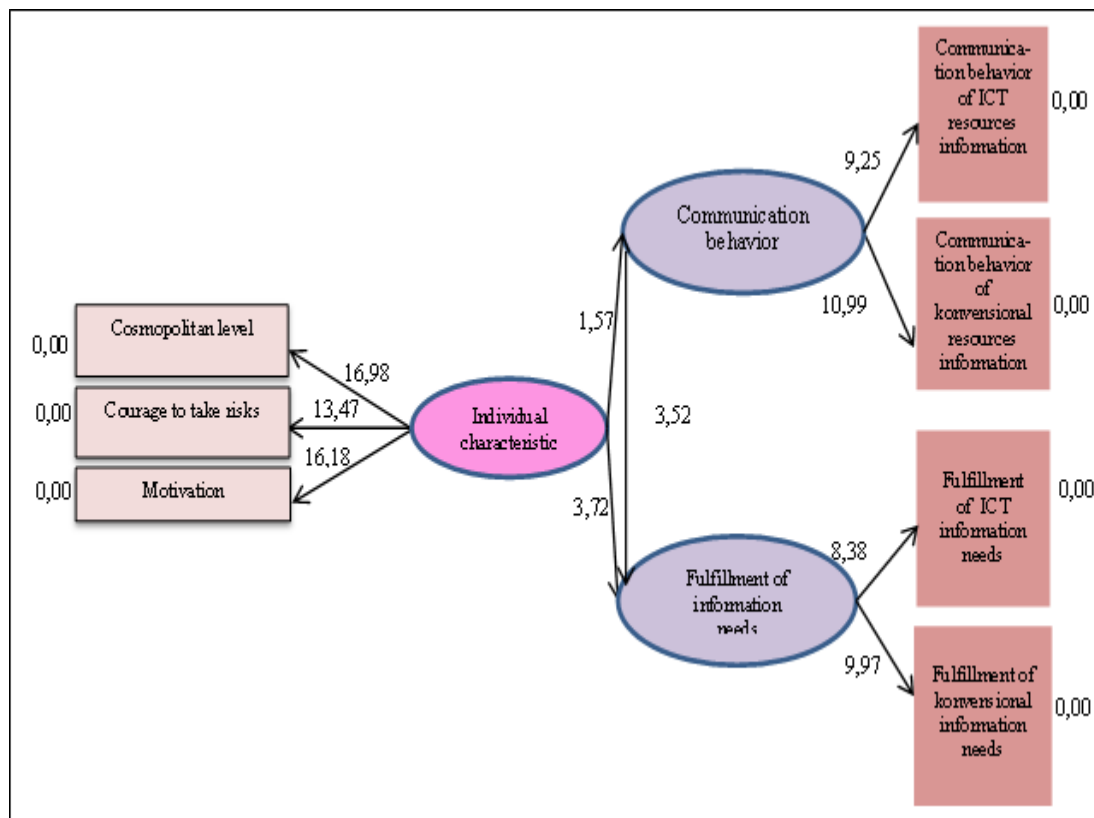

Figure 1: The t_{count} values of the influences of cosmopolitan level, courage to take risk, and motivation to communication behavior in fulfilling agricultural information needs

There is a negative influence between individual characteristics and communication behaviors of horticulture farmers to be seen from bigger t_{count} (1.96) than t_{table} at trust level of 99%, but it has negative direction. The same thing occurs for indicator of courage to take risk (Figure 1).
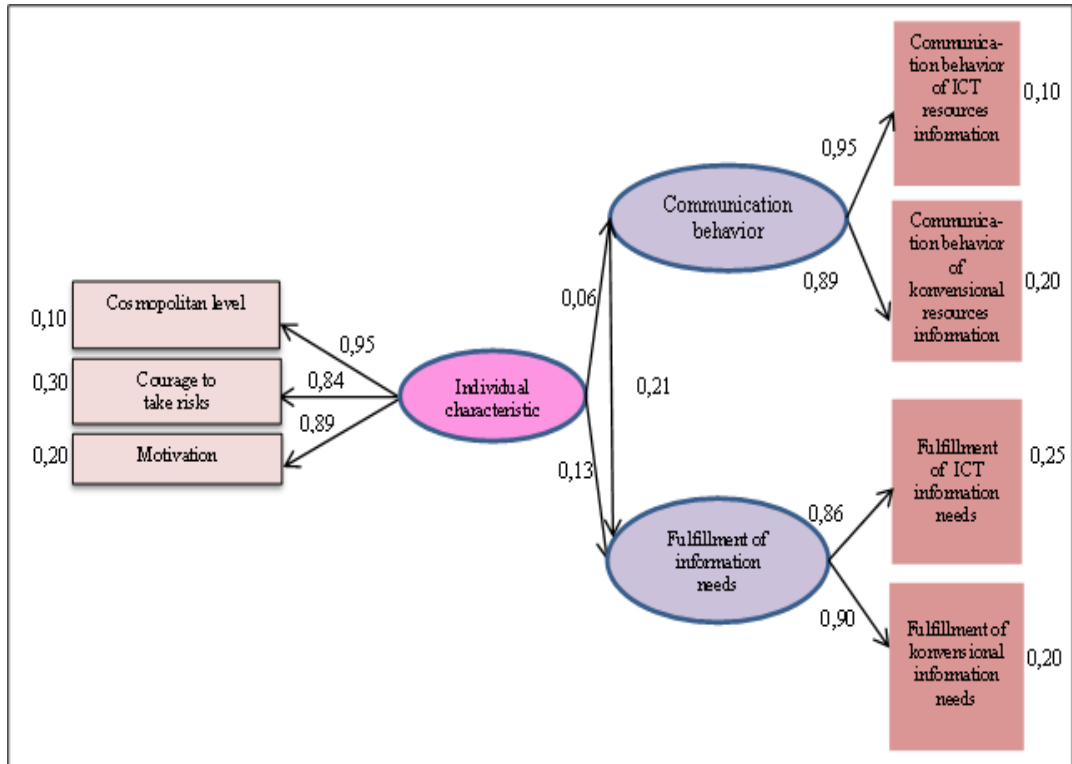
Figure 2: Standardized loading factor image of the influences between individual characteristics and communication behaviors in fulfilling agricultural information needs

Figure 2 in general illustrates the influences of individual characteristics to communication behavior in using ICT based information sources and conventional information sources to fulfill agricultural information needs. Based on model properness criteria, the communication behaviors of horticulture farmers are negatively influenced by individual characteristics and indicator of courage to take risk. Based on the image of structural model parameter estimation which explains direct or indirect influences from research variables, the model criteria can be seen in Table 6.

Table 6: The summary of properness result of structural model of horticulture farmers strengthening by using cyber extension communication media

Goodness-of-Fit	Cutt-off-Value	Hasil	Keterangan
RMR (Root Mean Square Residual)	≤ 0,05 atau ≤ 0,1	0.055	Good Fit
RMSEA(Root Mean square Error of Approximation)	≤ 0,08	0,000	Good Fit
AGFI(Adjusted Goodness of Fit Index)	≥ 0,90	0.95	Good Fit
CFI (Comparative Fit Index)	≥ 0,90	0,97	Good Fit
NNFI	≥ 0,90	0.94	Good Fit
GFI	≥ 0,90	0.98	Good Fit

The values of RMR, RMSEA, AGFI, CFI, NNFI and GFI have satisfied standard criteria of model properness, and this means that Figure 2 is able to use as model of horticulture farmers strengthening by using cyber

extension communication media (Table 6).

However, this study has its limitations, because not all respondents are farmers land owners who have a role as decision makers in determining the technological innovations that will be used in vegetable farming. Most of the respondents were already using cyber extension is sharecroppers or tenant farmers

4. Conclusions and Recommendations

4.1. Conclusions

1. Horticulture farmers are not ready to face globalization because low individual characteristics in terms of formal education level, age, informal education level, length of conducting agribusiness, experience in agribusiness and cosmopolitan level. However, the courage to take risk and motivation to use cyber extension media are high and these can help farmers to compete in globalization era.

2. The higher the formal education level and motivation, the higher is horticulture farmer's behavior in using ICT based information sources. However, the older the age and the higher agribusiness experience make the lower behavior of horticulture farmers in using ICT based information sources.

3. There was no individual characteristic difference of horticulture farmers in both horticulture production centers in Lampung Province, but cosmopolitan level, length of agribusiness, and motivation in Tanggamus District are different compared to West Lampung District.

4. There are correlations between individual characteristics and communication behaviors in using ICT based information sources, but there is no correlation between individual characteristics and communication behaviors in using conventional information sources.

5. The model of horticulture farmers strengthening by using cyber extension communication media is conducted by educating about how to use ICT based information sources by involving stakeholders in rural areas.

4.2. Recommendations

Education for horticulture famers in groups about the benefits of ICT based information sources is required, so that the farmers will take advantages from this information sources to solve agribusiness problems. Education can be followed by assistances in forms of extensions, trainings and workshops.

Special Thank

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