Ownership and Utilization of Information and Communication Technologies for Supporting Commercial Farming Activities in Yogyakarta

Subejo[1], Ratih Ineke Wati[2], Mesalia Kriska[3], Najmu Tsaqib Akhda[4], Paksi Mei Penggalih[5], Sylvatra Puspita Sari[6], Ade Intan Christian[7], Ani Dwi Wimatsari[8]
{ subejo@ugm.ac.id[1], ratihinekewati@ugm.ac.id[2], mesalia.kriska@mail.ugm.ac.id[3], najm7779@gmail.com[4], paksimei@gmail.com[5], sylvatrapuspitasari@gmail.com[6], adeintan0@gmail.com[7], anidwi94@gmail.com[8]}

Extension and Agricultural Communication; Extension and Development Communication Universitas Gadjah Mada, Yogyakarta, Indonesia[1,2,3], Extension and Development Communication Universitas Gadjah Mada, Yogyakarta, Indonesia[1,2,4,5,6,7,8]

Abstract. Information and communication technologies (ICTs) is an alternative source to obtain the information of agricultural innovations. This research aims to investigate the ICTs ownership and the utilization of ICTs for supporting commercial farming activities in Yogyakarta. It was conducted in four sub-district namely Patuk (Gunungkidul Regency), Turi (Sleman Regency), Sanden (Bantul Regency) and Panjatan (Kulon Progo Regency). Farmer samples were selected by simple random sampling technique.The total sample was 120 peasants. The research results show that smartphone and mobile phone are the most popular media owned by farmers although the utilities is limited to dial function. Internet access in smartphone is not functional because of the signal difficulty in some areas. The utilization of ICTs for supporting commercial farming activities which includes for searching agricultural information. Technical production is the popular topic farmer search from electronic media, including smartphone, mobile-phone, radio, and television. Farmers also access marketing information mostly from mobile-phone and smartphone. They sometimes watch success stories of a farmer from television since this topic can inspire them to work harder as farmers. Human interest, policy and funding are not the popular topic they search from electronic media.

Keywords: ICT, commercial farming, agricultural information, innovation, Yogyakarta

1 Introduction

Historically, dissemination mechanism of information and agricultural innovation has been carried out with various approaches and mechanisms started from conventional step through training and visits by agricultural extension workers that is globally known as Training and Visit (T and V model) to the new development step such as the utilization of mass media (electronic media and newspaper). In the recent development of agricultural extension and communication with the utilization of new media such as online system and internet network in the field of agriculture has been being applied in many countries (including developing countries).

ICEMSS 2018, December 7-8, Banyuwangi, Indonesia

DOI 10.4108/eai.7-12-2018.2281814

There are several strength and advantages of electronic mass media usage in terms of information speed, diversity of information, wider reach, and relatively lower cost as compared to the physical direct visits of agricultural extension workers in farming areas. Information and communication technologies (ICTs) can be an alternative source and method in obtaining information related to agricultural innovations, especially for farmers who cultivate and manage commercial commodities (cash crops). The need for various information on all forms of innovation that support land quality and productivity improvement. Moreover, various agricultural products can be accessed easily through various media, such as print media, television, radio, telephone to internet.

Agricultural extension approaches and practices have been experiencing the dynamic changes. The changing paradigm has been indicated by a shifted on agricultural extension services in developing countries (including Indonesia) caused by dynamic of global changes and various local demands. The information delivery system of technology should include various effective solutions [1]. The speed and accuracy of service delivery is very important matter in new agricultural extension and communication. Since the last one or two decades, many developed and even developing countries have been paying greater attention to the wide use Information and Communication Technologies (ICTs) for the implementation of agricultural and rural extension.

In Indonesian context, ICTs utilization for agricultural and rural development has been gradually increasing with some considerations such as the insufficient number and the wide and spread coverage area of extension workers as well as the better farmer literacy and infrastructure development [2]. The ICTs development creates the opportunities for the agricultural development actors. The utilization of communication technology in the agriculture development requires the competence of information users and communication technology. So far, farmers are one of the weakest parties who access ICTs. They tend to rely on extension workers in learning process of agricultural innovation [3].

The community empowerment of ICTs, in this case of peasant community (farmers), is to keep the quality of information dissemination, through various media centre, community media, traditional media, strengthening human resources in the field of communication and information, and also encouraging the ICTs literacy [4]. It is in accordance with RPJM (Rencana Pembangunan Jangka Menengah - National Medium Term Development Plan) 2015-2019 in the term of politics and communication and infrastructure.

The implementation of agricultural extension through the media is not so easy to be managed. However, it is necessary to be developed because it has the high potency for supporting various extension activities. A study in rural Naded-India reported that the media is a powerful medium to promote various sectors. It was 90% of people in Nanded listen to the radio in their daily lives. Based on research conducted on media analysis for rural development from the perspective of the agricultural sector, some media have an influence on rural development, i.e. TV, Radio, Internet and Smart-phone [5].

Sub-urban area is a region that has been transformed to be “kotadesasi” (rural-urban) process, in which the structure of agrarian territory changes toward non-agrarian structure. The process of transformation of the region is not only physical but also socioeconomic and cultural changes of the rural population which, among others, concern to production structure, livelihood, and customs of the population. This spatial transformation will morphologically change the form of land use and give impact on economic activity, including the increase of people working in the non-agricultural sector [6]. This livelihood change will also have an impact on the aspects of planted commodities and in terms of access to agricultural information.

The stagnation of agricultural innovation and information nowadays, is expected to be improved by ICT through greater and flexible access on market information, production inputs, consumer trends, marketing, disease management and pest or cattle, market opportunities and market prices [3].

The use of ICT for agriculture in Yogyakarta is linked to the structure and characteristics of communities and regions. The use of ICT is relatively high in areas with good transportation and telecommunication access, developing commercial commodities, relatively well educated people and quite a lot of progressive young peasants [7].

The shifting of roles and functions of agricultural extension agencies is followed by the dynamic environmental situation of farming enterprises. Therefore, people including commercial farmers should make decisions quickly, especially with the emergence of farming problems in determining alternative solutions to the problem. The existence of ICTs is considered to assist farmers in obtaining various needed information related to alternative solutions for solving farming problems, such as land management, cultivation, and marketing of agricultural products in order to achieve more effective farming management.

Commercial agricultural areas in Yogyakarta with characterized by relatively better resources and better socio-economic characteristics might have strong links to the use of ICTs to support agricultural activities.

Based on the description of the problem, then the formulation of the problem proposed in this study are:

a. How is the ICTs ownership by commercial farmers in special region of Yogyakarta?
b. How is the utilization or functions of ICTs supporting commercial farming activities in the special region of Yogyakarta?

2 Method

The basic method used in this research was analytical descriptive method. Descriptive analytic method is a combination of descriptive method and analytical method that aims not only to know the chronology and description of a program or activity, but also can be used to determine the relationship between the factors studied to find various problems that occur in the field as well as to know how to determine the best way to solve it [8] [12].

The research was conducted in four locations, i.e. Gunungkidul Regency, Sleman Regency and Bantul Regency Those are commercial agriculture area in special region of Yogyakarta. The sub-district (kecamatan) samples were taken in each district, including Patuk (Gunungkidul), Turi (Sleman), Sanden (Bantul) and Panjatan (Kulon Progo). The samples of sub-district were chosen purposively with the consideration that there are agriculture area for commercial commodities (cocoa in Patuk sub-district, zalacca in Turi sub-district, chili and watermelon in Panjatan and red-onion and watermelon in Sanden). The population in this study were cocoa farmers, zalacca, red-onion and chili respectively in Gunungkidul, Sleman, Bantul and Kulon Progo Regency. Based on this population, a sample of 30 farmers was collected in one village in each sub-district in each district, surveying the total sample of 120 commercial farming households. Samples were taken by simple random sampling technique.

Fig 1. Map of Yogyakarta Province

3 Result

Socio-Economic Structure of Commercial Farmers in Special Region of Yogyakarta

Socio-economic structure and aspects of commercial farmers in Special Region of Yogyakarta include age, sex, educational level, social status, type of job, size of farming land, farming experience and household income. In detail, the socio-economic characteristics of commercial farmers in Special Region of Yogyakarta is displayed on Table 1.

Table 1. Socio-Economic Structure Of Commercial Farmers In Special Region Of Yogyakarta

No.	Variables	Categories	rcentage (%) =120)
1.	Age	Young (≤ 48 years old)	48.28
		Old (> 48 years old)	51.72
2.	Sex	Male	71.55
		Female	28.45
3.	Education	Low (≤ 9 years old)	55.17
		High (> 9 years old)	44.83
4.	Social status	Group member	22.41
		Group manager	77.59
5.	Type of job	Commercial farming	71.55
		Commercial farming and others	28.45
6.	Farming land	Narrow (≤ 3016 m^2)	68.97
		Wide (> 3016 m^2)	31.03
7.	Farming experience	New (≤ 25 years)	53.45
		Old (>25 years)	46.55
8.	Income	Low (≤ IDR 1.968.534)	62.93
		High (> IDR 1.968.534)	37.07

Source: Analysis of primary data, 2017
Note: 1 US$ = IDR 13.000

Based on Table 1, larger proportion of the farmers age is classified as old (more than 48 years), with percentage of 51.72%. The age differences lead to the difference interest in media selection and the type of information consumed [11]. Most of the commercial farmers interviewed were male who is more dominant in terms of agricultural production processes from the beginning to the end of the process (harvest) and is well-informed about agricultural inputs. Whereas female farmers usually only assist in maintaining and harvesting process. Therefore, more male farmers participate in interviews oftentimes because they have more information on farm and farming than female farmers.

In terms of education, 55.17% of farmers have formal education ≤ 9 years or equal to elementary or junior high school. The formal education determines one's intellectual level. This intellectual level will describe how a person chooses media to obtain the information he needs or wants. Based on status, farmers can be classified into two groups, farmers who become members and who served as managers in a group. In this case, the groups are farmer groups, fishermen groups, plantation groups, livestock groups and tourism management groups [8,9]. Farmers who hold positions in groups are having power and influence in social society, and they have a higher position/status. Moreover, farmers who served as group managers have more easily and widely access to information.

Based on the farming experience, as many as 53.45% of farmers are new farmers with less than 25 years farming experience. According to the type of work, about 71.55% of farmers are work in commercial farming with various commodities, such as snack fruit-zalacca, cocoa, red-onion, chili and watermelon. The average land area cultivated is 3,016 m2, with 68.97% of the farmers having a land area below the average (narrow). In addition, 28.45% of farmers have other jobs besides commercial farming, such as farm laborers, factory workers and traders. Based on income, farmers have average monthly income IDR 1,968,534, and it's greater than the Provincial Minimum Wage in 2017 i.e. IDR 1,337,645.25. This indicates that the average farmers have been able to suffice their needs.

Based on description above, it can be concluded about the relationship between social categories and media consumption behaviors. In Social Categories Theory [10], it can be seen that people who have the same character will have the same attitude in the face of a certain stimulus. This theory is appropriate to explain the influence of social structure of society on media and information access. Therefore, based on this theory, it can be concluded that people with same social categories will tend to choose the same communication medium and message (information).

ICT Ownership of Commercial Farmers in Yogyakarta

Smartphone is the most media owned by farmers that exist in all research locations. Mobile phone also becomes most media owned by farmers after smartphone. Mobile phone and smartphone have similar function to connect people around the world and have important roles in farmer daily life especially in information access. Their use has become something common in the community nowadays, including farmers. It shows that basically the phone either mobile or smartphone is a potential communication medium to be used as a source of agricultural information.

Although ownership of ICT media (see Table 2) at most on smartphone media, but more farmers just using dial function. Only few famers access the internet facility in their smartphone, because the difficulty of internet signal in some areas. Popular culture in the middle Special Region of Yogyakarta society has affected the society in following technology development especially in buying smartphone. In one family found more than one smartphone

and mobile phone. In the family of farmers, parents prefer to choose mobile phones while their children prefer smartphones.

The ownership of television and laptop is laid in the second place. Mostly, farmers only have one television and one laptop. The farm families rarely have more than a television and/or a laptop. Majority, they keep using CRT television, the type of television they has been owned since long. Only few farmer families that have LCD or LED television. While, the laptop is usually used by children farmers for school and college needs.

Table 2. ICTS Ownership By Commercial Farmers In Special Region Of Yogyakarta

Types of ICTs	**ICTs ownership**	**Period of ownership**
Television	**	Oooo
Radio	*	Oooo
Mobile phone	***	Oo
Smart phone	****	O
Laptop	**	O
VCD/DVD	*	O

Source: Analysis of primary data, 2017

Note:

ICTs ownership (%)	Period of ownership (years)
100 – 115: *	0 – 3: o
116 – 130: **	4 – 7: oo
131 – 145: ***	8 – 11: ooo
146 – 160: ****	12 – 15: oooo

Lastly, the ownership radio and VCD is the lowest. Radio has been abandoned by the farmers because it has been replaced by television, mobile phone, and/or smartphone. Similar with radio, only few farmers that keep using VCD. The popularity of VCD decreases because they have to buy a VCD disk. They also complain that the VCD disk is difficult to repair when damage.

Regarding to period of media ownership, farmers have television and radio for long time ago. Television and radio have existed since two decade ago and still exist until now. Television and radio have become the main tools of farmers to meet the information needs. Farmers started using hand-phone since four to seven years ago. Farmers in Special Region of Yogyakarta follow the development of technology by using smartphones, laptops/PCs, and VCD/DVD to support information needs. It has important roles in farmer daily life especially in agriculture information access.

Utilization of ICTs to the Community in Commercial Farming Area in the Special Region of Yogyakarta

The utilization or functions of ICTs for supporting various farming activities include technical production, marketing information, government policy on agriculture, success story on farming, human interest and financial information/funding. Table 2 shows detail functions of ICTs utilization for supporting various farming activities.

The electronic media, such as television, radio, hand-phone, smartphone, laptop, and DVD, are used by farmers in Special Region of Yogyakarta to look for the agricultural information, including: (1) technical production, (2) marketing, (3) policy, (4) success story of farmer, (5) human interest and (6) agricultural funding. The intensity of agricultural information access are: (1) never, (2) seldom, (3) rare, (4) often, (5) very often.

Table 3. Utilization Of Icts For Supporting Commercial Farming Activities In The Special Region Of Yogyakarta

Types of ICTs	Functions	Intensity of Usage				
		Never	Seldom	Rare	Often	Very often
Tele-vision (n = 106)	Technical production	6.40	27.16	38.43	26.30	1.73
	Marketing	22.34	26.29	28.73	20.91	1.73
	Policy	32.91	19.18	17.82	25.43	4.67
	Success story	23.71	27.16	27.52	21.62	0.00
	human interest	30.46	21.27	28.02	17.31	2.95
	Funding	49.50	19.18	20.26	11.06	0.00
Radio (n = 71)	Technical production	29.80	31.08	20.84	15.68	2.61
	Marketing	48.18	22.69	11.98	16.01	1.14
	Policy	51.25	29.61	11.46	6.54	1.14
	Success story	48.13	28.58	9.66	12.50	1.14
	Human Interest	45.86	33.97	10.80	9.38	0.00
	Funding	60.44	25.30	10.51	3.74	0.00
Hand-phone (n = 79)	Technical production	37.26	18.81	13.98	19.63	10.34
	Marketing	38.73	14.07	8.86	25.63	12.72
	Policy	47.68	26.97	8.90	13.67	2.78
	Success story	50.50	20.46	10.68	18.36	0.00
	Human Interest	52.89	23.80	12.07	11.25	0.00
	Funding	61.13	16.68	8.08	11.33	2.78
Smart-phone (n = 54)	Technical production	46.86	12.46	7.88	29.05	3.75
	Marketing	53.87	7.92	6.63	25.34	6.25
	Policy	52.69	13.30	10.38	22.39	1.25
	Success story	55.99	19.09	5.83	19.09	0.00
	Human Interest	59.70	8.75	13.71	17.84	0.00
	Funding	63.83	17.88	4.58	12.46	1.25
Laptop/ PC (n = 20)	Technical production	71.88	16.67	4.17	7.29	0.00
	Marketing	75.00	16.67	4.17	4.17	0.00
	Policy	75.00	16.67	4.17	4.17	0.00
	Success story	75.00	16.67	4.17	4.17	0.00
	Human Interest	75.00	16.67	4.17	4.17	0.00
	Funding	79.17	16.67	0.00	4.17	0.00
DVD (n = 31)	Technical production	97.50	0.00	2.50	0.00	0.00
	Marketing	100.00	0.00	0.00	0.00	0.00
	Policy	97.50	2.50	0.00	0.00	0.00
	Success story	100.00	0.00	0.00	0.00	0.00
	Human Interest	100.00	0.00	0.00	0.00	0.00
	Funding	100.00	0.00	0.00	0.00	0.00

Source: Analysis of primary data, 2017

Based on Table 3, 38.43% of farmers rarely use television to search the agricultural information of technical production. They even have never accessed this kind of information from laptop (71.88%) or DVD (97.50%). Mostly, they look for this information from the other sources, such as from the other farmers in the farmer group, extension, agricultural tool seller, etc.

The most of farmers have never used the electronic media to search the marketing information because the other source, such as farmer group and seller of agricultural product in the market, bring enough information to them. Those information sources are closer with them and more trusted. Moreover, they also argue that the electronic media seldom present the agricultural information about marketing.

Farmers do not pay attention to the policy information in agricultural sectors. Most of farmers have never access the policy information by electronic media because they think that the policy information is not something important for them. They also add that the electronic media is not present a lot of policy information in agriculture sectors.

The information about succeed story of farmers is accessed rarely by farmer from television as many as 27.52%. They confess that the success story they see in television can inspire them. Majority has never searched this information from radio, hand-phone, smart-phone, laptop, and DVD. Since most of them have television, they find easily and freely to watch success story of farmers which is packed interestingly in audio-visual.

In the case of human interest as agriculture information, the farmers has never accessed it from electronic media. They say that it is not urgent information to them. It is just an added insight about the other condition in many other places.

Lastly, the farmers also have never accessed the information on financial aspect of agriculture or funding from electronic media. Farmers likely access it from the other sources, such as bank officers or farmer group meeting.

5 Conclusion

The existence and utilization of ICTs bring the easiness to the community in order to access various information from various sources either national or global level. As an alternative source of agricultural information and innovation, many agricultural actors have been starting to use ICTs to improve performance of farming activities. Study found that commercial farmers have a high number of ownership on the new media (ICTs) which include not only conventional electronic media such as television and radio, but also new media such as hand phone and smartphone. Most of commercial farmers in Special Region of Yogyakarta have smartphone and mobile-phone to accessing various information to support their farming activities. Most of them also have television and radio as conventional electronic media to access various new information.

Farmer sometimes use ICTs to collect agriculture information and innovation. Technical agricultural production aspects are still dominant type of information which have been searched through ICTs by farmers. Commercial farmers also have been using smartphone and mobile-phone to access marketing information, while television commonly to be used for accessing the success stories of other farmers. Utilization of ICTs especially new media (hand phone and smartphone) among commercial farmers is getting more important in line with the development of modern and commercial agriculture, therefore the completeness of aspects or contents that provided through new media should be appropriately arranged in the future development of ICTs.

Acknowledgements. The authors would like to thank for the great supports from all of the household respondents and Graduate School Program of Universitas Gadjah Mada (UGM). This study has been funded by the Research Grant from Graduate School Program UGM Yogyakarta-Indonesia for fiscal year 2017.

References

[1] Subejo, "New era of agricultural and rural extension" (*Babak baru penyuluhan pertanian dan pedesaan*). Jurnal Ilmu-Ilmu Pertanian, Fakultas Pertanian UGM, Yogyakarta, Vol. 7, No. 1 (pp 61-70), Juli 2011.

[2] Subejo, "Cyber extension, a new hope for agricultural and rural development", The Jakarta Post, Paper edition June 4, 2013.

[3] Elian, N., Lubis, D. P., and Rangkuti, P.A., "Use of internet and utilization of agricultural information by agricultural extension in bogor regency western region" (*Penggunaan internet dan pemanfaatan informasi pertanian oleh penyuluh pertanian di Kabupaten Bogor Wilayah Barat*), Jurnal Komunikasi Pembangunan, Institut Pertanian Bogor, Jawa Barat, Vol.12, No.2 (pp 104-109), July 2014.

[4] Praditya, D., "Farmers empowerment by the community of information and communication technology" (*Pemberdayaan petani oleh komunitas teknologi informasi dan komunikasi* (TIK), Jurnal Penelitian Komunikasi Vol. 19 No. 1 (pp 41-54), year 2016.

[5] Yadav, K. B.. "A *critical study & analysis of electronic media & rural development"*. International Journal of English Language, Literature, and Humanities. Vol. III (IX), year 2015.

[6] Hardati, P. "Transformation of peri urban area, case in Semarang regency" (*Transformasi wilayah peri urban, kasus di Kabupaten Semarang*), Jurnal Geografi Vol. 8 No. 2 (pp 108-117), year 2011.

[7] Subejo et.al,. "Access and utilization of ICTs for agriculture in Yogyakarta" (*Akses dan pemanfaatan TIK untuk pertanian di Yogyakarta*), Laporan Hibah Penelitian Fakultas Pertanian 2016 (research report, unpublished paper), 2016.

[8] Morissan, M. A. "Management in broadcasting media: Strategy in Managing Radio and Television (*Manajemen media penyiaran: strategi mengelola radio dan televisi*), Edisi Ketujuh (Alih Bahasa: Zoelkifli Kasip). Kencana Prenada Media Group, Jakarta, 2008.

[9] Schiffman, L. dan L. L. Kanuk. "*Perilaku Konsumen*". PT. Indeks, Jakarta, 2008.

[10] Defleur, M. L. and S. B. Rokeach. "Theories of mass communication", 3th edition. David McKay, New York, 1975.

[11] Sumarwan, U. "Theory of Consumer Behaviors and The Aplication in Marketing" (P*erilaku konsumen teori dan penerapannya dalam pemasaran*). Ghalia Indonesia, Bogor, 2004.

[12] Nasir, M., "Research Method" (*Metode penelitian*), Jakarta: Ghalia Indonesia, 1999.