A Comparative Study Based on Learning Typology in Farmer Training Centre

Harjanti. M[1]; Sumardjo[2]; Lubis D.P[3]; Suhanda N.S[4]

[1,3]Ministry of Agriculture of The Republic of Indonesia
[2,4]Faculty of Human Ecology, Bogor Agricultural University, Indonesia
[1,3]Jalan Raya Puncak Km 11 Ciawi Bogor
[2,4]Jalan Kamper, Komplek IPB Dramaga Bogor

Corresponding Author: Harjanti. M

ABSTRACT

FARTC disseminates information to farmers with three different learning methods, namely: (1) informal (spontaneous learning in daily life in the surrounding environment); (2) nonformal (planned learning in the activities of internships and training); and (3) informal-nonformal (combination of informal and nonformal methods). The different ways of learning had triggered differences in the structure of communication. This study applies social network analysis to compare the communication structures of the three FARTC communities that apply informal, informal-informal, and nonformal learning. The result shows that informal FARTC depends on the opinion leader and live in adjacent location. On the other hand, the communities of nonformal FARTC are scattered in various locations. They build networking by utilizing communication technology. Meanwhile, the communication structure of informal-nonformal FARTC is a combination of informal and nonformal patterns. The study suggests that each FARTC requires different information dissemination strategies according to their own network communication structure.

Keywords: Social Network analysis, long-life learning, farmertraining centre, opinion leader, learner farmer

INTRODUCTION

Training and apprenticeship activities from farmers to farmers in Indonesia have developed in the form Farmer Agricultural and Rural Training Center (FARTC). FARTC is an organization managed by agribusiness entrepreneurs both individuals and groups. This organization conduct training and apprenticeship in the agriculture sector (Ministry of Agriculture 2016). The Government of the Republic of Indonesia continues to support the development of FARTC throughout Indonesia. FARTC has the potential to provide information for farmers in the remote area. This is an effort to overcome the dependence of farmers on government extension officers to obtain agricultural information

The previous researches have examined the role of FARTC from various perspectives. Dewi and Marbun (2006) concluded that FARTC is an effective institution for disseminating information to farmers because of its characteristics namely: (1) managed by a farmer whose business has proven successful; (2) conducted in a direct learning process in the field and guided by practician who has successfully run his business; (3) supported by the community and local government. Pratiwi et al. (2015) show that FARTC has an impact on the implementation of aquaculture techniques by fish farmers. Kereh et al. (2015) show that the productivity and income of farmers who have participated in FARTC flower cultivation training are greater than farmers who have not to join the training. Hardi and Awza (2014) revealed the existence of

positive and negative opinions from the surrounding community and training participants on the training program organized by FARTC

FARTC organizes learning activities for farmers regardless of age, place and time. The lifelong learning theory states that the learning process is carried out by each individual during his lifetime "to learn as long as to live" (Jarvis 2004 and Longworth 2003). Jarvis (2004) states that events in adulthood period, an individual continues to learn from the working environment and the surrounding social environment. Lifelong learning is required by everyone to enhance the flexibility and innovativeness in order to survive in the era of globalization (Longworth 2003). Research conducted by Eshach (2007); Cameron and Harrison (2012); Malcolm et al (2003) in the working environment has strengthened the theory of lifelong learning. Those three studies revealed that informal learning process formed spontaneously in the daily interaction with the neighborhood, family and other relatives. On the other hand nonformal learning occurs in situations that have been planned in conditions according to the needs of the actors. Harjanti *et al.* (2018) reveal that FARTC is an organization where farmers obtain lifelong learning. Their study has been identified that FARTC is applying three types of learning methods, namely: informal learning, informal-nonformal, and nonformal. The FARC which has applied spontaneous learning in daily life with the neighborhood is identified as informal learning pattern FARTC. While the FARTC which has able to organizes planned learning in the form of training and internships for farmers is identified as nonformal learning pattern FARTC. In addition to the mentioned two patterns, Harjanti *et al.* (2018) have found the other FARTC which has the ability to conduct both informal and nonformal patterns learning pattern. The last FARTC are identified as informal-nonformal learning patterns.

Training and apprenticeship activities at FARTC adopting a participatory approach in the learning process. It means the learning process is combining with working directly on farms (Abbas et al. 2014). Trainees and apprentices should participate directly in the agribusiness activities conducted by FARTC organizer. Training is held for several days. While the apprenticeship takes over a longer period of time. Apprenticeship takes for several weeks or several months with more complete learning material. Trainees and apprentices from outside the area will stay at the FARTC inn during the training or apprenticeship period.

Hinds and Pfeffer (2003) revealed that in organizations there is a flow of knowledge from individuals who have the experience to new individuals who are still in the learning phase. They also stated that sharing knowledge through the transfer of experience is the key to success in controlling the organization. The communication network theory believes in networking in sharing knowledge (Wood et al. 2014). Scott (2000) reveals that communication networks is individual to individual connectionwhich form communication flows. Communication network theory underlies much of the research in the realm of communication and sociology.

Density is an indicator of communication networks which means the number of relationships that exist divided by the number of relationships that may occur (Hanneman and Riddle 2005). Lakon et al. (2008) revealed that density is also an important element for explaining social capital. This is because density can have the effect of strengthening and weakening social capital. Dense networks have a strong internal influence on individual behavior in the community. However, in some case, the dense network can trigger difficulties to adopt innovation from the outside community. A dense communication network is sometimes difficult to receive

information from outside because it is less open to foreign parties (Lakon et al. 2008).

Centrality is the other communication network indicator which explains how individuals establish relationships with other individuals (Scott 2000). Lakon et al. (2008) state that individuals who have a high position in the flow of information will have wide access to all network components and also have high social capital.

Isaac et al. (2007) compared the communication network among four farmer communities in sharing agroforestry knowledge. Their study analyzes the informal structure of farmer networks and identifies the position in the core group and the peripherals (the supporter). The results state that core farmers are more often looking for information from the core than to peripherals. Analysis of the core structure shows the relationship of native migrants bound by mutual information and not limited to familial or immigrant ties. Pape (2015) uses a comparative test on network member farmers and non-network members to test awareness of soil nutrient management practices. The results show that farmers who are members of formal networks have more awareness in conservation and use of water. This means that farmers have goals to join the network that is to get benefit from the use of information.

Zulkarnain (2015) conducted research on the communication network in the fish farmers community. The result states that there exists a relationship between communication networks and changes in livelihood and the mindset of farmers. This means that the higher the role of individual communication networks, the higher the change in livelihood and individual mindset. Hapsari (2016) concluded that the centrality of communication networks had an influence on community participation in the social movement titled "Rejecting Cement Factories" in the Samin indigenous community in Pati, Central Java. This study

also shows that the level of network centrality is influenced by individual perceptions and the level of political engagement. Rangkuti (2009) found that the characteristics of farmers significantly influence communication networks in the process of adopting hand tractor innovations. His research found that the community leaders still dominate the farmer communication network in the adoption of hand tractor to cultivate the land. Gandasari et al. (2015) revealed that online communication networks have become a good coordination forum for orchid floriculture consortium, although the network centrality is still relatively low. Research by Harjanti et al. (2018) has revealed the existence of three typologies of FARTC learning patterns. This result underlies the idea of exploring the differences in communication networks formed by the three typologies of FARTC learning patterns.

Based on the background, this study wanted to analyze the phenomena that have not been explored by previous research. The purpose of this study are: to analyze communication network structure in the three FARTC communities based learning on learning patterns; and identify the role of opinion leaders in those communities. The analysis was conducted on three FARTC which held informal, informal-nonformal, and nonformal learning patterns. This step was done in order to be able to compare the communication networks of the three FARTC communities. The suggestions generated from this analysis will be very effective because it is based on the characteristics of each communication network. These suggestions are specific to each FARTC typology.

METODOLOGY

The research subject is farmers in FARTC communities. The data was collected from three FARTC communities that consistently applied informal, informal-informal, and nonformal learning patterns. Respondents are farmers who have

participated in learning activities conducted by FARTC. Interviews with farmers are conducted when FARTC holds meetings, training, or internships. This is done because farmers, trainees, and apprentices come to FARTC from various regions.

FARTC Mandiri Farm in Lebak Regency, Banten Province was chosen to represent communities that applied informal learning patterns. This FARTC consistently applies informal learning that is spontaneous in daily interactions with farmers. The number of communication actors in the informal FARTC number is 82 people. Meanwhile, Informal-non-formal represented by FARTC Simpay Tampomas in Sumedang Regency, West Java Province. The communication actors in this FARTC are 91 people. Further, FARTC Okiagaru Ikamaja in Cianjur Regency, West Java Province was chosen to represent a community that applies nonformal patterns. The number of communication actor at this FARTC is 105 people. Surveys in all three community are conducted from July to December 2017. The location of three FARTC is depicted on the map in Appendix 1.

FARTC main activity is to disseminate information regarding the cultivation techniques. This is the basis of the communication network context explored in this study. The question posed to farmers is who is contacting them and to whom they contact with in terms of technical cultivation. This question can reveal the network regarding the cultivation techniques. The type of cultivation depends on the main commodity in each FARTC.

The intact system sampling method (census) is used to determinate of respondents in this study. It means that the respondents are all members of the population in each FARTC. This method was chosen because communication network research emphasized the description of the overall communication structure.

The analysis is carried out with the following stages:

(1) Data obtained from communication network questionnaires. The question posed to farmers is who contacted them and to whom they relate to in terms of technical cultivation. The next step is to make a communication relationship matrix based on the respondent's answer. The communication relationship matrix consists of rows and columns. Rows represent sources of information while columns represent recipients of information. Communication relationships are marked with binary numbers. If there is a communication relationship marked 1 while if there is no communication relationship marked 0 (Hanneman and Riddle 2005).

(2) The communication relationship matrix is transformed into sociogram images using software UCINET (Boorgati and Freeman 2002). The sociogram image shows the pattern of relationships and the role of individuals in communication networks.

(3) Communication network matrix data is then processed using UCINET to display the network indicators which consist of:

(3.1) Density explains the level of individual connectedness in a sociogram. The value of density in a network is defined as the number of real interactions divided by the number of interaction that might be occurred. Network density can depict the speed of which information spreads among actors and the extent to which actors have a level of social capital or social constraints (Hanneman and Riddle 2005)

(3.2) Centrality describes the number of interactions that individuals can make with other individuals within the system. Centrality is the number of relationships from and towards the actor. This indicator can show the actor's popularity in the communication network. This study uses indicators of outdegree and indegree centrality to measure the actor's expansion. Outdegree centrality is the number of links or interaction made by one actor to another actor divided by the total interaction that

might be made in the communication network (Eriyanto 2014). The total interaction that might be made in the network is the total number of community members minus one. The formulation Outdegree Centrality is formulated as follows:

Outdegree Centrality =
Number or interaction made by one actor to another actor

_____

The total interaction that might be made in the network

Indegree centrality is the number of interaction received by a communication actor from other actors in the community. It is formulated as follows:

Number or interaction received by one actor from another actor
_____
The total interaction that might be made in the network

The measurement of centrality will display the role of stars and isolate. Star is the most popular people in their groups. Isolate is people who have no relationship. Identification of the role of individuals is needed to develop the strategies of information dissemination for the community.

RESULT AND DISCUSSION
Communication Network Analysis Regarding Cultivation Techniques in Informal Patterned FARTC

FARTC Mandiri Farm represents communities that applied informal learning patterns. This FARTC conducts informal learning in daily interactions with farmers spontaneously. This community is located in Sajira Mekar Village, Sajira District, Lebak Regency, Banten Province. This location has low elevation at 85 above sea level and the daily temperature is 30 ° C. The farmers in this community cultivate rice as the main commodity. Farmers have been actively conducting learning activities since 2000 in this community. The FARTC have been officially established in 2014.

The FARTC organizers disseminate information to farmers through daily interactions in the field such as discussion and consultation. The FARTC organizers assist farmer to earn production facilities such as fertilizers and seeds, and to sell their product. In some cases, FARTC also plays a role to bridge the government programs to farmers. The FARTC organizers coordinate government programs of training for farmers and pest control. All farmers in Mandiri Farm FARTC community produce rice. Thus, the question posed to farmers is who was contacted and who contact them in terms of rice cultivation. This question can reveal the network information regarding rice cultivation within the FARTC community.

Communication Networks Analysis depicts the interaction that occurs among farmers in giving and receiving information regarding cultivation techniques. Analysis of communication networks produces sociograms which describe how information is distributed to all members. The sociogram also shows the role of individuals in the communication network.

Actors involved in the communication network in term of cultivation at FARTC are tied to the proximity of the location. This means that all actors live in the same area and cultivate a similar product which is rice. The number of actors involved in the communication network is 82 actors consisting of 77 actors as farmers, 2 actors as FARTC organizers, and 2 government extension officer.

The communication network in term of cultivation on informal FARTC shows a low density of 0.027. This means that only 2.7 percent of interactions are formed by the actors of the total potential communication interaction that may be formed. Low density is triggered by group size and the number of interaction. The larger the members of a group and the fewer interaction, would trigger the lower density of communication. This means that the interactions among

farmers are limited. The similar result from Zulkarnain (2015) and Wahyuni (2016) also found the low density in the networks.

Centrality is the number of interaction to and from the actor to show his popularity in the communication network. Outdegree centrality is the number of interactions given by one actor to another in the network. While indegree centrality is the number of interaction received from another actor. Centrality measures the expansion of an actor. The highest degree of centrality called the star. The star and the opinion leader are displayed in a Table 1.

Table 1: *Star* dan *opinion leader* dalam struktur komunikasi P4S berpola Informal

Peran dalam Struktur Komunikasi	*Node* Nomor	*Centrality*		Peran Sosial
		Indegree	*Outdegree*	
Star	47	0,407	0,407	(Fer) Ketua P4S sekaligus ketua poktan
Opinion leader	56	0,012	0,198	(Vit) Penyuluh

The star in this community is the communication actor who is most contacted by other farmers to explore cultivation information. Star has the highest degree of centrality and able to influence members decisions. The star of this community is node 47 (FER). FER is the leader and founder of FARTC. While opinion leaders also indicate individuals who have lots of interaction even though not as many as stars. The opinion leader in this community is node 56 (VIT). VIT is a government extension officer who actively joins FARTC activities to disseminate information. The dissemination of information in this community relies on the FER and VIT as seen Table 1. Figure 1 Sociogram of informal learning pattern FARTC indicating that there are 6 cliques in this network.
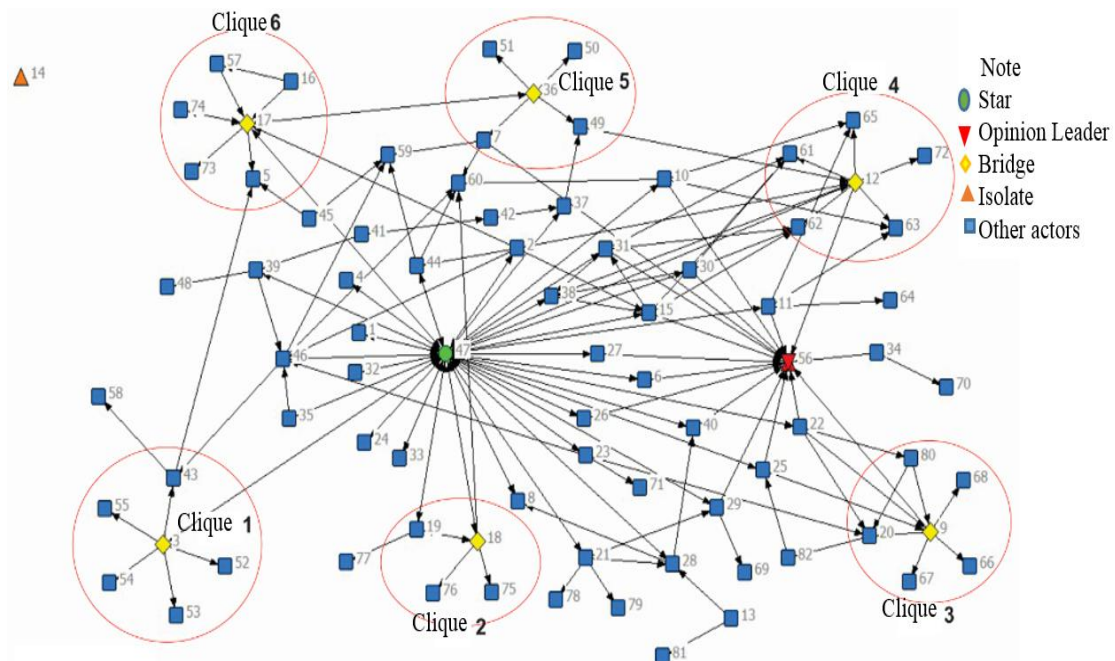
Figure 1: Sociogram of informal learning pattern FARTC

The cliques are part of a system where interaction among members is more frequent than other members in the communication system. The clique members are farmers in most close locations, thus make direct interpersonal communication easier. Every clique in the network are connected to each other through the role of individuals called bridges. The bridge is a member of the cliques that are linked his clique with other cliques. The bridge is farmer of FARTC core community who disseminate information to his close companion.The cliques and bridges in the network are identified in Table 2.

Tablel 2: Identifikasi klikdalam jaringan komunikasi P4S berpola pembelajaran Informal

Clique	Bridge	Social Role	Location
Clique 1	*Node* 3 (Mug)	Farmer of FARTC core community who disseminate information to his companion.	Sajira Mekar Village Sajira District
Clique 2	*Node* 18 (Sah)	Farmer of FARTC core community who disseminate information to his companion.	Sajira Mekar Village Sajira District
Klik 3	*Node* 9 (Dar)	Farmer of FARTC core community who disseminate information to his companion.	Sajira Mekar Village Sajira District
Klik 4	*Node* 12 (Sam)	Farmer of FARTC core community who disseminate information to his companion.	Sajira Mekar Village Sajira District
Klik 5	*Node* 36 (Sar)	Farmer of FARTC core community who disseminate information to his companion.	Sajira Mekar Village Sajira District
Klik 6	*Node* 17 (Ibr)	Farmer of FARTC core community who disseminate information to his companion.	Sajira Mekar Village Sajira District

Data in Table 2 shows the distinctive pattern of informal pattern FARTC that distinguish it from other patterns. The proximity of the locations determines the network of informal learning pattern FARTC. All cliques in this network are in one adjacent area

Communication Network Analysis Regarding Cultivation Techniques in Informal-Nonformal Patterned FARTC

Only a few FARTC which has the ability to combine informal and nonformal patterns in the daily activities. This is due to the obstacles in practicing both learning patterns. FARTC whom able to practice informal and nonformal learning patterns are supported by many factors such as farmers characteristics, organizers capability, location characteristics, market, social capital and others.

FARTC Simpay Tampomas is consistently able to conduct informal and nonformal patterns in daily activities. This community is located in Cibeureum Wetan Village, Cimalakadistrict, Sumedang Regency. The elevation is 700 meters above sea level. The land in the village is rich in sand, gravel, and stone. Since 80's sand mining industry have developed in this area and triggered environmental destruction. Before the sand mining arrived, this location was green but then it turns into barren rock with temperatures reaching 40^0C.

The concern regarding nature destruction was encouraged UHA family to cultivate the barren field since 1988. The first crop which was able to grow on arid land is Gliricidae Sepium. They then grow teak wood, guava, mango, and other crops and raising local meat goats. The success of this family attracted the attention of the other local community who was previously working as the sand miner. Twenty-five families now imitate UHA as goat farmer. They form Simpay Tampomas goat farmer group. SUJ, one of the local youths, start to breed the Ettawa dairy goat to produce milk since 2006. He also cultivate dragon fruit plants which are able to flourish on arid land. The innovation of dairy goat and dragon fruit then imitated by other farmers in Simpay Tampomas community. The Simpay Tampomas community fame as the leading farmer livestock community in West Java and won some awards at the provincial and national levels.

The success of Simpay Tampomas community inspired farmers from other regions to learn the cultivation of both meat goat and dairy goats, dragon fruit cultivation, and sand mine land reforestation. This triggered the organizer of Simpay Tampomas to conduct training and internships for farmers from other location. Farmers who had attended training at Simpay Tampomas then cultivated goats and dragon fruit in their respective regions. They disseminate cultivation information for fellow farmers on their home village.

The communication network analysis context of this study adjusts the activities carried out by FARTC. The main commodity of FARTC Simpay Tampomas is goat. The question posed to farmers is who was contacted and who contact them in terms of goat farming cultivation. This question can reveal the network contacted

by respondents and the network that contacted respondents in term of goat farming cultivation.

The actors in this network are combination those who live in the local main community and other communities outside Simpay Tampomas. The actors in the local community are Simpay Tampomas farmers. While other communities actors are alumni who have been trained at FARTC Simpay Tampomas. They disseminate cultivation information for fellow farmers on their home village. The number of actors involved in the network is 91 farmers from various regions. information about cultivation techniques there. The actors used the internet as discussion media related to agricultural issues.

The communication network regarding goat farming cultivation in informal-nonformal learning pattern FARTC has a low density of 0.037. This means that only 3.7 percent interaction formed by actors of the total potential interaction that might appear. The Star and the opinion Leaders are shown in Table 3.

Table 3: Roles in Communication Network in Informal-Nonformal Learning Patterned FARTC

Role in Communication Network	*Node* Number	*Centrality*		Social Role
		Indegree	*Outdegree*	
Star	5	0,333	0,344	(SUJ) FARTC Leader
Opinion leader	6	0,233	0,244	(UHA) FARTC Founder

The star is node 5 (SUJ) a young farmer and the leader of FARTC Simpay Tampomas. SUJ is most active in giving and receiving information to other farmers. The opinion leader is node 6 (UHA) the founder of FARTC. He could persuade sand miner community to save their environment by changing livelihood to agribusiness. UHA is one of trainers in FARTC. He is less active in FARTC now due to his age.

Figure 2 the sociogram of informal-nonformal learning pattern FARTC indicating that there are 7 cliques in this network.
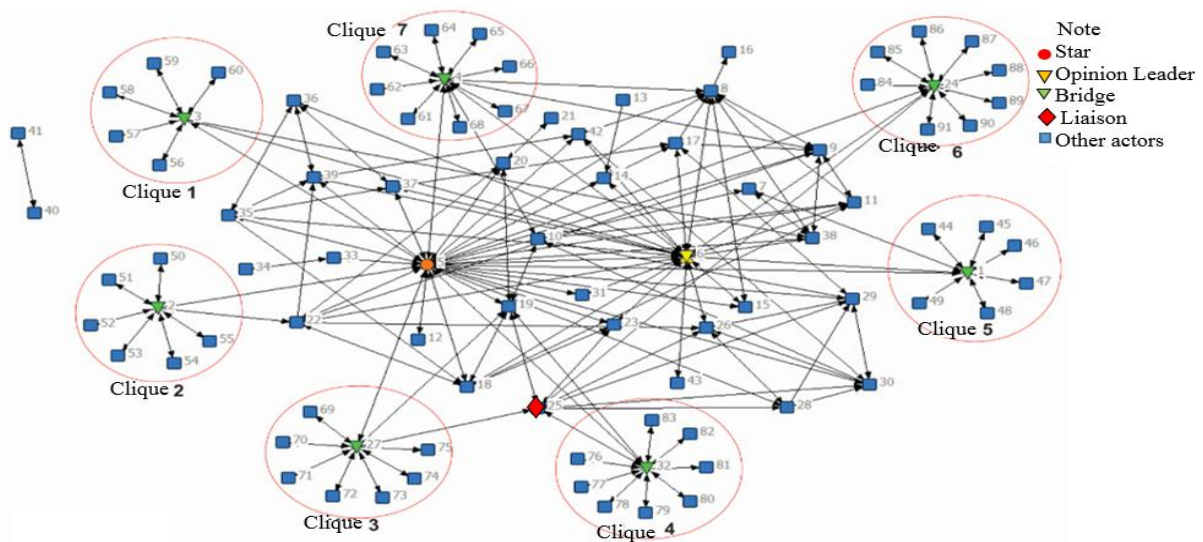
Figure 2: Sociogram of Informal-nonfromal learning pattern FARTC

Unlike the other two FARTC learning patterns, the informal-nonformal FARTC has a core community complemented with 7 cliques located in other regions. Alumni of FARTC training actively disseminate information to other farmers on their respective regions and form cliques in the communication structure. Node number 25 is the only liaison found in this community. She is the secretary of FARTC who actively communicates with other cliques. The Liason is individual who connect between cliques but not a member of the core community. Seven bridges are found in this community. They are member of the cliques who

plays a role to connect his cliques with other cliques in the network. In this community, the bridges are alumni of FARTC training who deliver information from FARTC to their companions on their home village. Bridge, cliques and their location are shown in Table 4.

Tablel 4: Cliques in Communication Network of Informal-Nonformal Learning Patterned FARTC

Clique Number	Bridge	Social Role	Location
Clique 1	*Node* 3 (Opi)	Alumni of FARTC training. He disseminates information to other farmers in his home village.	Majalengka DistrictMajalengka Regency
Clique 2	*Node* 2 (Nan)	Alumni of FARTC training. He disseminates information to other farmers in his home village.	Widasari District Indramayu Regency
Clique 3	*Node* 27(Ucu)	Alumni of FARTC training. He disseminates information to other farmers in his home village.	Buahdua District Sumedang Regency
Clique 4	*Node* 32(Las)	Alumni of FARTC training. He disseminates information to other farmers in his home village.	Rancakalong District Sumedang Regency
Clique 5	*Node* 1(Dod)	Alumni of FARTC training. He disseminates information to other farmers in his home village.	Paseh District Sumedang Regency
Clique 6	*Node* 24(Gra)	Alumni of FARTC training. He disseminates information to other farmers in his home village.	Conggeang District Sumedang Regency
Clique 7	*Node* 4(Mas)	Alumni of FARTC training. He disseminates information to other farmers in his home village.	Situraja District Sumedang Regency

Communication Network Analysis Regarding Cultivation Techniques in Nonformal Patterned FARTC

Lifelong learning theory states that the nonformal learning means practicing learning processes in planned situations, however, remains flexible in terms of material, time, and conditions according to the needs of the actors (Jarvis 2004 and Longworth 2003). The nonformal learning process in FARTC includes apprenticeship and training activities for farmers.

FARTC Okiagaru Ikamaja was chosen as the research community subject because they consistently applied nonformal learning patterns in daily activities. The activity of this FARTC was initiated by AAN. He had ever joint an agricultural internship in Japan in 2008. After returning from Japan he formed young farmers group. Since then lots of prospective participants join the internship at FARTC Okiagaru to prepare themselves before leaving for the apprenticeship on Japan. The FARTC has nine trainers who have high education backgrounds in agricultural.

FARTC Okiagaru Ikamaja officially established on 2014 even though they have held training for farmers long before it. This FARTC is located in Tunggilis Village, Pacet District, Cianjur Regency. The FARTC organizer manages 30,000m2 to produce horticulture product. The area is also utilized as a training place for participants. The land is located at the foothills of Gunung Gede Mountain. The area is fertile and famous for its horticultural product at elevation of 1,000 meters above sea level. The trainees and apprentices at FARTC Okiagaru came from various regions including farmers, students from high schools and universities, and staff from government agencies and other practicians. The FARTC organizers provide a variety of materials, such as the introduction of Japanese culture and language, Japanese vegetable cultivation, marketing, agribusiness analysis, business networking, and organic cultivation. The trainees stay for several days in FARTC inn. The material was presented in the classroom while the practical session held in the field. Meanwhile, the apprentices stay for a longer period of several weeks or months. The apprentices joint directly with the organizer's agribusiness activities in the field. The FARTC learning process applying the concept of learning while working.

Interview with AAN revealed that the training and apprenticeship had attracted lots of participants, however, the informal learning activities have not developed well. The FARTC organizers have not able to develop a community of neighborhood farmer.

Only a few farmers around the location are interested to participate on activities in FARTC. The FARTC organizer state that this phenomenon due to the condition of the region and the local culture. Cipanas district is one of the production centers of horticulture which supply the great number of the product to Jakarta. The agriculture market chain in Cipanas had developed well. Farmers in Cipanas can easily buy seeds and other agricultural input. They also can market their crops easily. Lots of agricultural traders buy the farmers products to be brought to Jakarta. The organizers reveal that the neighborhood farmers around Cipanas Subdistrict tend to work alone because of the support of the facilities around them. Cipanas local farmers have sufficient technical skills in horticulture cultivation inherited from their family. FARTC Okiagaru is less recognized by neighborhood farmers but more known by agriculture practician outside the region.

The context of communication network analysis in this study adjusts to the activities carried out by FARTC. The main product of FARTC Okiagaru is horticulture and the main training material is horticulture cultivation technical. The question posed to farmers is who was contacted and who contact them in terms of horticulture cultivation technical. This question can reveal the community communication network. The number of actors involved in communication networks in this community is 105 agricultural practitioners. They come from various regions.

The results of the analysis show that the level of communication network density by FARTC Okiagaru is 0.033. This means that only 3.3 percent of interaction has been formed by the actors of the total potential interaction that might be formed. The individual roles in the communication structure are shown in Table 5 below:

Tablel 5: Roles in Communication Network in Nonformal Learning Patterned FARTC

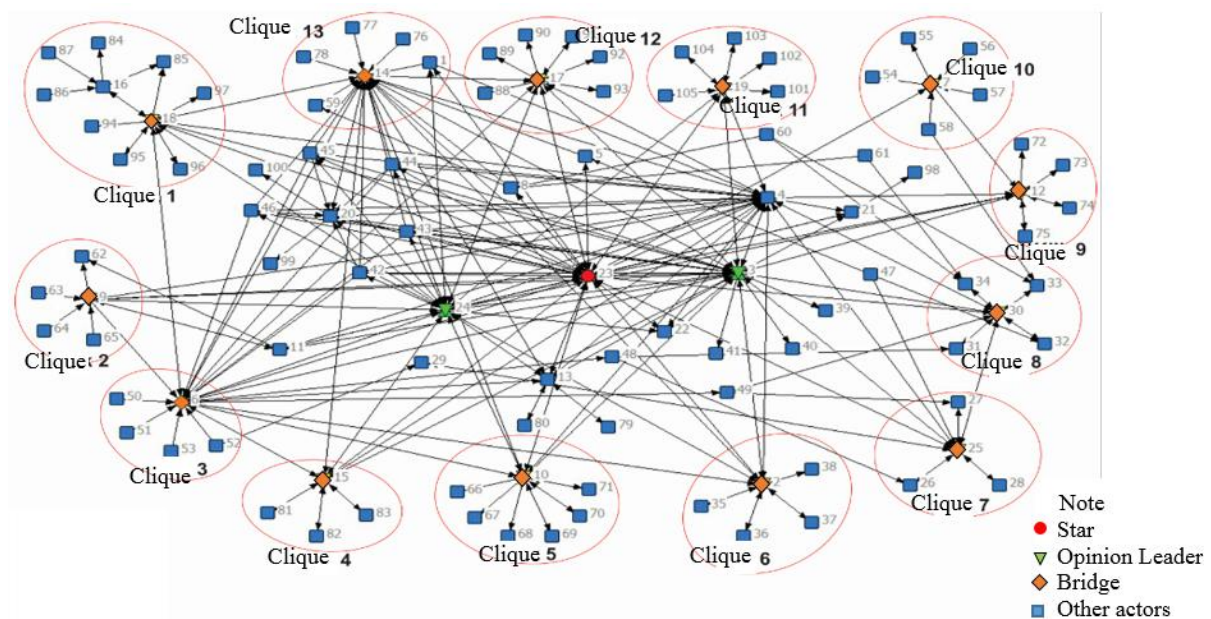| Roles in Communication Network	Node Number	Centrality		Social Role
		Indegree	Outdegree	
Star	23	0,279	0,279	(AAN) FARTC Leader
Opinion leader	24	0,221	0,221	(YUK) FARTC Trainer
Opinion leader	3	0,221	0,240	(MIS) FARTC Trainer

Figure 3: Sociogram of nonformal learning pattern FARTC

The star of this communication network is the leader of FARTC (AAN).

The opinion leaders of the communication network are YUK and MIS, both of them

are trainers of FARTC who work as horticulture farmer. This showed that information dissemination in FARTC does not only rely on FARTC leader only but involves agricultural practitioners as sources of information. Figure 3 sociogram of nonformal learning pattern FARTC indicating 13 clicks as shown below.

The communication network of nonformal learning pattern FARTC is different from the informal pattern or informal-nonformal pattern. The actors of the communication network regarding horticultural cultivation in nonformal learning pattern FARC are not bound by the proximity of the location. The actors come from various regions but have similar interests in agriculture. The actors who had attended training or apprenticeships at FARTC Okiagaru returned to their respective regions. They built cliques by disseminating information to their companion.

Communication through the internet is established to bridge the distance among actors. They utilize online discussion forum to discuss technical obstacles and other agriculture issues.

The cliques of nonformal learning pattern FARTC are located in various regions. Farmers in one clique stay in a location adjacent to each other. Farmers in one clique can communicate directly or bridged via online. Communication among cliques in the network can be connected through an individual role called bridge. The bridge is a member of the cliques who plays a role to connect his cliques with other cliques in the network. In this community, bridges are FARTC trainers or alumni of FARTC training who deliver information from FARTC to their companions on their respective regions. Identification of the cliques in the communication networks can be seen in Table 6.

Table 6: Cliques in Communication Network of Nonformal Learning Patterned FARTC

Clique Number	Bridge	Social Role	Location
Clique 1	*Node* 18 (Uus)	Alumni of training who built cliques by disseminating information on their respective regions.	Wanayasa district Purwakarta regency
Clique 2	*Node* 9 (Gia)	Alumni of training who built cliques by disseminating information on their respective regions.	Ciranjang district Cianjur regency
Clique 3	*Node* 6 (Sam)	Organizers of FARTC who built cliques by disseminating information to their companion.	Cugenang district Cianjur regency
Clique 4	*Node* 15 (Lih)	Alumni of training who built cliques by disseminating information on their respective regions.	Cipongkor district West Bandung regency
Clique 5	*Node* 10 (Jih)	Alumni of training who built cliques by disseminating information on their respective regions.	Ciracap district Sukabumi regency
Clique 6	*Node* 2 (Jej)	Alumni of training who built cliques by disseminating information on their respective regions.	Cibugel district Sumedang regency
Clique 7	Node 25 (Ded)	Alumni of training who built cliques by disseminating information on their respective regions.	Bantarujeg district Majalengka regency
Clique 8	*Node* 30 (Hen)	Alumni of training who built cliques by disseminating information on their respective regions.	Leuwiliang district Bogor regency
Clique 9	*Node* 12 (Suh)	Alumni of training who built cliques by disseminating information on their respective regions.	Sajira district Lebak regency
Clique 10	*Node* 7 (Muh)	Alumni of training who built cliques by disseminating information on their respective regions.	Cisarua district Bogor regency
Clique 11	*Node* 19 (War)	Alumni of training who built cliques by disseminating information on their respective regions.	Teluk Sampit district Kota Waringin Timur regency
Clique 12	*Node* 17 (Erw)	Alumni of training who built cliques by disseminating information on their respective regions.	Sliyeg district Indramayu regency
Clique 13	*Node* 14 (Sub)	Organizers of FARTC who built cliques by disseminating information to their companion.	Cipanas district Cianjur regency

The Comparison Among FARTC Pattern

This study explores deeper the result of Harjanti et al. (2018) regarding three learning patterns in FARTC namely informal, nonformal, and informal-nonformal. The results strengthen Sumardjo (2016) that FARTC as a local institution can disseminate innovation by performing roles as (1) information sources; (2) innovators;

(3) forum media (4) filtering information from outside parties.

This research provides novelty by mapping FARTC based on learning patterns and developing strategies based on the typology of the learning patterns.

Based on the identification of the learning pattern then communication network analysis was conducted to show the differences in communication structure among the three FARTC patterns. The informal learning pattern FARTC has shown dependence on FARTC leader and the proximity of the location. Meanwhile nonformal learning pattern FARTC are scattered in various locations. Farmers in this community utilize communication technology to build the network. The informal-nonformal learning FARTC shows a combination of informal and nonformal patterns. Figures 1, 2 and 3 have shown communication networks in learning farmers on FARTC in an informal, informal-nonformal, and nonformal pattern. Table 7 shows the comparison of communication structure indicators in the three communication networks.

Table7: The Comparison of Communication Structure Indicators in The Three Communication Networks

Indicators of Comm Structure	Typologyof Learning Pattern		
	Informal	**Informal Nonformal**	**Nonformal**
Density	0,027 (low)	0,037(low)	0,033 (low)
Shape	Radial Personal Network (the networks shape are open, the densities are low, but tend to open to information from outside)		
Star	FARTC leader (they have brain gain experience)		
Clique	local community (surrounding farmers)	Combination of local community, and non-core community spread across various locations.	Communities spread across various locations.
Opinion Leader	Government extension officer	FARTC Trainers	FARTC Trainers
Isolate	1 person	-	-
Bridge	Local farmer	Alumni of training who built cliques by disseminating information on their respective regions.	FARTC trainer and alumni of FARTC training who built cliques by disseminating information on their respective regions.
Liaison	-	FARTC organizer	-
Communication Media	Face-to-face communication	Face-to-face communicationfor core community. Online discussion forum for non-core community spread across various locations.	Online discussion forum for communities spread across various locations.

This result shows the shape of the three communication network is radial personal networks. This shows the openness of farmers which means that the networks shape are open, the densities are low, but tend to open to information from outside. The finding of the communication network shape is in line with Wahyuni (2016), but different from Zulkarnain (2015) who found an interlock personal network in the communication network of fisheries production. Interlock personal network is less open to information outside due to similarities among members of the internal communities and domination of certain individual (Zulkarnain 2015).

The cliques of informal FARTC and informal-nonformal FARTC core communities show the proximity of the location. On the contrary, the nonformal FARTC and informal-nonformal non-core community spread across various locations. The members are able to utilize communication technology to develop the network.

The informal and the informal-nonformal learning pattern FARTC have similarity. Both FARTC started from farmer groups that are tied to the proximity of location. However, the informal-nonformal learning pattern FARTC is more able to develop products and innovate cultivation techniques. Thus FARTC activities not only attract farmers in core community but also attract other agriculture practicians from various locations. The ability to create innovation in agribusiness is the strategy of

FARTC in order to attract other farmers to joint FARTC activities.

Face-to-face communication is applied by informal learning pattern FARTC to disseminate information. FARTC organizer help farmer to market their products and to earn production inputs. Living in the same location leads them to communicate face-to-face. Whenever they need, Farmers may visit FARTC room to discuss their obstacle or other issues. Online communication through is rarely used because some farmers can not access the internet.

The different condition occurs on nonformal learning pattern FARTC. Indirect communication through the internet intermediaries plays an important role in this communities. This was triggered by the separate locations of farmers and supported by the ability of farmers to access the internet. The community of nonformal learning pattern FARTC is dominated by young farmers with middle to upper education background who get used to accessing the internet. Face-to-face communication among organizers and farmers in this community only occur during training or apprenticeships. The online discussion forum bridges communication in this community when farmers return to their respective region after the training period.

combination of face-to-face and indirect communication is applied by the informal-nonformal patterned FARTC. Face-to-face communication is implemented with surrounding farmers communities in daily interactions. In addition, direct communication is applied during training or apprenticeship which followed by farmers from other regions. Whereas indirect communication via online discussion forum is used to bridge communication with the trainee when they return to their respective region after the training period.

The identification of communication modes applied by FARTC in disseminating information is important to set learning strategies. The non-formal FARTC and

informal-nonformal FARTC should develop online learning materials in short videos that are easily disseminated via online discussion forum or other social media. The nonformal FARTC and informal-nonformal FARTC also need to provide rooms and facilities for the trainee who comes from outside the region to stay in FARTC during the training period.

On the other hand, information dissemination strategies in informal FARTC is more emphasized on location proximity-based activities. The strategies might be applied by informal FARTC are to coordinate farmers in the core community to earn production inputs; to train farmers in term of prevention and eradication of pests or diseases that have the potential to attack the area; to coordinate farmers to sell products. The similar activities are also needed by informal-nonformal FARTC to be applied to core community farmers in the same location.

The Potencies of Opinion Leaders

The star ofthe communityisthe actors who is most contacted by other farmers. The stars of the three communities in this research are the leaders of FARTC. They are young educated workers who have gained international experience and return to develop their homeland which known as brain gain actors (Conway and Potter 2010).This research is in line with Setiawan (2015) which state that brain gain actor has potential ability to empower their community. The stars of informal and nonformal learning pattern FARTC have experience from Japan agricultural internship. While the star of informal-nonformal FARTC has experience as an agricultural worker in Malaysia. This finding marks the importance to support the brain gain actors as the community developer in their respective region.

opinion leader is indicating individuals who have lots of interaction even though not as many as the stars. The opinion leaderof the three communities shows the difference. Opinion leader of

informal FARTC is a government extension officer which show the dependence of this community to government support. The opinion leader of informal-nonformal FARTC and nonformal FARTC are trainers of FARTC who work as agribusiness practitioners. This showed that information dissemination in both informal-nonformal dan nonformal FARTC have involve practitioners as sources of information.

The ability of FARTC to involve practitioners as sources of information becomes key to success in the learning process. This showed that activities in FARTC do not only rely on FARTC leader or government support. Thus it would lead to sustainability of learning process in future.

REFERENCES

1. Abbas S, Ismail M., Sobirin M., &Gendari D. *Peran Pusat Pelatihan Pertanian dan Perdesaaan Swadaya (P4S) Dalam Mencerdaskan Petani.*Yayasan Amal Masyarakat Pertanian Indonesia.Jakarta. 2014. p.6-10.
2. Boorgati E, Freeman. UCINET VI. Reference Manual. Analytic Technologies. 2002
3. Cameron R, Harrison JL. The Interrelatedness of Formal, Nonformal and Informal Learning: Evidence From Labour Market Program Participants. *Australian Journal of Adult Learning*. 2012; 52(2):277-309.
4. Conway D, Potter RB. *The return of youthful Trinidadian professionals: their potential as a 'brain gain'.* In: Trans-Atlantic perspectives on international migration: cross-border impacts, border security and social-political responses. 4-5 Mar 2010, San Antonio, TX, USA, p. 1-27.
5. Dewi O, Marbun O,*Kerjasama BPTP dengan Pusat Pelatihan Pertanian dan Pelatihan Perdesaan (P4S) dalam Diseminasi Inovasi Teknologi. Prosiding Temu Teknis Nasional dan Tenaga Fungsional Pertanian;* Bogor, Indonesia. Bogor, Indonesia : Pusat Penelitian dan Pengembangan Peternakan. 2006. Bogor, Indonesia Indonesia. p.430-438.
6. Eriyanto. *Analisis Jaringan Komunikasi Strategi Baru dalam Penelitian Ilmu Komunikasi dan Ilmu Sosial Lainnya.* 2014.Jakarta, Indonesia :Prenada Media Group.
7. Eshach H. Bridging In-school and Out-of-school Learning: Formal, Nonformal, and Informal Education. *Journal of Science Education and Technology.* 2007; 16(2):171-190.
8. Gandasari D, Sarwoprasodjo S, Ginting B, Susanto D. Model Sistem Informasi Komunikasi Konsorsium Anggrek di Indonesia. *Jurnal Agro Ekonomi.*2015; 33(1):35-50.
9. Hanneman RA, Riddle M. *Introduction to Social Network Methods.* [Internet]. California, USA: University of California.2005. Available from: http://faculty.ucr.edu/~hanneman/
10. Hapsari DR. Jaringan Komunikasi Dalam Partisipasi Gerakan Sosial Lingkungan (Studi Pengaruh Sentralitas Jaringan terhadap Partisipasi Gerakan Sosial Tolak Pabrik Semen pada Komunitas Adat Samin di Pati Jawa Tengah). 2016. Depok, Indonesia : Universitas Indonesia.
11. Hardi R, Awza R. 2014. Opini Masyarakat Dalam Pogram Pusat Pelatihan Pertanian Pedesaan Swadaya Masyarakat (P4S) Kabupaten Kampar. *Jurnal Online Mahasiswa Fisip. 2014;* 1(2):1-12.
12. Harjanti M, Sumardjo, Lubis DP, Suhanda NS. Online Discussion Forum: Revealing the Role of Progressive Farmers in Learning Process. International Journal of Progressive Sciences and Technologies. 2018;7(1):117-126
13. Hinds P, Pfeffer J. Why Organizations Don't ''Know What They Know'': Cognitive and Motivational Factors Affecting the Transfer of Expertise. Di dalam M. S. Ackerman V, Pipek, Wulf V, editor. *Sharing Expertise: Beyond Knowledge Management*. Massachusetts, USA: Massachusetts Institute of Technology. 2003. p 4–22.
14. Isaac ME, Erickson BH, Quashie-Sam B, Timmer VR. Transfer of Knowledge on Agroforestry Management Practices: the Structure of Farmer Advice Networks. *Ecology and Society.*2007; 12(2): 32-51
15. Lakon CM, Godette DC, Hipp JR. Network-Based Approaches for Measuring Social Capital. Di dalam Kawachi I, Subramanian SV, Kim D, editor. *Social Capital and*

Health Edited. NewYork, USA: Springer. 2008. p.63-82.

16. Kereh BM, Wangke WM, Lolowang TF, Mandei JR.Peranan Pusat Pelatihan Pertanian dan Perdesaan Swadaya (P4S) "Sahabat Tani" Dalam Meningkatkan Produktivitas dan Pendapatan Petani Bunga Potong Krisan di Kelurahan Kakaskasen Satu dan Dua. *Cocos Jurnal Ilmiah Fakultas Pertanian Universitas Sam Ratulangi*. 2015; 6(2):1-13.

17. Jarvis P. *Adult Education and Lifelong Learning: Theory and Practice.*2004. London, Great Britain : RoutledgeFalmer.

18. Longworth N. *Lifelong learning in Action: Transforming Education in the 21st Century. 2003*. London, Great Britain: KoganPage.

19. Malcolm J, Hodkinson P, Colley H. The Interrelationships Between Informal and Formal Learning. *Journal of Workplace Learning*. 2003; 15(7):313-318.

20. Ministry of Agriculture. Regulation of The Ministry of Agriculture of The Republic of Indonesia Number 33 Year 2016 onGuideline of Farmer Agricultural and Rural Training Centre. 2016

21. Pape A. Power of Peers:How Effective Are Indiana Farmer Networks? 2015. Indiana, USA :Purdue University.

22. PratiwiYSH, Kusai, Hendri R. Tingkat Adopsi Alumni Program P4S (Pusat Pelatihan Pertanian Pedesaan Swadaya) Terhadap Teknologi Budidaya Ikan Dalam Keramba Jaring Apung di Kecamatan Kampar Kabupaten Kampar Provinsi Riau. Jurnal Online Mahasiswa (JOM) Bidang Perikanan dan Ilmu Kelautan. 2015; 2(2):1-12.

23. Rangkuti PA. Analisis Peran Jaringan Komunikasi Petani dalam Adopsi Inovasi Traktor Tangan di Kabupaten Cianjur, Jawa Barat. *Jurnal Agro Ekonomi.*2009; 27(1):45-60

24. Scott. *Social Network Analysis: A Hand Book*. 2000. California, USA : Sage Publications Inc.

25. Sumardjo. Sistem Diseminasi Inovasi Pertanian Untuk Meningkatkan Keberdayaan Petani Sayuran Dalam Proses Pengambilan Keputusan. Di dalam: Muljono P, Murtini S, Suryahadi, Triadiati, Martawijaya EI, editor. *Penelitian IPB dalam Pengarusutamaan Pertanian Indonesia 2016*. Bogor, Indonesia: Lembaga Penelitian dan Pengabdian kepada Masyarakat Institut Pertanian Bogor. p 24-33

26. Wahyuni S. Jaringan Komunikasi, Dinamika Kelompok dan Peningkatan Kapasitas Petani dalam Agribisnis Padi Organik. 2016.Bogor , Indonesia :Institut Pertanian Bogor.

27. Wood BA, Blair HT, Gray DI, Kemp PD, Kenyon PR, Morris ST. Agricultural Science in the Wild: A Social Network Analysis of Farmer Knowledge Exchange. PLoS ONE. 2014;9(8):1-24. doi:10.1371/journal.pone.0105203.

28. Zulkarnain. 2015. Analisis Hubungan Jaringan Komunikasi dengan Perubahan Taraf Penghidupan dan Pola Pikir dalam Pemberdayaan Pembudidaya Ikan di Kabupaten Kampar, Riau. 2015.Bogor, Indonesia :Institut Pertanian Bogor

******