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## Mapping Indonesian Department of Communication

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### ABSTRACT

The beginning of the history of communication studies in Indonesia is constructed by the invisible college of Indonesian scholars who returned from their studies in the United States, but no one has explained the contemporary conditions. Popular invisible college researches have tended to use co-citation and co-authorship analysis, even though invisible college relations are also formed through a scholarly background. The explanation about invisible colleges contributes to explaining influential groups in a particular field of science. Using social network analytics combined with historical reviews, this study explains the link between communication science education institutions in Indonesia that form an invisible college based on academic background identity. This study uses data relations between educational backgrounds and work places for 741 lecturers from 30 communication studies with 'A' accreditation in Indonesia. This study found that there was a shift in the orientation of communication science education from the USA to the local because of the development of communication science education in the ASEAN region, one of which was Indonesia. This study found that there were five invisible colleges based on the most influential educational backgrounds in communication science education namely the University of Indonesia, University of Padjadjaran, University of Gadjah Mada, University of Mercu Buana, and LSPR College of Communication. There are three factors making them the influential institutions: historical factors, heterogeneity, and geographical proximity.

**Keywords:** *Indonesian communication science, social network analysis, scholar network, invisible college, influential institutions.*

### INTRODUCTION

Invisible college is a term used to refer to intellectual associations or networks of scholars built of linking ideas among scholars sharing common interests (Paisley, 1972; Schonland, 1959). The bond is formed from their relationships and interactions. The relation that occurs can be through indirect or direct relationships among the scholars. On the one hand, indirect relationships refer to the idea that these scholars do not interact with each other but are bound to the same idea. Invisible college can be recognized through the citation listed in the research conducted by scientists. The search is conducted by looking at the bibliographic patterns of the scholars commonly referred to as the bibliometric technique (Lievrouw, 1989; Hart, 1993; Tuire & Erno, 2001; Zuccala, 2004; Zuccala, 2006; Casey & McMillan, 2008). This bibliometric technique is the initial reference for developing an invisible college study. The use of bibliometric techniques is conducted by observing the scholars' behavior of citing other scholars' publications such as journals, books and proceedings (Lievrouw, 1989; Hart, 1993; Tuire & Erno, 2001; Zuccala, 2004; Zuccala, 2006; Casey & McMillan, 2008).

On the other hand, Paisley (1972) explained that direct relationship refers to the scholars interacting with each other. Primordial ties are common in being the basis of forming the invisible college through direct relationship. The similarity in educational, social, geographical proximity

and research institutions allow the formation of an intellectual association or an invisible college (Schonland, 1959; Paisley, 1972; Lievrouw, 1989; Urs & Sharma, 2010). Invisible colleges that are formed through direct relationships can be traced using social network analysis methods to observe the invisible networks formed by the relationship and interaction of the scholars (Urs & Sharma, 2010).

The invisible college study is useful for explaining the relationship and interaction that exist among scientists in a particular field (Lievrouw, 1989). The formed invisible college network can explain the relationship and structure between the main actors and supporting actors in the delivery or dissemination of scientific ideas (Lievrouw, 1989; Eriyanto, 2014). Invisible colleges in qualitative studies can be used to understand the ideas that are dominant in a study. When linked to the social, economic and political context of society, the concept of invisible college can be used to understand the occurring power of knowledge (Diaz-Andreu, 2007).

Researches on Invisible College in the field of Western communication have been widely carried out. For example, a research related to invisible college conducted by Chang and Tai (2005) explains the role of invisible college in the changing landscape of mass communication research through the publication citation behavior of researchers. The research utilizes the citation behavior of researchers found in published works to see the role of the invisible college in changing the views of research occurring in mass communication. Another research was carried out by Mario Hambrick (2016) who tried to explain the relationships that exist between communication researchers in the field of sports by observing their citation behavior. Both studies provide an overview on how the invisible college research is developing in the communication science domain.

Lievrouw (1989) provides a review along with criticism and suggestions on the study of the invisible college. In his view, invisible college researches are inclined to only set their eyes on published scientific products such as books, journals and proceedings. The previous researchers tend to use bibliometric techniques that focus only on the scholars' citation behavior. Whereas in the scientific activities, relationships among scholars are possible due to social factors such as similarity in educational background, culture, geographical proximity and collaboration in research. Edge (1977) supported the opinion by stating that scholars might have certain reasons in quoting the ideas of other scientists in their work. This opinion reinforces Lievrouw's criticism saying that citation behavior is not the only indicator forming an invisible college; so, the social aspects of scholars' communication behavior also need to be considered to reveal the invisible college (Lievrouw, 1989; Zuccala, 2004; Zuccala, 2006).

According to Lievrouw (1989), the existing invisible college studies are still rarely viewed from the communication's perspective; while in fact, this study is closely related to the communication process or communication behavior among scholars. Invisible college researches using bibliometric as the initial foundation of this study; it describes that the scholars' communication process does not emerge from communication researches (Lievrouw, 1989; Zuccala, 2004; Zuccala, 2006). In fact, invisible college researches are mostly studied by scholars in other fields. Invisible college as a construct of theory based on close communication with bibliometric techniques is a helpful starting point and opens up opportunities for this study to be considered from the point of view of communication (Lievrouw, 1989; Zuccala, 2004; Zuccala, 2006). Furthermore, Lievrouw (1989) suggested that it is necessary to develop methods to uncover invisible college concerning the social factors such as the use of ethnographic methods,

content analysis methods, and also the use of social network analysis from mentoring activities, co-authorship or collegiality (Urs & Sharma, 2010).

In addition to criticism and suggestions on the study of the invisible college, the writer also reckons the need for a study of communication science's invisible college in Asia; because the discussion of influential actors in the study of communication science has not been widely within view in Asia. Based on Rogers (1977), there are no Asian figures or institutions that contribute to the early history of communication science. All communication science figures or institutions in the book written by Rogers "History of Communication" are from the West (Kriyantono, 2017); whereas in fact, the study of communication in Asia is essential now because communication studies and communication education institutions in Asia have developed, when the studies of communication in Asia have been influenced by Western perspective (particularly America) after all this time.

Communication science ideas or communication science studies with Eastern perspective were just recently conducted. It can be seen from some of the scientists' writings in this field. Dissanayake (1988) and Kriyantono (2017) argue that "to expand the research in the field of communication productively, we must pay more attention to the communication concepts formulated by non-Western societies". Typical Asian theoretical studies have sprung up with the emergence of communication theories such as Chinese Harmony Theory, Chinese Communication Theory, Taoist Communication Theory, Japanese Kuuki Theory, Confucian Communication Theory (Kriyantono, 2017; Raharjo, 2013; Gunaratne, 2009; Ayish, 2003; Dissayanake, 1986; Dissanayake, 2003).

The development of communication studies in Asia is certainly unseparable from the role of actors in this scientific field (Adhikarya, 1980; Adhikarya, 1981). Researchers are aware of the scarcity in studies that examine both the individual actors and institutional actors taking part in developing Asia's communication studies. Adhikarya's (1980) and Adhikarya's (1981) studies explained that the development of communication science in ASEAN was incited by actors studying communication in the United States (US) who had returned to their respective countries. Initially, the knowledge of communication in ASEAN relied heavily on communication knowledge originating from America. This can be seen from two-thirds of actors or scholars in the field of communication that still use American communication knowledge as a reference when they are teaching or researching (Adhikarya, 1981). These scholars chose America as their place of study due to their unfamiliarity with foreign countries' communication education outside America. America was still considered as the most appropriate place and as the most expert in the field of communication, both in theory and research as well as in the practical field of communication (Adhikarya, 1980; Adhikarya, 1981).

Furthermore, although 80% of scholars in ASEAN are dependent on American knowledge, around 74% of scholars argue that communication education in their country is relevant to the needs of their community, and they do not see the knowledge of American communication they carry as a threat to the philosophy, political structure or economic development of their country (Adhikarya, 1981). ASEAN scholars believe that with so many ASEAN scholars taking PhDs in a few years, studies of communication research in ASEAN will develop in number and significance, leading to the increase in the communication publications based on the local data or ASEAN data (Adhikarya, 1981).

According to Adhikarya (1981), to maximize communication science education in ASEAN, countries in ASEAN must have a communication science education center in their own country. While taking a Ph.D. in America is important, scholars' education in the field of masters should be conducted at the communication education center in the ASEAN region itself. This is to support the development of more appropriate communication knowledge for ASEAN settings. The center for communication education in ASEAN is needed to demonstrate the existence and establishment of communication education schools in ASEAN; and universities that provide communication education schools must offer comprehensive courses in the field of social science and Southeast Asian studies (Adhikarya, 1981).

Referring to the results of research conducted by Adhikarya (1980) and Adhikarya (1981), it is suggested that further researchers conduct a research examining the role of communication science education schools in ASEAN. If reflected in the Indonesian context after the development of communication education schools in ASEAN, there has not been a research that discusses communication science education institutions or actors in Indonesia, especially in the field of communication sciences, for observing the development of communication science in Indonesia. The research trends of communication science development in Indonesia are discussing the paradigms and methodological aspects of communication science developed in each educational institution, or meta-analysis researches using content analysis. There have been no studies that discuss both actors in the form of individuals and institutions playing a role in the development of communication science; while in fact, in order to see the development of the science, the discussion of the most influential actors of communication science development in Indonesia needs to receive attention as well.

Researchers consider this gap as an opportunity to conduct a research defining the actors who play a role in the development of communication science in Indonesia. In this case, the researcher uses the idea of invisible college as one that can be considered from the point of view of communication science (Lievrouw, 1989). The study of invisible college is also still rarely studied in Asia, especially Indonesia; whereas in fact, the invisible college can describe the connectedness of actors involved in the development of a science (Paisley, 1972; Lievrouw, 1989; Zuccala, 2004; Chang & Tai, 2005; Zuccala, 2006; Hambrick, 2016). Therefore, this study seeks to find out the institutions (communication education schools) and relationships existing among communication science education institutions in Indonesia, and also to see their position or influence in communication science education.

## LITERATURE REVIEW

### *Invisible College*

Invisible College is the first term used in the 17th Century (Abel, 1991; Lievrouw, 1989; Urs & Sharma, 2010). This concept is present in line with the existence of the Royal Society of London. Members of this community are scientists who interact with each other to exchange scientific knowledge through regular meetings. This community is informal (Lievrouw, 1989). There is no official establishment certificate stating that this community is an institution. It is only the interest of science that brings the scholars together (Lievrouw, 1989; Chang & Tai, 2005; Casey & McMillan, 2008; Urs & Sharma, 2010).

This term was later developed to explain the invisible relationship between scholars (Lievrouw, 1989; Paisley, 1972; Chang & Tai, 2005; Casey & McMillan, 2008; Urs & Sharma, 2010). The connections can be direct or indirect. The direct connection is in the form of similar educational, geographical, and thinking backgrounds enabling them to interact with one another (Lievrouw, 1989; Zuccala, 2004; Zuccala, 2006). Crane (1972) explained that relations among scholars having affiliations with them can form an invisible college. According to Crane (1972), the invisible college is a relation among scholars that can connect several groups of scholars which consist of productive and less productive scholars. The productive scholars or the scholars with the most cited ideas can act as actors that connect several scientific groups (Leifeld, 2017). For example, invisible colleges are formed through academic processes (Verspagen & Werker, 2003), mentoring (Verpagen & Werker, 2003), and co-authorship (Leifeld, 2017).

Based on this opinion, the academic background can form a node of an invisible college. Those from the same campus can be assumed to be invisible colleges (Zuccala, 2004; Vespagen & Werker, 2003). Connectivity is not directly related to the closeness to the aspect of thinking. Those who have studies or similarities in scientific study subjects are actually hidden colleagues (Lievrouw, 1989; Paisley, 1972; Chang & Tai, 2005; Casey & McMillan, 2008; Urs & Sharma, 2010). This can be seen from the reference or citation they use. They may not know each other, but they are connected through thoughts based on using similar references of ideas (Lievrouw, 1989; Paisley, 1972; Chang & Tai, 2005; Casey & McMillan, 2008; Urs & Sharma, 2010).

Invisible college tends to be informal; although in its development, there are efforts to formalize it. Crane emphasizes communication and relationships between those who have scientific interests. Activities carried out by this intellectual community can exchange scientific papers, collaborative writing, correspondence, exchange of research information, to research collaboration (Bosserman, 1973). In this dimension, Crane is inclined to emphasize that among scholars, the invisible college is informal. Although on the other hand, White, Wellman and Nazer stated that the communication that occurs actually shows the effort to formalize the invisible college (Bosserman, 1973). It is the interaction and the work entwined among them that makes it possible for scholars to show their existence.

Invisible college can be revealed through two things. First, the invisible college is visible when scholars who share the same thoughts are joined in a formal, procedural, institutionalized group and have meetings. This institutionalization facilitates identification because there are face-to-face processes and products resulted from these interactions. The existing documentation also makes it possible to see the interaction processes in the community. On the other hand, this form of institutionalization does not eliminate the nature of invisible college, but is one of the consequences that can emerge from the interaction process.

Second, the invisible college can be revealed by doing research. Bibliometrics method is a method commonly used to conduct invisible college-themed research (Lievrouw, 1989). This method uses references to published articles from a group of scholars being studied. The use of bibliography can be used to map the thoughts of the scholars. Social network analysis is another method that can be used to describe an invisible college (Urs & Sharma, 2010). This method uses individual background information from the scholars group being studied. These scholars' *nodes* can explain the patterns and relations formed among them. Social, political, and economic background as well as intersectional studies can bring the scholars together in an invisible college.

Studies of invisible colleges have various benefits (Lievrouw, 1989). Invisible college researches can help explain the nodes existing among scholars in a particular field (Lievrouw, 1989). The depiction of these nodes leads to an explanation of the intellectual network formed through relations among scholars. This can explain the structure and relations regarding the main and influential actors among scholars (Eriyanto, 2014; Lievrouw, 1989). Combined with historical data, it can help explain scholars' thoughts and paradigms. If it is combined with social, political and economic data, it can even explain the position of the scholars group being studied (Díaz-Andreu, 2007).

### *The History of Indonesian Communication Science*

The efforts to develop communication science education institutions have existed since the post-independence of the Republic of Indonesia. However, the term 'communication science' was not popular at the time. Publicistic science was more popular than communication science because the European thinking approach was inclined to influence the academic world in Indonesia (Antoni, 2004; Anwar, 2002; Rahardjo, 2012). This often led to the term 'publicity' being exchanged with the term 'communication science'. Communication / publicity education in Indonesia was first held by the Political Sciences Academy in Yogyakarta in 1949 (Sendjaja, 2014). Later on, the academy developed into the Faculty of Social and Political Sciences, University of Gadjah Mada (UGM) (Maschab, 1980; Sendjaja, 2014; Cangara, 2014). Then, the publicistic studies in the academy became UGM Publicity Department in 1950 (Cangara, 2014; Sendjaja, 2014). The second institution that specifically teaches Communication Studies in Indonesia, the Djurnalistik College in Jakarta was established in 1949 (Sendjaja, 2014). The establishment of communication / publicist educational institutions was continued by several other institutions such as the University of Indonesia (1959), University of Padjadjaran (1960), University of Hasanudin (1961), Prof. Dr. Moestopo-Beragama (1962), University of Diponegoro (1967) (Adiprasetio, 2016; Antoni, 2004). The number continues to grow up to 218 communication study programs in Indonesia with the following details: 30 study programs with 'A' accreditation, 137 study programs with 'B' accreditation, and 51 study programs with 'C' accreditation (the official site of the National Accreditation Agency per 2017). This amount is still expected to increase in line with the public's interest and market needs for communication science graduates.

The paradigm shifts of communication science ideas from the European perspective to the American perspective occurred in the 1970s (Hardjana, 2004). The concept of "publicity" was changed to the concept of "communication" (Hardjana, 2004; Sendjaja, 2014; Antoni, Alfira & Handayani, 2017). This was preceded by changing the name of the University of Indonesia Publicity Department to the Department of Mass Communication in 1976, then to the Department of Communication in 1981. This change was later reinforced by the Presidential Decree No. 107 of 1982 (Antoni, 2004; Santoso, 2016; Sendjaja, 2014). The change of name from the Publicity Department to the Department of Communication Science was followed by other universities such as University of Gadjah Mada in 1982 and University of Padjadjaran in 1983 (Sendjaja, 2014). This transition was a result of the return of several Indonesian scholars after formal and non-formal education in the United States, which also made communication science education in Indonesia influenced by or dependent on American communication knowledge (Adhikarya, 1980; Adhikarya, 1981). The roots of communication studies in Indonesia are strong in the publicist tradition on the one hand, and then it shifts to the tradition of communication

science. The contribution of communication science that was born and developed in the United States significantly influences the Communication Study Program in Indonesia (Antoni, Alfira, & Handayani, 2017). Another factor influencing these changes is the commercial needs. Publicistic is considered to be only related to journalistic work, even though the world of media or society also requires non-journalistic practices such as film, television and public relations (Prajarto, 2002; Prajarto, 2005).

The development of communication science studies continued with the effort to establish postgraduate education. The University of Indonesia became the first university to administer a master of communication science education in 1982 and a doctoral program in 1993. University of Padjadjaran became the second institution administering postgraduate education of the master program in the 80s and doctoral programs in the early 90s. After the establishment of the postgraduate communication at the two universities, various universities followed with master's education establishment. University of Gadjah Mada, which became the pioneer of communication science education in Indonesia, only had a master education program in 2009.

The increase in the number of institutions administering postgraduate education is due to the needs of the industrial and educational world (Prajarto, 2005). Today's industrial world does not only require practitioners but also analysts for communication. The increase in the need for education is the result of the demands of Law No. 14 of 2005 concerning teachers and lecturers demanding that lecturers must have a minimum of master / graduate degree.

#### METHODOLOGY

Invisible colleges are apt to be researched using bibliometric or co-citation analysis methods. Whereas in fact, IC is not only related to idea relations but also related to social relations. These existing methods (bibliometric and co-citation analysis) are derivatives of the social network analysis (SNA) method. This research also follows up on Lievrouw's (1989) recommendation to conduct an invisible college research by considering the use of other methods aside from the two methods that are often used, such as using social network analysis, ethnography, and co-authorship analysis. This is also based on Lievrouw's (1989) view stating that the network of scientists is not only limited to aspects of notion or ideas, but it also needs to consider other aspects forming an invisible college such as scientific backgrounds and geographical proximity. One of the adhering backgrounds of researchers is their educational background. Adhikarya (1981) stated that the paradigm and epistemology of knowledge is determined by educational background. Therefore, this study uses a social network analysis method viewing the scientists' educational background as a scientific network.

This research data uses information on teaching educational background of communication science available on the website of 30 communication science colleges in Indonesia receiving 'A' accreditation from the Universities National Accreditation Board from January to July 2017. Accreditation does not only show the good management and quality but also describes the ranking of communication science study programs in Indonesia. Good governance also allows the inference of the availability of adequate data, although it is possible that universities with lower accreditation grade have excellent website data availability. Then, the data obtained will be verified with the information available at the Higher Education Database (or PDPT – *Pangkalan Data Perguruan Tinggi*) of the Ministry of Research, Technology

and Higher Education. This aims to check the correctness of the information obtained. Based on the data collection conducted on the 30 websites, 940 teacher data was obtained. However, only 741 data were used in this study. This is because the information obtained through the website cannot be verified; the teachers' education data were not obtained, and there is a difference in data between the website and Ministry of Research, Technology and Higher Education's PDPT.

The writer analyzed the collected data using the NodeXL and UCINET applications. This application was used for network analysis to describe the network that was formed from the interaction of the actors as the objects of research. The communication network analysis was conducted to find teaching education institutions and relations in communication at universities in Indonesia. Several types of measurements were made to describe the network including density, centrality degree, centrality betweenness, centrality closeness (Rogers & Kincaid, 1981; Wasserman & Faust, 1994; Scott, 2000; Monge & Contractor, 2003).

The density measurement is made to see the density or cohesiveness of the network, namely the intensity of the actors' relationship in the network. The density number that is close to 1 indicates high network cohesiveness (Brass, 1995; Scott, 2000; Monge & Contractor, 2003; Eriyanto, 2014). The results of density measurement in this study will explain the cohesiveness of communication science education institutions through interactions among institutions. The centrality degree measurement is made to see actors occupying a central position in the network based on the intensity of interactions created with other actors in the network (Scott, 2000; Monge & Contractor, 2003; Eriyanto, 2014). The centrality degree measurement results in this study will explain the dominant institutions contacting or contacted by other institutions. The betweenness centrality measurements are made to see actors who act as intermediaries for other actors. This position is considered important because it can place actors in strategic positions as carriers or distributors of information for other actors (Scott, 2000; Monge & Contractor, 2003; Eriyanto, 2014). The measurement of centrality betweenness in this study will explain the institutions potential in becoming the bridge or intermediaries for other institutions in communication science education. The measurement of centrality closeness is made to see the proximity of actors in the network (Scott, 2000; Monge & Contractor, 2003; Eriyanto, 2014). This measurement result will explain the institution that has the shortest path to contact or to be contacted by other institutions in the network.

## RESULTS

The data processed with NodeXL and UCINET forms a communication network pattern called sociogram. Sociogram is a network graph that can explain the direction of actor interaction, the flow of information exchange and the roles of actors involved in the communication network (Rogers & Kincaid, 1981; Eriyanto, 2014). Sociograms are used to describe existing networks so that we can determine the limits of analysis. In the existing network, there are 2 types of relations namely weak ties and strong ties. 'Strong Ties' is a network that has more than 1 node bond while 'Weak Ties' are networks that have not more than 1 bond node. From Figure 1, it can be seen that the one in the red circle is a network that can be seen as 'Strong Ties', while those outside the circle are 'Weak Ties'. This study only focuses on the analysis of several institutions that have strong ties rather than focusing on institutions that have weak ties; since the relationship is not strong, the effect is less significant to be studied.



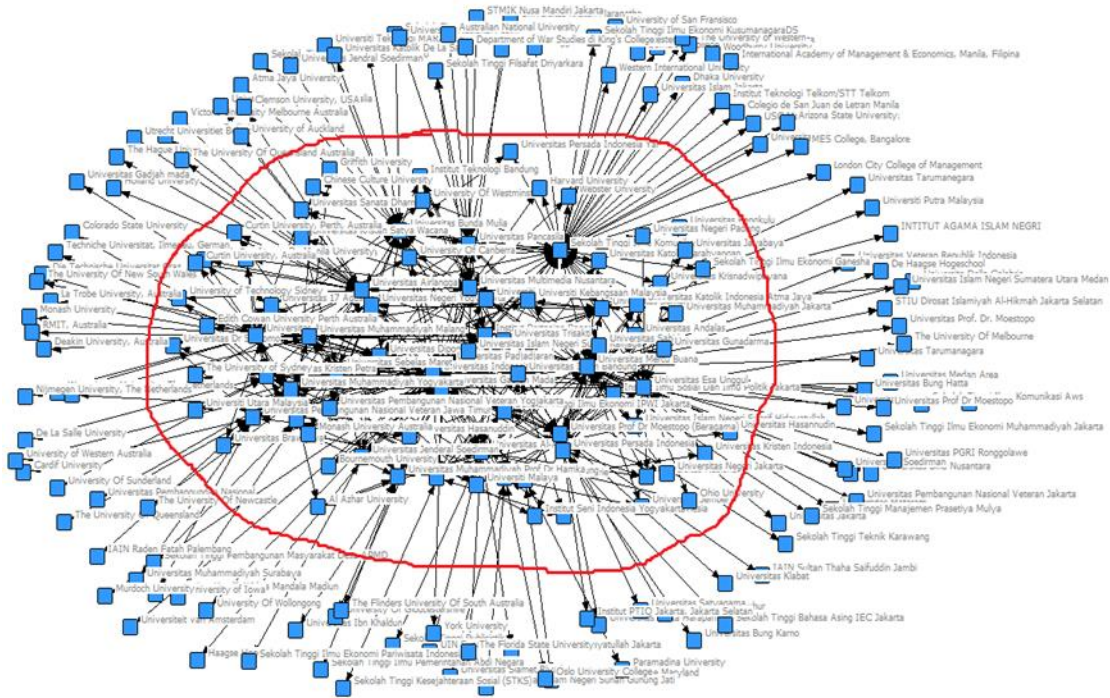


Figure 1: Sociogram.

Furthermore, the sociogram obtained can describe the network formed between communication science education institutions in Indonesia in a more detail and easily-understood way. The writer made several measurements that are common in social network or communication analysis. The measurements used the indicators that have been explained in the research method; they are the measurement of density, centrality degree, centrality betweenness and centrality closeness.

1. Density

Table 1: Density.

	<i>Number of Ties</i>	<i>Nodes/ Institution</i>	<i>Avg Degree</i>	<i>Density</i>
Density Global Network	<b>904</b>	<b>204</b>	<b>11,422</b>	<b>0.056</b>

*Explanation:*

Number of ties: the number of relationships or interactions between actors / institutions

Average degree: the average relationship or interaction

Density: the overall network cohesiveness

The density measurement results show the relationship cohesiveness existing among communication science education institutions in Indonesia. Based on the research, it was found that 204 universities became the educational background of 741 instructors of communication science in Indonesia. Through the measurement using UCINET, there were 904 relations from the

number of universities. The formed network shows the density rate of 0.056 or this means that the opportunity for inter-institutional relations in the network is 5.6%; while the average level of relationship is 11.422, conveying that each actor / institution has more than 1 institution relationship, and each actor / institution has more than 11 actors in average. 'Density' or connectedness indicates the level of communication connectedness of a person to the other in the network. Density is the actual ratio and contact potential. The result of the density measurement ranges from the number 0 to 1; the closer it is to 1, the more cohesive the network is; the number 1 shows all the actors / institutions connected to each other or becomes a network's perfection that is often called 'perfectly all connected' (PAC).

## 2. Centrality Degree

Table 2: Centrality Degree.

No	Name of University	Centrality Degree
1.	University of Indonesia	229.000
2.	University of Padjajaran	197.000
3.	University of Gadjah Mada	148.000
4.	University of Mercu Buana	138.000
5.	LSPR College of Communication	107.000

The results of the centrality degree measurement will display communication science education institutions in Indonesia as the centrals or educational centers of communication science scholars in Indonesia. 'Centrality Degree' is a measure of an actor's / institution's centrality through the level of the actor's/ institution's relationship: the higher the degree of centrality, the higher the level of relations with other actors / institutions in the network. This study took five ranks with the highest centrality, namely, University of Indonesia, University of Padjajaran, University of Gadjah Mada, University of Mercubwana, and LSPR College of Communication. The reason leading the centrality to the five universities can be found by looking further at the data and history of each institution. The University of Indonesia occupies the highest position because it is one of the earliest institutions for communication science education in Indonesia. This is reinforced by its presence as a pioneer in postgraduate education in this field. A similar reason applies to University of Padjajaran; in fact, what distinguishes the two is that University of Padjajaran ranks as the second. This is because University of Indonesia had established the institutions of communication science education before University of Padjajaran.

An interesting fact actually appears from University of Gadjah Mada; it occupies the third position even though it is the first communication science education institution in Indonesia. It is on account of the delay in establishment of the communication science graduate program at the institution. The even distribution of alumni with undergraduate background in all of universities being studied makes University of Gadjah Mada still reaches the third place. University of Mercu Buana and LSPR College of Communication are respectively the fourth and the fifth because these educational institutions have the highest number of communication science's teachers data in Indonesia, on the basis of their websites that are verified by the PDPT data of the Ministry of Research, Technology and Higher Education; and as for the exact number, University of Mercu Buana has 87 lecturers and LSPR College of Communication has 64 lecturers.

### 3. Closeness Centrality

Table 3: Closeness Centrality.

No	Name of University	Closeness Centrality
1.	University of Indonesia	371.000
2.	University of Padjajaran	386.000
3.	University of Gadjah Mada	387.000
4.	University of Mercu Buana	401.000
5.	LSPR College of Communication	406.000

Another matter to be considered in this study is related to the institutions' closeness. The measurement of closeness will show the institutions that have the most proximate closeness to other institutions. The measurement is made by using the centrality closeness concept. This concept refers to the range that an actor / institution has in a network, and is based on the minimum distance needed by a member to connect with all other network members. The lower the value of closeness is, the better it will be; because it shows the low distance of each actor / institution to connect with other actors / institutions. The results of this 'Closeness Centrality' measurement are the same as the results of the 'Degree Centrality', in which the best closeness goes to University of Indonesia actors / institutions; followed by University of Padjajaran, University of Gadjah Mada, University of Mercu Buana, and LSPR Communication College. It can be concluded that University of Indonesia only needs 371 steps to contact all other actors / institutions. This number is then followed by University of Padjajaran with 386 steps, University of Gadjah Mada with 387 steps, University of Mercu Buana with 401 steps, , and LSPR College of Communication with 406 steps.

### 4. Betweenness Centrality

Table 4: Betweenness Centrality.

No	Name of University	Betweenness Centrality
1.	University of Indonesia	5048.084
2.	University of Padjajaran	4646.697
3.	University of Gadjah Mada	3059.867
4.	University of Mercu Buana	2971.033
5.	LSPR College of Communication	2246.496

Aside from the most influential institutions, this research also found institutions that mediate or connect one institution to the others. The measurement of betweenness centrality describes the extent to which an actor / institution mediates, or is placed in the shortest path between an actor/ institution; the greater the number is, the more it will show the actor/ institution acting as a connector or a bridge. The higher the intermediary value is, the more important the position of an actor/ institution is; because it shows that an actor/ institution must pass through this particular actor in order to connect with other actors/ institutions. In betweenness centrality, it is discovered that LSPR College of Communication, University of Mercu Buana, University of Airlangga, University of Indonesia, and University of Gadjah Mada are connecting one institution to the others. University of Indonesia, that has the highest centrality

degree and closeness centrality, is in the fourth position of betweenness centrality instead. The same thing applies to University of Gadjah Mada which is in the third rank of centrality degree and closeness centrality; it even does not appear to be an intermediary institution. University of Padjadjaran, which has centrality degree and closeness centrality in the second rank, does not even exist in centrality betweenness. In betweenness centrality, a new institution acting as a connector is found: University of Airlangga.

## DISCUSSION

Based on the data obtained, it was found that the center of communication science education in Indonesia was in Java. Based on the research data, there were only 30 from 218 communication education institutions in Indonesia with 'A' accreditation. Among the research's objects, 27 of the 30 institutions are in Java. Even 9 of the 27 institutions are in one province, namely DKI Jakarta. This province is the capital of Indonesia. This means that the island of Java is the center of communication science education in Indonesia. This is certainly inseparable from the historical factors of Indonesian education policy from the colonial to the contemporary era which places this island as the center of education. The policy of economic centrality also contributes to the matter. 70% of Indonesia's total economy is centered on this island, so human resources and educational institutions are essential.

This finding can respond to Ronny Adhikarya's (1981) research as well; the research explains that many scholars of communication science in ASEAN relied heavily on the knowledge of USA communication at that time, because they studied in the USA. Back then, the communication science scholars in ASEAN considered that the USA was the most appropriate place for communication science education. These days, however, there are many communication studies in Indonesia at both the undergraduate and postgraduate levels. This situation has made communication science scholars have many choices of communication science education in the country. This is certainly in line with Adhikarya's (1981) suggestion in his research; he stated that communication science education in ASEAN would advance with more communication science education centers opened in each ASEAN country, one of which was Indonesia.

Another finding from this study is related to the University of Indonesia which occupies the position of communication science education. It is because the University of Indonesia is one of the early institutions of communication science education in Indonesia. Its position is getting stronger because it was the first institution to establish a communication science graduate program in Indonesia, in 1983. The establishment of this postgraduate program was inseparable from Prof. Alwi Dahlan's role as the first doctor in this field. He graduated from University of Illinois. This institution later became a reference for communication science teachers in Indonesia to continue their education.

Whereas in fact, referring to the historical facts, University of Gadjah Mada should have been the most influential institution in teaching communication science in Indonesia. Instead, this institution occupies the third position of each measurement in this study. The delay in the establishment of postgraduate communication science education is possibly the cause for University of Gadjah Mada's influence to be reduced. Although relatively late in establishing a postgraduate program, University of Gadjah Mada still shows its great influence because communication science teachers around East Java and Central Java have their graduate

background from this university. Before 2009, the teachers in the area were inclined to have their educational background from University of Gadjah Mada. After that year, there were several teachers who had continued their postgraduate education to this university. Accordingly, this strengthens University of Gadjah Mada in the third position.

This position is one level lower than University of Padjadjaran, which is in the second place. Even though Communication Studies at University of Padjadjaran was born after University of Gadjah Mada and the University of Indonesia, this university has become the second influential communication science education institution because of historical factors. The postgraduate education at this university was born several years after the establishment of the same program at the University of Indonesia. Another reason is that communication science education at this institution is based in the Faculty of Communication Sciences. This is different from the two previously mentioned universities which put communication science education under the management of the study program. This implication made University of Padjadjaran have more graduates and they are spread in various communication science education institutions.

The positions of University of Indonesia and University of Padjadjaran do not change if it is related to the context of Ronny Adhikarya's (1981) research; he placed the University of Indonesia and Padjajaran University as the center of Communication Science education in Indonesia. Although at that time the context of the research conducted by Adhikarya (1981) was to see scholars of University of Indonesia and University of Padjajaran who continued Communication Studies in the USA. With a quite number of communication science education in Indonesia, this research is considered necessary to trace the distribution of communication science scholars in Indonesia. The results of this study indicate that communication science scholars from the University of Indonesia and University of Padjajaran are widely distributed as teachers or lecturers in other communication science education institutions.

On the other hand, despite having the most distribution, University of Indonesia is the main choice in continuing postgraduate education for University of Padjadjaran alumni who work elsewhere. This is proven by University of Indonesia being at the highest position in centrality degree and centrality closeness. The alumni of University of Padjadjaran who work at University of Padjadjaran are likely to continue their graduate education at the same institution. It is suspected that there was a self-recruitment in communication science education at the University. The allegation is proven by the absence of the University of Padjadjaran in centrality betweenness.

The highest heterogeneity is seen in two private institutions instead; they are LSPR Communication College and University of Mercubuana. LSPR College of Communication Studies has instructors in communication with 30 different educational backgrounds. University of Mercu Buana has instructors in communication with 28 different backgrounds. The high heterogeneity of these two institutions has caused them to become the common ground for various instructors with different educational backgrounds. This can be seen as the two institutions are in the highest position of betweenness centrality. The LSPR College of Communication and University of Mercu Buana are the a few parts of scholars from several other communication science education institutions in Indonesia. This has led to allegation that the two private universities are more open to recruitment than state universities which have a tendency to recruit their own alumni.

Another interesting fact related to heterogeneity leads its way to Airlangga University. The university has never appeared as an influential institution in some measurement criteria of this study, but it exists as a heterogeneous one. The betweenness centrality data shows that this institution is in the third position. Resorting to the human resource data, there are lecturers of communication science with 15 different educational backgrounds. The undergraduate education background of communication science instructors at University of Airlangga are dominated by those from University of Gadjah Mada and University of Airlangga. The diversity of graduate and post-graduate education levels in becoming institutional factors is a meeting point for various educational institutions. Another decisive factor is that University of Airlangga becomes a communication science's teaching educational background in East Java. If further observed, 5 of 30 institutions that are the objects of this research are in this particular province. The majority of the communication teachers' undergraduate and postgraduate educational backgrounds in the region are from University of Airlangga.

The geographical proximity factor turns out to be the factor that influences the distribution of alumni to other institutions. University of Indonesia alumni are the majority teachers in communication science education institutions in DKI Jakarta. A similar thing appears to University of Padjadjaran alumni who dominated educational institutions in West Java Province. On the other hand, University of Gadjah Mada only dominates the undergraduate education background of the communication science teachers in Central and East Java Provinces. In the region, the teachers have various postgraduate education backgrounds. Another interesting finding related to the geographical proximity also emerges from educational institutions outside Java; from University of North Sumatra, for example. For some university communication science lecturers, Malaysia is a reference for continuing postgraduate study. North Sumatra Province is geographically closer to Malaysia than to Jakarta, the capital of the Republic of Indonesia. Based on this fact, it can be assumed that geographical proximity might affect the alumni distribution in communication science education institutions in Indonesia.

Based on the results and discussion, it can be said that the research of communication science scholars as a network of scientific or intellectual invisible (invisible college) can show the roles of actors (institutions or individuals) in the development of a science. With several measurements of social / communication network analysis, this research can reveal the relationships that exist among educational institutions, reveal institutions that are the centrals of communication science education, and study the institutions that are the place for communication science scholars from various institutional backgrounds. This research also proves that the use of social network analysis methods is also applicable and can contribute to explain the invisible college relations that are formed based on the scientists' identity. In the other context, the scientists' identity has not become a specific discussion in the research of invisible college.

This research can also explain that when a science exists, the center of science development is inclined to exist in the initiator or pioneer (country or institution) or one that is very active in developing the knowledge. This can be seen from the communication science discipline which made many ASEAN scholars in the 60s and 80s took communication studies in America, and they were very influenced by America (Adhikarya, 1980, Adhikarya, 1981). Nevertheless, science is growing and spreading with many scientists taking the scientific field. Supported by the establishment of scientific education institutions in its respective country, the

center of education has shifted to each region that develops the knowledge. This also confirms that if one wishes to make a change, the central education of an existing discipline must be in its respective country. This has occurred in Indonesia, as it is proved with the existence of many communication science education institutions; and it is in line with what was predicted by Ronny Adhikarya in his 1981's research related to the transnational and communication knowledge transfer to ASEAN countries.

### CONCLUSION

This research proves Lievrouw's statement asserting that invisible college disclosures are not only formed through co-citation or co-authorship. The scientist's background is also a determinant of the invisible college, because the idea is formed through an educational process. In the context of Indonesian communication science, this is evident from the link among communication science education institutions in Indonesia through the distribution of alumni who are teaching communication science education. This research is also related to Adhikarya's view (1980; 1981) stating that communication science education in Indonesia was influenced by Indonesian scientists studying in America. In the contemporary context, the results of this study prove Adhikarya's predictions that there will be a shift in the orientation of communication science education from the United States to the local because of the development of communication science education in the ASEAN region, one of which is Indonesia. On the other hand, the findings of this study confirm that universities of communication science education in Indonesia, which have direct relationships with scientists who study in the USA, still have a central position. The dynamics of communication science education are determined by these local universities.

The dependence on communication science education from the United States has declined. The communication science education in Indonesia is influenced by educational institutions in the island of Java. There are five universities that have the most influence; they are the University of Indonesia, University of Padjadjaran, University of Gadjah Mada, University of Mercu Buana, and LSPR College of Communication. The University of Indonesia and University of Padjadjaran are the most influential universities because they have historical relations with communication science education in the United States. This makes the two universities become a reference for communication science education in Indonesia. There are three factors causing them to become influential institutions: historical factors, heterogeneity, and geographical proximity. State universities such as the University of Indonesia, University of Padjadjaran, and University of Gadjah Mada are superior because of historical factors. LSPR Communication College and University of Mercu Buana are at the top because of their level of resources heterogeneity compared to the state institutions that tend to be homogeneous and to practice self-recruitment for their academic staff. Geographical proximity determines the distribution of alumni in other communication education institutions.

### RESEARCH LIMITATION

This research has several limitations. First, this study only uses data of teaching education background from the communication science department with 'A' accreditation. Second, this study only refers to the data in each department of communication science and the Higher Education Database of the Ministry of Research, Technology and Higher Education. This research

took place from January to July 2017, so the data used is the data available during that period. One should ignore any reality discrepancy in this study if the lecturer whose data has been used is deceased, has moved to a new work place, or has been inactive.

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