INTENSIF, Vol.4 No.2 August 2020
**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

# Utilization of Social Network Analysis (SNA) in Knowledge Sharing in College

*Pemanfaatan Social Network Analysis (SNA) dalam Knowledge Sharing di Perguruan Tinggi*

**Received:**
9 June 2020
**Accepted:**
28 July 2020
**Published:**
19 August 2020

**[1*] Nurrokhman, [2] Hindriyanto Dwi Purnomo, [3] Kristoko Dwi Hartomo**
*[1,2,3]Magister Sistem Informasi, Universitas Kristen Satya Wacana*
*[1,2,3]Salatiga, Indonesia*
*E-mail: [1]nurrokhman087@gmail.com,*
*[2]hindriyanto.purnomo@staff.uksw.edu, [3]kristoko@gmail.com*
*Corresponding Author

**Abstract**—Campus competition in Central Java creates superior and empowered human resources to make XYZ campus optimize the Knowledge Sharing process. In optimizing the Knowledge Sharing process on the XYZ campus through interaction and communication between students in the study program. This study aims to identify the Knowledge Sharing collaboration of students on the XYZ campus in three study programs with 100 respondents using the Social Network Analysis (SNA) method. The parameters used in this study include density, degree centrality, closeness centrality, betweenness centrality, and clicks (subgroups). Based on the analysis of the results obtained by the level of density level of 4.7% or weak ties because under 50%. Actor 98 has the highest degree of centrality with outdegree value 32 and indegree 7, while actor 65, which has the highest closeness centrality with inCloseness value 16,952 and outCloseness value 1,020. Actor 15 also has the highest centrality betweenness with an amount of Betweenness 2750,148 and nBetweenness 28,346. In this study, it can be concluded that there is collaboration in the Knowledge Sharing of students on the XYZ campus from each divided into three study programs, namely, informatics engineering, accounting computerization, and graphic design.

**Keyword**—Knowledge Sharing, College, Social Network Analysis

***Abstrak***—*Persaingan kampus di Jawa Tengah dalam menciptakan SDM unggul dan berdaya guna membuat kampus XYZ mengoptimalkan proses Knowledge Sharing. Dalam melakukan optimalisasi proses Knowledge Sharing di kampus XYZ melalui interaksi dan komunikasi antara mahasiswa intra program studi. Penelitian ini bertujuan untuk mengidentifikasi kolaborasi Knowledge Sharing mahasiswa di kampus XYZ pada tiga program studi dengan jumlah responden 100 orang dengan menggunakan metode Social Network Analysis (SNA). Parameter yang digunakan dalam penelitian ini termasuk density, degree centrality, closeness centrality, betweenness centrality, dan klik (subgroup). Berdasarkan analisa diperoleh hasil tingkat hasil tingkat density sebesar 4,7% atau ikatan lemah karena dibawah 50%. Aktor 98 memiliki degree centrality tertinggi dengan nilai outdegree 32 dan indegree 7, sedangkan aktor 65 yang memiliki closeness centrality tertinggi dengan nilai inCloseness 16.952 dan nilai outCloseness 1.020. Aktor 15 juga memiliki betweenness centrality tertinggi dengan nilai Betweenness 2750.148 dan nBetweenness 28.346. Dapat disimpulkan dalam penelitian ini terdapat kolaborasi dalam Knowledge Sharing mahasiswa di kampus XYZ dari masing-masing individu yang dibagi menjadi tiga program studi, yaitu teknik informatika, komputerisasi akuntansi, dan desain grafis.*

***Kata Kunci***— *Knowledge Sharing, Perguruan Tinggi, Social Network Analysis*

INTENSIF, Vol.4 No.2 August 2020
**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

## I. INTRODUCTION

The development of the world of education in the era of information technology multiplies with the support of various media patterns in the delivery and reception of information. It demands new learning methods, especially in sharing Knowledge. Sharing Knowledge is very important in learning for students to transform Knowledge so that they can follow the concept and then apply it as a skill.

Learning has one goal, which serves to increase the insight and knowledge of students so that they are expected to have the ability to express again about understanding the Knowledge that has been learned [1]. In the learning process, it is necessary to share Knowledge (knowledge sharing) both between students and between teachers and students. In a knowledge-sharing activity supported by KMS (knowledge management system), where Knowledge is always associated with a concept of tacit Knowledge and explicit Knowledge [2].

Knowledge Sharing can be defined as an action where Knowledge is available to others in an organization [3]. Knowledge Sharing can increase strength for students in the learning process through the use of information technology [4]. Knowledge sharing is a part of the process in knowledge management, which has a function of optimizing the use of Knowledge through the process of distributing Knowledge to each member of the organization [5]. Knowledge sharing has a vital role in developing human resources, especially students, especially in terms of interactions in the learning process. In the knowledge sharing process, it is necessary to describe and explain the mapping or mapping of individuals who have an essential role in the knowledge distribution process. Mapping individuals who have a central role in the knowledge sharing of the learning process can be done with the social network analysis (SNA) method, which in addition to mapping knowledge sharing patterns, central actors, and attributes that influence the learning process.

Indicators in knowledge sharing use the theory of Michael J. Marquardt [5], which divides the company's knowledge process into two, namely, the first is Knowledge Sharing Tacit. Knowledge can be transferred intentionally in various ways, namely through methods written, oral methods including internal conferences, and briefings. Training and mentoring and transfers are planned to spread Knowledge to other areas of the organization. Furthermore, the second is Knowledge Sharing Explicit, where organizations can also transfer Knowledge accidentally in various ways, namely through stories, myths, task forces, and informal networks.

Communication has a very central role in a company because one of the elements of communication, namely information sources, can influence the behavior of individuals in the company [6] so that it can affect the performance of employees or employees [7]. In an

**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

organization, communication will run smoothly if supported by existing information networks, including informal and formal systems that will always exist and be used in an organization or company, one of which is "The Piano Institute" in Surabaya [8].

Social Network Analysis (SNA) is a method of analysis in a study that concentrates on relationship research and is often used to measure a relationship and describe some information individually [9]. SNA can also be used to map government partners in the Electronic Procurement System (SPSE) network where patterns can be studied so that it can be used by the government to analyze, evaluate, and monitor the tender procurement process in SPSE [10]. With the existence of smooth communication without obstacles or barriers, it is hoped that good collaboration will occur between employees at PT. Arum Mandiri Group, both between divisions and different divisions, expects that work process synergy can occur.

In a study that discusses the topic of scientific research collaboration analysis by lecturers using social network analysis (SNA) as a method of analysis. The results of collaborative scientific works published nationally and internationally by lecturers at a faculty "X" were carried out mapping based on the study program's attributes. Lecturer functional positions (JAFA) indicate a collaborative pattern between actors based on measurements in the form of a sociogram and in the way of sociometry in the analysis of each actor [11].

Research at the Open University in Kupang, where the topic focuses on student collaboration, aims to map each student's social interaction to provide motivation and encouragement in understanding lecture material [1]. The result is that students have social interaction at the Open University even though the value is small [1].

Research related to SNA was also carried out on multi-company objects that focused on the communication network's topic among employees using social network analysis (SNA) at PT. BFI Finance Tbk. Salatiga Branch. The results showed that there were 36 employees of PT. BFI Finance Tbk. Salatiga branch, either through formal communication or informal communication [12].

Based on the results of previous research used as references by the author about social network analysis (SNA) in an institution, the authors tried to link the use of social network analysis (SNA) in learning patterns on campus or college "XYZ," where the purpose of this study was to find a relationship. Student interaction in the knowledge sharing process in three different study programs, namely informatics engineering, accounting computerization, and graphic design.

INTENSIF, Vol.4 No.2 August 2020
**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

## II. RESEARCH METHOD

This research is descriptive quantitative analysis aims to analyze the mapping of knowledge sharing patterns, central actors, and the attributes that influence the learning process in an XYZ College. The data collected in this study used a questionnaire survey, which uses a sampling method based on the availability of elements and the ease of obtaining them. The technique in selecting respondents is done by using snowball sampling. This technique is known as the snowball technique, which takes the initial sample as information to mention the following sample data so that the number of samples is met. [13].

In the snowball sampling method, the first actor is asked about the relationship/relationship with other actors. The researcher tries to confirm to the actor who has been mentioned. If the statement is confirmed / there is a relationship with a value of one (1) and if there is no relationship is zero, it means that both actors must both know.

The components in SNA (social network analysis) are divided into three parts [1], namely the first group or group with a minimum number of 25 members, the second is interaction (interaction between several actors or individuals), and the third attribute (gender, age). , etc.). This study involved 100 respondents from XYZ College students from three study programs, with a composition of 51 people in the Computerized Accounting Study Program, 12 Graphic Design Study Programs, and 37 Informatics Engineering Study Programs. The next step is to tabulate the data from the questionnaire in the attribute matrix (gender and study program) and the relationship matrix (centrality) using Excel format, which is given a value of 0 if there is no relationship and is given a value of 1 if there is a relationship.

The results of data that have been tabulated in Excell have then transferred to UCINET 6 software to be analyzed [14]. The material in filling out the student collaboration questionnaire uses a two-part format: the first is a name generator. The second is named interpreter, where the first part mentions actors who have relational, and the second part validates the data cited by the initial respondent [12].

The overall process of the Knowledge Sharing process, which has a unique pattern at XZY Higher Education, can be shown in Figure 1, which looks for relationships between students as actors/individuals both in one study program and in different study programs and their alternative solutions. The mechanism for this research is described in the following steps:

A. Centrality Analysis

Data analysis using the Social Network Analysis (SNA) approach has a function to identify a pattern of social relationships between individuals/actors in a social network [16]. The measure of the proximity of one node to another in network analysis is centrality. Centrality in research

**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

is generally divided into three centralities, namely: Degree Centrality, Closeness centrality, Betweenness Centrality [14]. Density is a comprehensive description of the network (network) that better interprets network structure and network characteristics [14].

The formula for the density of one component "D" is the value of density (frequency), number 1 is the name of relations (links) that occur in a network, and component "N" is the number of individuals (actors) in the system [14]. The density value is in the range 0-1 with the greater the value, the higher the density value. The formula for density (D) is as follows:

$$D = \frac{l}{N(N-1)} \qquad (1)$$

Furthermore, Degree Centrality characterizes individuals who have the highest level of popularity with high indegree and outdegree value indicators [12]. The value of degree centrality is in the range of numbers 0 to 1. If there is a relationship between actors, it is worth one, and if there is no relationship, it is worth 0. The formula for degree centrality (Cd) is as follows:

$$C_d = \sum \frac{d_1}{N-1} \qquad (2)$$

Then look for Closeness Centrality, which shows an actor/individual who has the shortest relational relationship or who has the fastest path in disseminating information to other individuals in the population [14], [17], [18]. The formula for calculating closeness centrality (Cc) is as follows:

$$C_c = \frac{N-1}{\sum D_{ij}} \qquad (3)$$

The calculation of Betweenness Centrality shows the individual/actor who has the best ability in relational communication, making it possible to control information control [19]. Individuals/actors who have a high betweenness centrality value can connect with other actors in the population network. The formula betweenness centrality (Cb) is as follows:

$$C_b = \frac{\frac{g_{ij}{}^{P}{}_{k}}{g_{ij}}}{n^2-3n+2} \qquad (4)$$

B. Subgroup Analysis

In subgroup analysis, we look for modularity or clique (click) defined as an individuals collection (actors) by being grouped into a network by including all the relationships between individuals who interact with all members of their community [20], [21]. It functions so that social engineering can be carried out if a clique interferes with the knowledge sharing process on campus.

INTENSIF, Vol.4 No.2 August 2020
**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

C. Relations Between Actors

To describe a relational relationship between actors/students, a graph or network structure is needed to model individual object-relational relationships using the SNA method, which is symbolized by a collection of related nodes to form a sociogram[22]. A sociogram is a directed relationship with a symbol line (edge), which will help map the relationships between individuals in a community or organization [22]. The sociogram in this research topic has the function of being able to show the visualization of the relationship of actors in the network based on the points connected and arranged in a pattern.

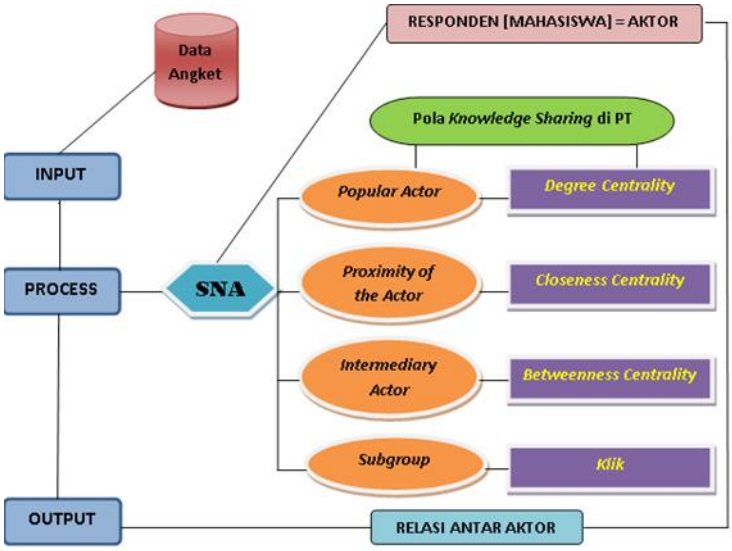



**Figure 1.** RESEARCH PROCESS FLOW

## III. RESULT AND DISCUSSION

A. Graph

The relationship pattern between the nodes (actors), which is based on the gender attribute and the study program of each individual, is described in tables 2 and 3 and Figure 2. The colors are differentiated based on the study program, where the blue color is for the informatics engineering study program, the green is the study program. Graphic design and red color accounting computerize study program. As for female gender, use a circle symbol, and the male gender uses a square logo.

**Table 1.** SYMBOL AND GENDER

| No | Gender Symbol | |
|---|---|---|
| 1 | Male | *Square* |
| 2 | Female | *Circle* |

INTENSIF, Vol.4 No.2 August 2020
**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

**Table 2.** STUDY PROGRAM, SYMBOLS, AND ACTOR ID

| Study Program | Color | Actor ID |
|---|---|---|
| TI | Blue | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95. 96, 97, 98, 99, 100 |
| KA | Red | 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61. 74, 75, 76, 77, 78, 79, 80, 81 |
| DG | Hijau | 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73 |

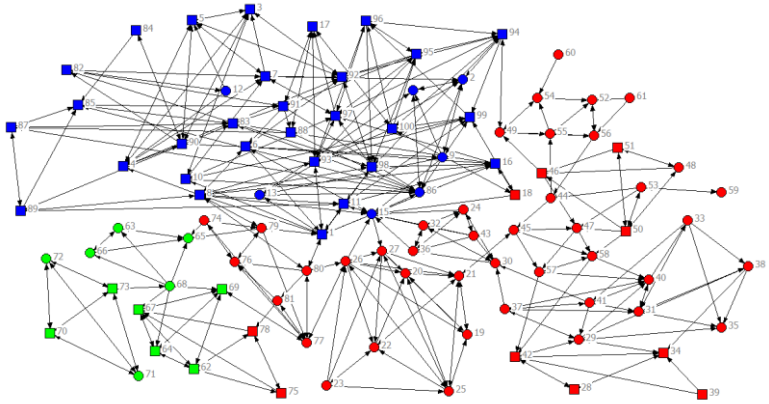
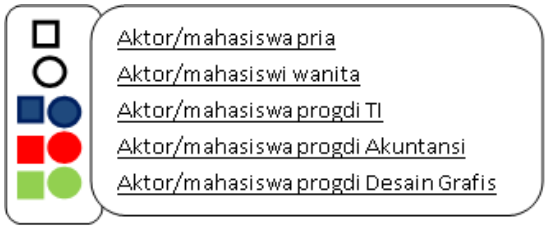


**Figure 2.** SOCIOGRAM

**Information:**




B. Density

The results of the calculations that have been processed with UCINET 6, attached to Table 4, show that 464 ties/relationships occur in the network. The average value in the network is 4.7%, which can be seen in table 4 below. It can be concluded that there is a possibility that the relationship between actors (students) is fragile because it is less than 50%. The weak network density in the results of this study can be overcome by various innovations carried out by XZY colleges, such as increasing the intensity of interaction between students through positive campus activities.

INTENSIF, Vol.4 No.2 August 2020
**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

The following is the calculation of density (equation formula 1):

$$D = \frac{l}{\mathrm{N(N-1)}} = \frac{461}{100(100-1)} = 0{,}0465$$

**Table 3.** DENSITY

| ***Density / Average Matrix Value*** | | |
|---|---|---|
| 1. *Density* | 2. *No. of ties* | 3. *Avg Degree* |
| 0,047 | 461 | 4,610 |

C. Degree Centrality

The value of degree centrality can be seen in table 5, where there are 100 people in the group network. There are only a few actors (individuals) who have a high (accessible) level of centrality. In table 5, actor Id 98 is a male actor from the informatics engineering (TI) program, has the highest centrality value with a value of thirty-two (32 times) to contact, and seven (7 times) to be contacted. It illustrates that actor Id 98 sends information to 32 people in the network and receives data from 7 other people in his group.

Degree Centrality can be a reference for lecturers for policymaking regarding the right individual. Students can occupy essential positions in UKM (student activity unit) or Department Student Association (HMJ) as well as consideration material to become a useful learning role model for fellow students so that the knowledge sharing process can run effectively and efficiently. They are mainly based on individuals with the highest degree of centrality (high level of preference).

**Table 4.** DEGREE CENTRALITY

| ***Freeman's Degree Centrality Measures*** | | | | |
|---|---|---|---|---|
| *ID* | *OutDegree* | *InDegree* | *NrmOutDeg* | *NrmInDeg* |
| 98 | 32.000 | 7.000 | 1.796 | 0.393 |
| 99 | 23.000 | 6.000 | 1.291 | 0.337 |
| 8 | 11.000 | 9.000 | 0.617 | 0.505 |
| 1 | 9.000 | 9.000 | 0.505 | 0.505 |
| 26 | 9.000 | 5.000 | 0.505 | 0.281 |

Degree centrality in Figure 3 shows the actor who has the highest level of popularity or liking (degree centrality) in the sociogram. The actor is given an orange sign on the sociogram with actors 98, 99, 8, and 1 (informatics engineering study program), and actor 26 (computerized program study of accounting) is the top 5 highest value of degree centrality. Several students of the automated accounting study program stated that 98 was a male actor

**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

who was considered a pleasant person and liked to help in all things, including sharing his Knowledge with his classmates.

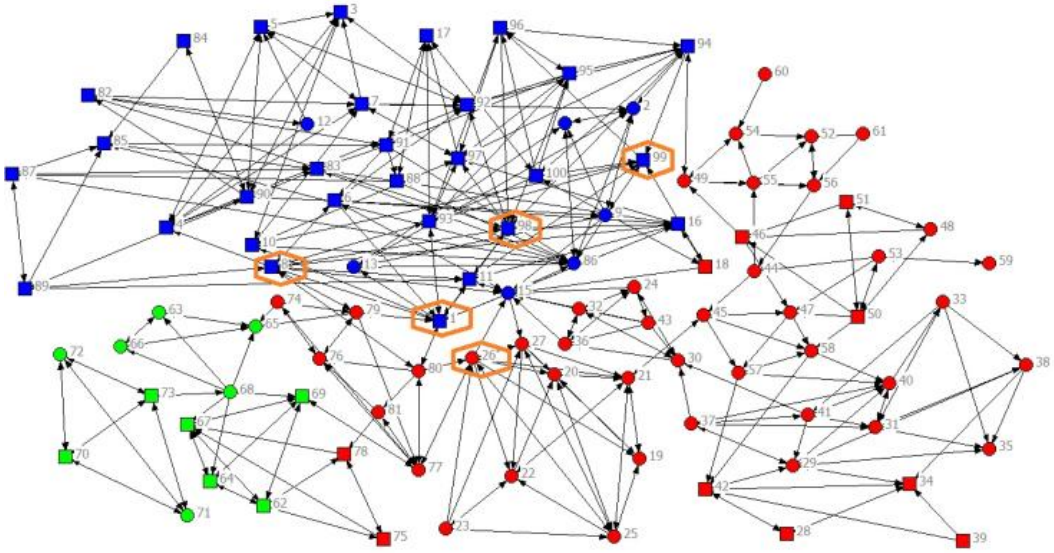


**Figure 3.** SOCIOGRAM DEGREE CENTRALITY

D. Closeness Centrality

The closeness centrality results are in table 6, where the closeness centrality value of several individuals/students is measured using two components: incloseness and outcloseness to show the closeness between individuals and their network groups. So based on the calculations in Table 6, it can be seen that actor 65 (graphic design study program) has the highest incloseness and outcloseness values. Actor 65 is one of the individuals who have a closeness to students from various study programs and becomes a collaborator. The relationship pattern, especially the Knowledge Sharing process between individuals, is only concentrated in the computerized accounting study program, namely actors 65, 63, 66, 15, and 1.

**Table 5.** CLOSENESS CENTRALITY

| ***Closeness Centrality*** | | |
|---|---|---|
| ID | *inCloseness* | *outCloseness* |
| 65 | 16.952 | 1.020 |
| 63 | 14.667 | 1.020 |
| 66 | 14.667 | 1.020 |
| 15 | 13.693 | 5.800 |
| 1 | 13.469 | 5.779 |

Closeness centrality in Figure 4 shows the actors who have the highest closeness to students (closeness centrality) in the sociogram. The actors are given an orange sign on the sociogram

INTENSIF, Vol.4 No.2 August 2020
**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

with actors 65, 63, and 66 (graphic design program), and actors 15 and 1 (program informatics techniques) are the top 5 values for closeness centrality. Meanwhile, the accounts of several actors stated that actor 65 was a female student who was known to be friendly, outgoing, and helpful by his friends

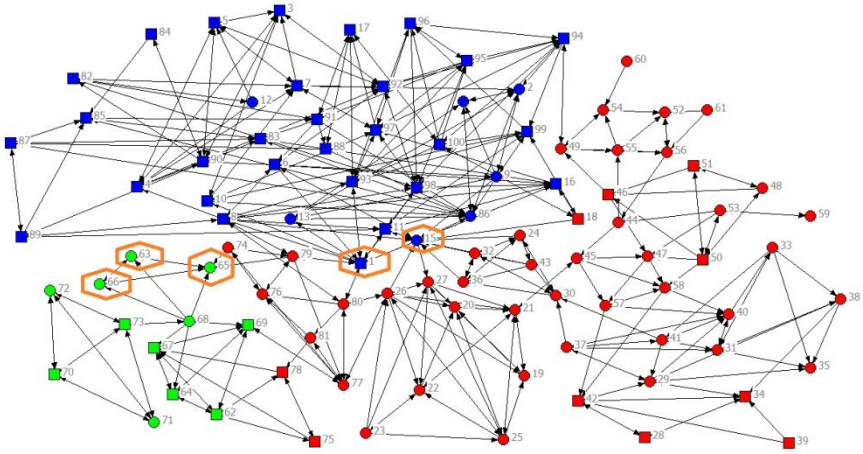


**Figure 4.** SOCIOGRAM CLOSENNESS CENTRALITY

E. Betweenness *Centrality*

Betweenness Centrality in table 7 is the result of calculating the value of betweenness centrality, where actor 15 with the gender of WOMEN (informatics engineering study program) has the highest nBetweenness value. It means that the actor (individual) has a favorite position in the network because many actors are interdependent. On them to create a network of friends with other individuals. In contrast, the second to fifth positions are occupied by actors 45, 21, 77, 26 (accounting computerized study program). Individuals with the highest betweenness centrality value involved all study programs but were dominated by students of accounting electronic study programs.

**Table 6.** BETWEENNNESS CENTRALITY

| ***Freeman Betweenness Centrality*** | | |
|---|---|---|
| ID | *Betweenness* | *nBetweenness* |
| 15 | 2750.148 | 28.346 |
| 45 | 1671.008 | 17.223 |
| 21 | 1635.484 | 16.857 |
| 77 | 1363.945 | 14.058 |
| 26 | 1319.546 | 13.601 |

The Sociogram Betweenness Centrality in Figure 5 shows the actor who is the favorite in completing or sharing Knowledge with other students with the highest betweenness centrality value on the sociogram. All actors 15, 45, 21, 77, and 26 are women who are marked with

**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

orange on the sociogram, where most of the computerized accounting study program and 15 female actors (informatics engineering study program) were in the top 5 of the highest scores betweenness centrality. Several students from the informatics engineering study program stated that the actor 15 was a person who was known to be friendly, outgoing, and helpful by his friends and was considered a role model and reference in the problems of lecture assignments. The purpose of the sociogram is to find out individuals/students who have good relations and can become a liaison in spreading knowledge sharing to other students so that the lecturers at the "XYZ" college can optimize the efficiency of learning courses.

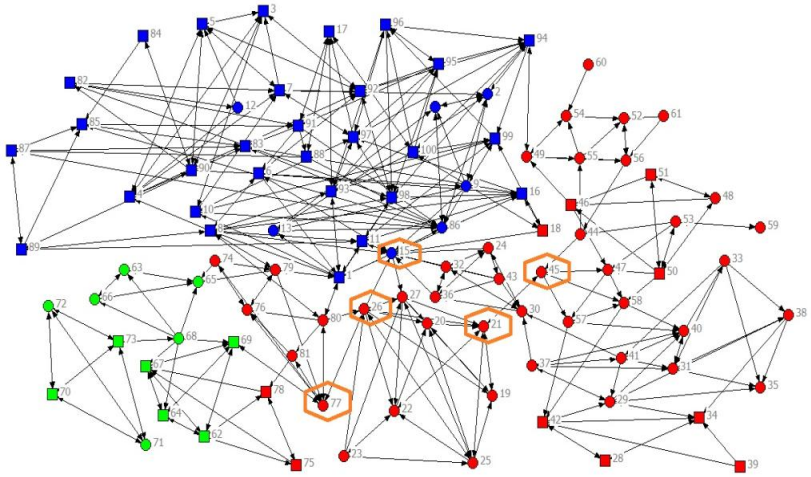


**Figure 5.** SOCIOGRAM BETWEENNESS CENTRALITY

F. Modularity/Clique

The questionnaire results can be generated up to 2 clicks with a minimum limit of 6 the number of members, as shown in table 8, which shows where clicks only accommodate four relationships between actors out of a total of 100 actors in the network structure. In the click pattern, all actors are dominated by computerized accounting students, namely two clicks. The existence of modularity/click in the organization has both positive and negative impacts. Klik has a positive effect if the relationship does not have a conflict of interest and can increase collaboration and Knowledge sharing patterns effectively between students within the study program. Meanwhile, clicks have a negative impact if they are seen as only a collection of individual members who only create a subgroup that is destructive in nature and resistance to constructive organizational change.

**Tabel 7**. KLIK

| | ***Sub group Actor*** |
|---|---|
| I | 19, 20, 21, 25, 26, 27 |
| II | 20, 21, 22, 25, 26, 27 |

INTENSIF, Vol.4 No.2 August 2020
**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

## IV. CONCLUSION

Testing when mapping the Knowledge Sharing process of XYZ College students, which is applied to three study programs (IT, KA, and DG) using the SNA method, shows fragile results with a density value of 4.7% (less than 50%). Actors with a degree of centrality (often contacted) are 98 male actors (graphic design study program). Meanwhile, actors (nodes) who have the value of closeness centrality (can reach jointly) are 65 female actors (graphic design study program), and 15 female actors (informatics engineering study program) who have the highest betweenness centrality (good liaison) value. In the case of grouping actors (clicks) using a minimum limit of 6 members and two clicks are obtained. Interaction of relationships in students of the IT, KA, and DG study programs is grouped in their respective study programs. At the same time, only a few actors interact, not according to their study program.

Researchers hope that this study's results can be investigated further to analyze a broader pattern of interaction relationships. This study aims to identify actors/students who have good relational relationships as a liaison in spreading knowledge sharing, especially regarding lecture materials and other campus academic activities. One of the breakthroughs that can be made by XYZ Higher Education is through regular informal meetings, including outbound activities to strengthen relationships between students and make positive activities in student interactions between study programs. It is hoped that with the Knowledge Sharing process between students, they can complete joint assignments, both academic (lecture, practical, experimental, etc.) and non-academic (student activity units, discussion of interests/hobbies, etc.).

## REFERENCES

[1] B. E. Giri, D. Manongga, and A. Iriani, "Using Social Networking Analysis (SNA) to Analyze Collaboration between Students (Case Study: Students of Open University in Kupang)," Int. J. Comput. Appl., vol. 85, no. No. 1, pp. 44–49, 2014.

[2] D. R. Anggraeni and H. Aulawi, "Pengaruh Knowledge Sharing Pada Organisasi Kemahasiswaan Dalam Meningkatkan Kemampuan Menyerap Pengetahuan Mahasiswa," J. Kalibr., vol. 16, no. 1, pp. 6–12, 2018.

[3] Y. L. Bavik, P. M. Tang, R. Shao, and L. W. Lam, "Ethical leadership and employee knowledge sharing: Exploring dual-mediation paths," Leadersh. Q., vol. 29, no. 2, pp. 322–332, 2018.

[4] S. A. Salloum, M. Al-Emran, and K. Shaalan, "The impact of knowledge sharing on information systems: A review," in Communications in Computer and Information Science, 2018, vol. 877, pp. 94–106.

[5] R. S. Andra and H. N. Utami, "Pengaruh Knowledge Sharing Terhadap Kinerja Kaeryawan ( Studi pada Karyawan PT Bank Rakyat Indonesia Kantor Cabang Malang Kawi )," J. Adm. Bisnis, vol. 61, no. 2, pp. 30–37, 2018.

[6] J. V. Manopo, "Peran Komunikasi Organisasi Dalam Membentuk Efektivitas Kerja Karyawan CV Magnum Sign and Print Advertising Samarinda," eJournal lmu Komun., vol. 2, no. 3, pp. 357–372, 2014.

**ISSN: 2580-409X (Print) / 2549-6824 (Online)**
**DOI:** https://doi.org/10.29407/intensif.v4i2.14460

[7] A. P. Wardhani, H. Leonardo Budi, and M. Maria Magdalena, "Pengaruh Lingkungan Kerja, Komunikasi dan Kepemimpinan Terhadap Kinerja Pegawai," J. Manage., vol. 2, no. 1, pp. 344–354, 2016.
[8] M. Pengestu, "Jaringan Komunikasi di The Piano Institute Surabaya," E- Komunikasi, Univ. Kristen Petra Surabaya, vol. 3, pp. 1–12, 2015.
[9] Y. Wu and Z. Duan, "Social network analysis of international scientific collaboration on psychiatry research," Int. J. Ment. Health Syst., vol. 9, no. 1, 2015.
[10] A. Syarifudin et al., "PEMETAAN REKANAN PADA JARINGAN SISTEM PENGADAAN SECARA ELEKTRONIK ( SPSE ) DENGAN SOCIAL NETWORK ANALYSIS ( SNA )," in Seminar Nasional Informatika 2018, 2018, pp. 43–50.
[11] H. Tuhuteru and A. Iriani, "Analisis Kolaborasi Penelitian Ilmiah Dosen Fakultas X dengan Social Network Analysis (SNA) Jurnal Teknik Informatika dan Sistem Informasi," J. Tek. Inform. dan Sist. Inf., vol. 4, no. No. 1, pp. 149–158, 2017.
[12] E. Zusrony, H. D. Purnomo, S. Yulianto, and J. Prasetyo, "Analisis Pemetaan Jaringan Komunikasi Karyawan Menggunakan Social Network Analysis Pada Perusahaan Multifinance," INTENSIF J. Ilm. Penelit. dan Penerapan Teknol. Sist. Inf., vol. 3, no. 2, pp. 145–158, 2019.
[13] I. Etikan, "Comparision of Snowball Sampling and Sequential Sampling Technique," Biometrics Biostat. Int. J., vol. 3, no. 1, 2017.
[14] Eriyanto, Analisis Jaringan Komunikasi, Edisi 1. Jakarta: Kencana, 2014.
[15] A. Latupeirissa, E. Sediyono, and A. Iriani, "Pemanfaatan Social Network Analysis Untuk Menganalisis Kolaborasi Komunikasi Pada Balai Perikanan Budidaya Laut Ambon," J. Sist. Inf. Bisnis, vol. 2, pp. 121–132, 2019.
[16] A. Iriani and S. H. Priyanto, "Modeling Of Employee Relationships In Sme Batik: Case Study Of Windasari Batik," Asian J. Manag. Sci. Educ., vol. 2, no. 4, pp. 22–35, 2013.
[17] T. W. Valente, Social Networks and Health: Models, Methods, and Applications. 2010.
[18] C. Prell, "Becoming Familiar with Social Networks," in Social Network Analysis: History, Theory, and Methodology, 2012, pp. 7–18.
[19] M. T. Anwar, A. Iriani, and D. H. F. Manongga, "Analisis Pola Persebaran Pornografi pada Media Sosial dengan Social Network Analysis," Buana Inform., vol. 9, no. 1, pp. 43–52, 2018.
[20] S. P. Borgatti, M. G. Everett, and J. C. Johnson, "10 Centrality BT - Analyzing Social Networks," in Analyzing Social Networks, 2013, p. 304.
[21] S. P. Borgatti, M. G. Everett, and J. C. Johnson, Analyzing Social Networks, 2nd Editio. London: SAGE Publication Ltd, 2018.
[22] F. N. Maulidya, W. Witanti, and A. I. Hadiana, "Pembangunan Sistem Informasi Pola Hubungan Kerja Antar Tenaga Medis Pada Rumah Sakit Jiwa Provinsi XYZ Menggunakan Social Network Analysis," in Prosiding Seminar Nasional Sains dan Teknologi ke-9, 2018, pp. 214–219.