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# ANALYSIS OF BUSINESS PARTNERSHIP NETWORK MAPPING: A CASE STUDY OF THE INOVAC COOPERATIVE IN BANDA ACEH CITY

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**_ABSTRACT_**

*Inovac Cooperative is a business entity engaged in expanding and marketing innovative products. Inovac has cooperative relationships with various parties. Obtaining communication interactions and having reliable service is essential to the success of the cooperative. This study aims to determine the pattern and network map between partners that have the most role in the sustainability of the Inovac cooperation. The analysis method used is Social Network Analysis (SNA). This research was conducted from February to April 2022. The results show that the network density in the cooperative relationship is 58%, where the network density can be categorized as quite strong. In addition, three (3) forms of cooperation network patterns and maps were obtained using Ucinet/Netdraw software: Degrer Centrality, Betweenness Centrality, and Closeness Centrality. The most dominant actors are ARC, UD. Ivone, BI, Diskop, Disperindag, Bappeda, and Patchouli Farmers. The results obtained can be used as a benchmark for Inovac cooperatives in continuing new collaborations with various partners.*

***Keywords:*** *Social Network Analysis, Partnership, Cooperation Network, Ucinet/NetDraw*

**ABSTRAK**

Koperasi Inovac merupakan badan usaha yang bergerak di bidang perluasan dan pemasaran produk inovatif. Inovac menjalin hubungan kerjasama dengan berbagai pihak. Memperoleh interaksi komunikasi dan memiliki layanan yang handal merupakan hal yang sangat penting bagi keberhasilan koperasi. Penelitian ini bertujuan untuk mengetahui pola dan peta jaringan antar mitra yang paling berperan dalam keberlangsungan kerjasama Inovac. Metode analisis yang digunakan adalah Social Network Analysis (SNA). Penelitian ini dilakukan pada bulan Februari sampai dengan April 2022. Hasil penelitian menunjukkan bahwa densitas jaringan pada hubungan kerjasama sebesar 58%, dimana densitas jaringan tersebut dapat dikategorikan cukup kuat. Selain itu diperoleh tiga (3) bentuk pola dan peta jaringan kerjasama dengan menggunakan software Ucinet/Netdraw yaitu Degrer Centrality, Betweenness Centrality, dan Closeness Centrality. Aktor yang paling dominan adalah ARC, UD. Ivone, BI, Diskop, Disperindag, Bappeda, dan Petani Nilam. Hasil yang diperoleh dapat dijadikan sebagai tolok ukur bagi koperasi Inovac dalam melanjutkan kerjasama baru dengan berbagai mitra.

***Kata Kunci***: Analisis Jaringan Sosial, Kemitraan, Jaringan Kerjasama, Ucinet/NetDraw.

## INTRODUCTION

Inovac is a business entity engaged in the expansion and marketing of the manufacture of patchouli oil derivative products and the only cooperative that accommodates community patchouli oil with a minimum price of Rp. 500/kg. Since its establishment at the end of 2017, the Inovac Cooperative has collaborated with farmers and middlemen from various parts of Aceh to purchase patchouli oil. Cooperation and partnerships continue with other commercial institutions inside and outside Aceh for large-scale sales of patchouli oil.

In 2020, Inovac signed an MoU with the Chancellor of Syiah Kuala University to develop various essential products with the Business Board of Syiah Kuala University and ARC-PUIPT Nilam Aceh. In addition to buying and selling patchouli oil, the Inovac Cooperative also sells patchouli oil derivative products in the form of perfume, dish soap, hand sanitizer, aromatherapy wind oil, body butter, beauty serum, and several types of pure essential oil. Sales are made through offline stores, online platforms, resellers, and distributors. However, until now, Inovac has not been able to correctly identify stakeholders/partners who have the most crucial role in the sustainability of cooperative cooperation and have a solid cooperative network relationship. Therefore, an analysis is needed to map the network that plays a role in the sustainability of Inovac's cooperative cooperation (Torang, 2012).

Social Network Analysis (SNA) is the method used in this research to map the network that plays a role in increasing the network of cooperation between partners. SNA focuses on the structure of society, organizations, communities, markets, people, or systems that exist in the world. In this study, SNA requires tools in the form of software or applications that are used to measure the amount of value held by stakeholders (Altuntas & Gok, 2020). UCINET/NetDraw is software used to analyze the network. This network will be determined by the degree of centrality or the level of popularity of actors, which describes the level of relations between actors with one another, betweenness centrality, which describes the intermediary between actors and other individuals and closeness centrality, which describes the closest reach between actors (Rakhmawati et al., 2020).

## MATERIAL AND METHODS

### *Study Area*

This study was carried out at the Inovac Cooperative, Banda Aceh City. This study was conducted in February-April 2022. This location was chosen deliberately with the following criteria: (i) the cooperative is the only largest cooperative engaged in patchouli oil processing in the city of Banda Aceh; (ii) Inovac cooperatives have cooperation or MOU agreements with many parties/partners.

The object of this research is the interaction of the partnership network relationship with the Inovac cooperative. The scope of this research is limited to the pattern and map of the Cooperation network that has the most role in the sustainability of the Inovac cooperative cooperation.

The type of data used in this study is primary data. Primary data was obtained from observation and structured interviews using a questionnaire. Where at this stage, the researcher designed several questions for Inovac. Then the results of the questionnaire are tabulated into a relationship matrix and an attribute matrix in Microsoft Excel format, provided that if there is no relationship, it is given a value of 0 (zero) and if there is a relationship, it is given a value of 1 (one).

***Method Analysis***

This study was conducted using the Social Network Analysis (SNA) method, which consists of several types of measurements that will be used to describe the network between partners who play the most role in the sustainability of the Inovac cooperative partnership. The first step in data analysis is that researchers make observations on cooperatives. The dataset contains data on interactions carried out by 19 internal and external agencies. The tabulated data into Microsoft excel is then exported into the UCINET/NetDraw application for further analysis. There are several steps involved in this analysis, including:

***Network Density***

Network Density (Density) is one of the parameters used to measure the network structure and characteristics by comparing the number of links available in the network with the number of links that appear.

Density aims to obtain information about the number of relationships or relationships received by each actor and determine which actor is the most influential (Yusnidar et al., 2021). Density has a value between 0 to 1, which indicates that all actors interact with each other. The density value is strong enough if the network's relationship between one actor and another actor is more than 50%.

***Measurement of Centrality***

Degree Centrality. This degree shows the actor's popularity on the social network. Level (degree) is the number of links (relationships between actors) from and to actors (individuals) (Giri et al., 2014). This measure shows the position of individuals in the network, where the network indicates the direction of actors who are often contacted (indegree) or contacted (outdegree).

Betweenness Centrality. Shows the position of actors as intermediaries (betweenness) of the relationship between actors (individuals) with other actors (individuals). Actors with the highest betweenness centrality are those with good liaison abilities between actors in a network and have control over the manipulation of information. The purpose of betweenness is to determine the actor who facilitates information (facilitator) to other actors. An actor who has a betweenness value above 0 (zero), then the actor has the opportunity to have good relations with other actors.

Closeness Centrality. Proximity centrality describes calculating the shortest path lengths from one actor to another. The closeness centrality is measured by looking at the number of paths an actor has either contacted or contacted by other actors in the network. These actors can disseminate information faster and have fewer intermediaries. The higher the closeness centrality value, the closer the average actor is to all other actors.

## RESULTS AND DISCUSSION

***Network density***

Popularity centrality is a measurement taken to map the popularity of actors in a relationship. The degree centrality value shows the actors' position in the network, where there are two popular actor values, namely (indegree) often contacted and (outdegree) contacting (da Silveira

Batista et al., 2018). This centralization describes the average centrality level of all nodes in a network. When the network has a high centralization value closer to 1, it indicates that several central participants dominate the information flow in the network. Networks with low centralization measurements closer to 0 are considered decentralized, where information flows more freely between multiple actors (Nurrokhman et al., 2020).

Based on table 1, information is obtained that there are 224 relationships formed in the network, with an average relationship that occurs at 11.2%. The results of calculations using UCINET 6 for descriptive statistics show that the average density in the network is 58%, which means that the network density is more than 50%. It can be concluded that the network density between partners is included in the strong category.

In addition, the data has a standard deviation value of 0.4919 below the number 1 or 1, which indicates that the data is in the correct category. The following is a measurement of the density value using the UCINET application:

Table 1 Density Value Measurement using the UCINET application.

| Total value | Density | No. of Ties | Avg Degree |
|---|---|---|---|
| | 0.5895 | 244 | 11.2000 |
| Standard deviation 0.4919 | | | |

*Degree centrality*

The degree of centrality value can be seen in table 2, where 19 partners collaborate with Inovac cooperatives. There are four categories of assessment in measuring degree centrality, namely OutDegree (contacting), InDegree (contacting), NrmOutDeg (Normality contacting), and NrmInDeg (Normality being contacted). Normality is an assessment used to see whether or not the spread of data is contained in a standard network. The measurement results were obtained using the UCINET application using two (2) measurement formulas (n-1)/indegree*100 and (n-1)/outdegree*100. The following is the result of the calculation of degree centrality (Centrality of Popularity):

Table 2 Measurement of Degree Centrality using the UCINET application

| ID | Partner Name | OutDegree | InDegree | NrmOutDeg | NrmInDeg |
|---|---|---|---|---|---|
| 14 | Inovac | 18.000 | 19,000 | 94.737 | 100,000 |
| 1 | ARC | 18.000 | 18.000 | 94.737 | 94.737 |
| 9 | UD. Ivone | 16,000 | 13,000 | 84.211 | 68.421 |
| 4 | Bank Indonesia | 15,000 | 15,000 | 78,947 | 78,947 |
| 7 | disco | 15,000 | 14,000 | 78,947 | 73.684 |
| 8 | Disperindag | 14,000 | 13,000 | 73.684 | 68.421 |
| 5 | Bappeda | 14,000 | 14,000 | 73.684 | 73.684 |
| 19 | Patchouli Farmer | 13,000 | 13,000 | 68.421 | 68.421 |
| 2 | Atsirina | 12,000 | 10,000 | 63.158 | 52,632 |
| 11 | Quinine | 11,000 | 12,000 | 57,895 | 63.158 |
| 12 | Kinas | 11,000 | 11,000 | 57,895 | 57,895 |
| 17 | Ramu | 11,000 | 10,000 | 57,895 | 52,632 |
| 13 | Consumer | 10,000 | 10,000 | 52,632 | 52,632 |
| 15 | Mangat Bee | 9,000 | 10,000 | 47,368 | 52,632 |
| 20 | Sumitro | 8,000 | 8,000 | 42.105 | 42.105 |
| 10 | Geunara | 7,000 | 7,000 | 36,842 | 36,842 |
| 6 | Mr | 6,000 | 8,000 | 31,579 | 42.105 |
| 16 | Member | 6,000 | 7,000 | 31,579 | 36,842 |

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| ID | Partner Name | OutDegree | InDegree | NrmOutDeg | NrmInDeg |
|---|---|---|---|---|---|
| 3 | Agent | 5,000 | 5,000 | 26,316 | 26,316 |
| 18 | Resellers | 5,000 | 7,000 | 26,316 | 36,842 |

In table 2, the actors/partners with the highest centrality values are ARC, UD. Ivone, Bank Indonesia and Diskop, where the actor has a broad scope with other actors. The three actors have a high level of centrality which illustrates that actors have reciprocal relationships between all actors in the network, both OutDegree (contacting) and InDegree (contacted). The centrality obtained by ARC has a normality value of 94%, where this value describes the information spread in the network very well. This result shows that the four actors often disseminate information or collaborate with various other actors. The following is a form of sociogram degree centrality obtained using the NetDraw application.

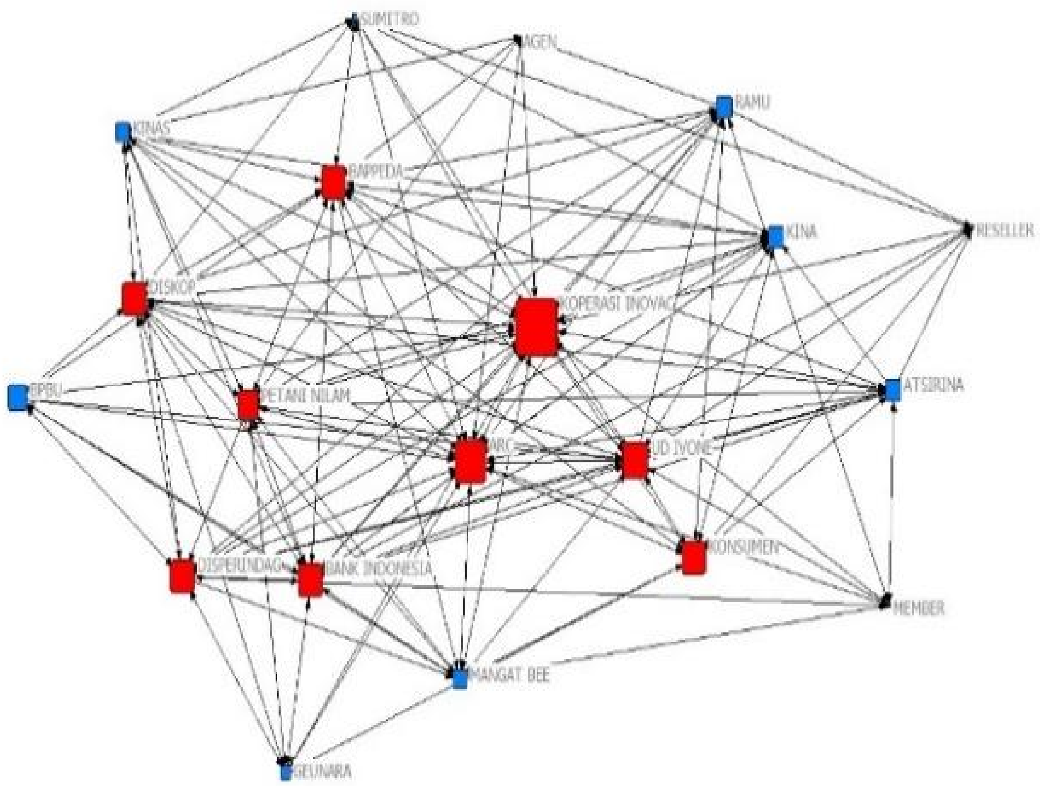


Figure 1. Sociogram Degree Centrality

Based on the Sociogram Degree Centrality image, eight actors have a large square shape. This indicates that the eight actors have the highest scores compared to other actors. From this measurement, it can be concluded that the bigger the square shape, the more significant the role played by the actor. The smaller the resulting square shape, the less interaction is carried out by the actor.

***Betweenness Centrality***

Table 3 shows the calculation results of intermediate centrality (betweenness centrality) consisting of several actors. Where ARC has the highest betweenness and betweenness values, these figures show that these actors have the most prominent role in

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the network, as several other actors depend on them to unite relationships with other actors/individuals. In addition, three actors have the highest score after ARC, namely UD. Ivone, BI, and DISKOP. These four actors have several alternative shortest paths to reach other actors in providing or receiving information. The following is a table for calculating betweenness centrality using the UCINET application:

Table 3 The results of the betweenness calculation using the UCINET application

| ID | Partner Name | betweenness | nBetweenness |
|---|---|---|---|
| 14 | Inovac | 32.831 | 9,600 |
| 1 | ARC | 25,437 | 7.438 |
| 9 | UD. Ivone | 13,525 | 3.955 |
| 4 | BI | 13.022 | 3.808 |
| 7 | disco | 10,141 | 2,965 |
| 19 | Patchouli Farmer | 8,934 | 2,612 |
| 5 | Bappeda | 8,794 | 2,571 |
| 8 | Disperindag | 7.905 | 2,312 |
| 13 | Consumer | 7.108 | 2,078 |
| 17 | Ramu | 5,929 | 1,734 |
| 12 | Kinas | 5,610 | 1.640 |
| 2 | Atsirina | 4,573 | 1.337 |
| 15 | Mangat Bee | 3.172 | 0.927 |
| 11 | Quinine | 3.036 | 0.888 |
| 20 | Sumitro | 2,364 | 0.691 |
| 18 | Resellers | 1.314 | 0.384 |
| 10 | Geunara | 1.047 | 0.306 |
| 16 | Member | 0.860 | 0.252 |
| 6 | Mr | 0.286 | 0.084 |
| 3 | Agent | 0.111 | 0.032 |

Based on table 3, it can be seen that ARC is an actor that has a significant role for Inovac. The table above shows that ARC is an actor that has an intermediary role between Inovac and other actors. ARC can connect Inovac with other actors, as well as between actors. The information spread by ARC is speedy, as seen in the sociogram form produced by the NetDraw software in Figure 3, which produces many network lines. In addition, these four actors have similar values, such as the calculation of degree centrality, which is included in the actor who has the highest value in cooperative network relationships. However, it is different with actors who have values after them.

In this measurement, patchouli farmers are included in the category that has a role as an intermediary. It can happen because the commodities managed by Inovac come from farmers. Farmers get buyers/buyers through inovac and vice versa. Inovac bridges farmers to various parties such as Bappeda, Disco, and other actors/partners to interact with each other and conduct business communication. So it can be concluded that the measurement of betweenness centrality differs from degree centrality. The actor who has the highest score on the degree of centrality does not necessarily have the same value on the measurement of betweenness centrality. It is because only certain actors who have a role as intermediaries or trust actors will be involved in this measurement.

It can be seen through the sociogram image (Figure 2) that there

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are two color categories, namely red and blue. An actor with red color is included in the category with the highest betweenness value, while the blue color follows the value of the actor after it. In this position, the larger the square shape, the more role the actor plays and if the more minor the square shape, the actor does not have a role as an intermediary between one actor and another.

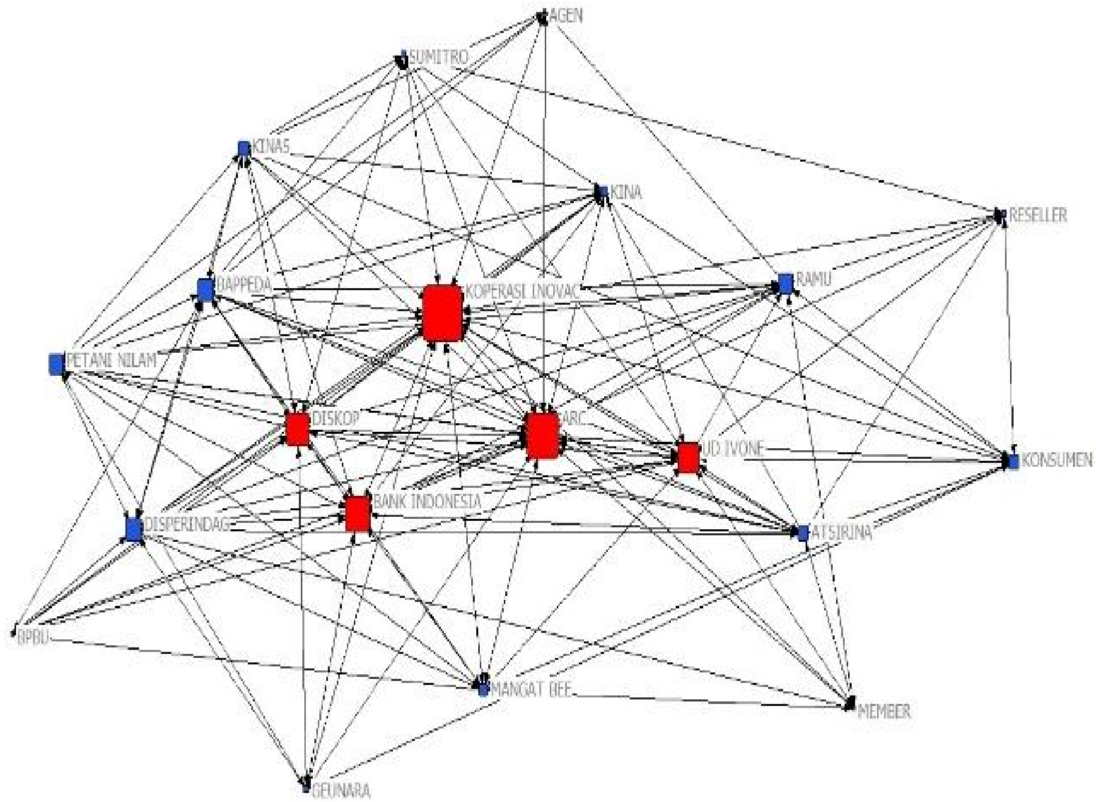


Figure 2. Sociogram Betweenness Centrality

***Proximity Centrality***

Measurement proximity, commonly known as closeness centrality, differs from density centrality (degree centrality) (Manik et al., 2017). The measurement of degree centrality only takes into account the number of direct interactions that are owned by an actor or individual. Meanwhile, closeness centrality considers the distance between one actor and all actors in a network. The closer the distance, the smaller the size of the resulting symbol. Based on calculations using the UCINET application, two (2) categories of values are generated, namely incloseness and outcloseness. This value indicates the proximity of one actor to another actor on the network. Incloseness shows how close the actor is to individuals in the network, while outcloseness shows how close the individual is to other actors in the network. If the difference between the incloseness and outcloseness values indicates that there are several networks that are not symmetrical, it does not mean that the network is weak. Explained that there was a considerable difference between the value of Incloseness centrality and the value of Outcloseness centrality, where the value of Incloseness centrality amounted to 66.20% while Outcloseness centrality amounted to 22.28% (Latupeirissa et al., 2019).

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These results indicate unequal distance differences between one actor and another and between other actors and certain actors in the network (Gronow et al. , 2021). The following is a table of the results of the closeness centrality calculation:

Table 4 Closeness Centrality calculation results using the UCINET application

| ID | Partner Name | *inCloseness* | *outCloseness* |
|---|---|---|---|
| 14 | Inovac | 100,000 | 95,000 |
| 1 | ARC | 95,000 | 95,000 |
| 4 | BI | 82.609 | 82.609 |
| 7 | Diskop | 79.167 | 82.609 |
| 5 | Bappeda | 79.167 | 79.167 |
| 9 | UD. Ivone | 76,000 | 86,364 |
| 8 | Disperindag | 76,000 | 79.167 |
| 19 | Patchouli Farmer | 76,000 | 76,000 |
| 11 | Quinine | 73.077 | 70,370 |
| 12 | Kinas | 70,370 | 70,370 |
| 13 | Consumer | 67,857 | 67,857 |
| 15 | Mangat Bee | 67,857 | 65.517 |
| 17 | Ramu | 67,857 | 70,370 |
| 2 | Atsirina | 67,857 | 73.077 |
| 6 | Mr | 63.333 | 59,375 |
| 20 | Sumitro | 63.333 | 63.333 |
| 16 | Member | 61.290 | 59,375 |
| 10 | Geunara | 61.290 | 61.290 |
| 18 | Resellers | 61.290 | 57,576 |
| 3 | Agent | 57,576 | 57,576 |

Based on the calculations in table 4, it can be seen that there are seven (7) actors who have the highest closeness value after Inovac, namely ARC, BI, Diskop, Bappeda, UD. Ivone, Disperindag, and Patchouli Farmers. The network between one actor and another is quite strong and highly valued. The position of closeness centrality in the network shows that the two actors have high-speed interactions with many actors. ARC has much information, so it is always the most prominent actor in a network. These actors have a vital role in the cooperative relationship that has been formed by Inovac. And is a liaison between partners who cooperate.

In addition, BI is an actor whose role is to facilitate information related to sales domestically and abroad, assist in getting buyers/buyers, and carry out an intense communication process. Diskop is engaged in facilitating MSME business assistance and providing socialization related to financing innovative products made from patchouli raw. The results of these calculations are then exported into NetDraw to describe the form of network relationships that occur within. The following is a form of Closeness centrality sociogram obtained using the NetDraw software:

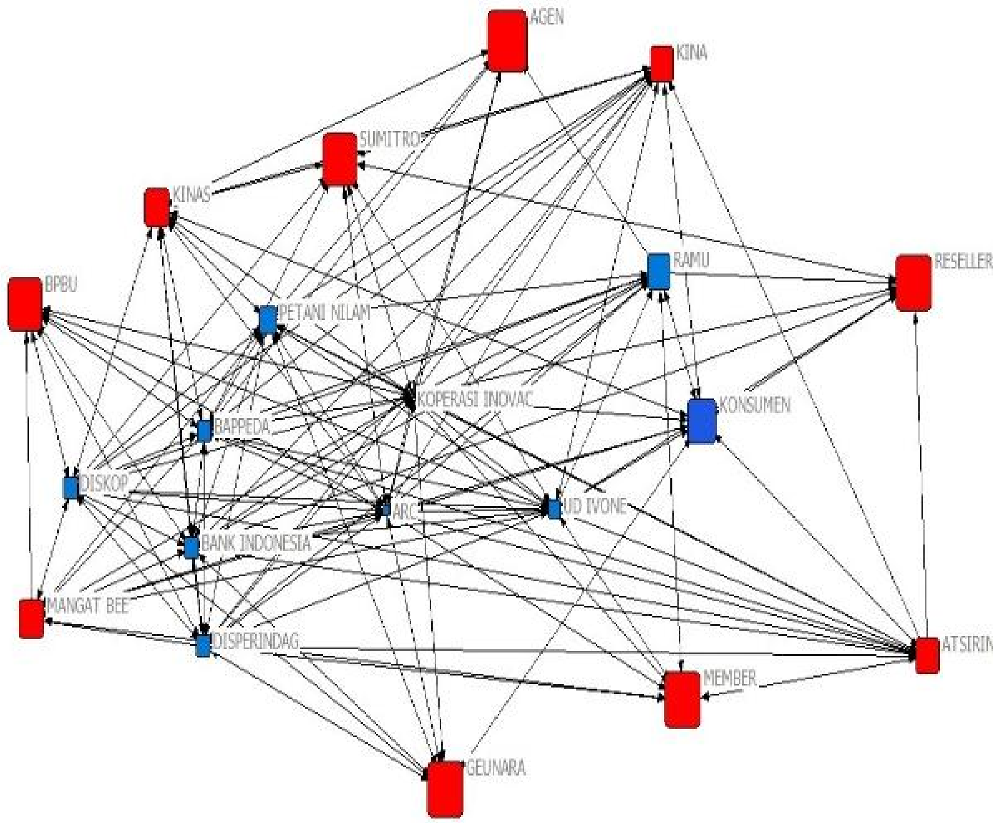


Figure 3. Sociogram Closeness Centrality

The seven actors with the highest scores have a significant role to Inovac and other partners working together. These actors can disseminate information faster because they have fewer intermediaries. Based on the shape of the network pattern generated by the NetDraw software, it can be seen that the seven actors have very many relationship lines. The smaller the resulting square shape, the more networks that connect each other. The larger the square shape, the less influential the actor in the network (Nguyen Long L & Krause, 2021). In Figure 3, it can be seen the difference in color and size of the square. Actors with small squares are marked in blue, while actors with large squares are marked in red.

## COCLUSIONS

Based on the results of research and discussion, it is concluded that the density of the cooperation network carried out by the Inovac cooperative with several partners illustrates that both parties often interact, both just communication and business interactions. Not only the relationship between cooperatives and partners but also between partners often carry out these interactions. So, the network relationship that occurs is quite strong. There are three (3) forms of cooperation network patterns and maps obtained using UCINET/Netdraw software that contribute to the sustainability of Inovac cooperatives, namely popularity centrality, intermediary centrality, and proximity centrality. The three forms of network maps explain the role of several actors in the Inovac cooperative. Actors who have a role as the centrality of popularity are: ARC, UD. Ivone, BI, Diskop, Disperindag, Bappeda, and Patchouli Farmers. Actors who have a role as an intermediary centrality are: ARC, UD. Ivone, BI, Diskop and Patchouli Farmers. Meanwhile, the actors who act as the centrality of proximity are: ARC, BI, Diskop, Bappeda, UD. Ivone, Disperindag, and Patchouli Farmers. The results obtained can be a benchmark for Inovac cooperatives to continue collaborating again with partners.

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