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An Analysis of the Agribusiness Communication Structure of Dairy Cattle Farmers: the Case Study of The Tegal Mandiri Farmer Group

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Abstract. Problems in dairy cattle agribusiness require attention not only from the farmers themselves but also from farmer organizations. To understand the communication patterns among group members in the agribusiness sector, including the exchange of information related to cattle production, animal health, and wholesale prices, it is essential to analyze the communication network of the dairy cattle farmer group. This network is significant because it serves as the hub of organizational communication, both internally and externally. This research seeks to analyze the communication structure of the dairy cattle farmer group and investigate the relationship between the respondent characteristics and the communication networks within the Tegal Mandiri farmer group in Bogor Regency. The Social Network Analysis (SNA) method and a quantitative approach were used to conduct the research, with the Tegal Mandiri farmer group members in Bogor Regency as the unit of analysis. The group communication structure was analyzed using degree and closeness centrality, and the relationship between respondent characteristics and the communication network was analyzed using Spearman rank correlation. IBM SPSS Statistics 26 and UCINET 6 were the tools used for analysis. The study revealed that 1) the average degree centrality of the group was between 1.00 and 2.20, and the average closeness centrality was between 400.00 and 558.10. 2) The respondents' characteristics of farmers were significantly related to the communication networks within the group. The study found that the communication structure of the Tegal Mandiri farmer group exhibited low connectivity and an ineffective coordination forum.

Keywords: agribusiness communication, centrality, dairy cattle information, group, SNA

Abstrak. Permasalahan dalam agribisnis sapi perah memerlukan penanganan tidak hanya oleh peternak sendiri, namun yang terpenting adalah oleh organisasinya. Untuk melihat perilaku komunikasi antar anggota kelompok dalam menerima, memberikan, dan menyebarkan informasi dalam bidang agribisnis, antara lain informasi produksi ternak, kesehatan hewan, dan harga susu, maka perlu dilakukan analisis jaringan komunikasi kelompok peternak sapi perah. Jaringan komunikasi kelompok ternak ini penting karena merupakan pusat komunikasi organisasi baik internal maupun eksternal. Penelitian ini bertujuan untuk menganalisis struktur komunikasi kelompok peternak sapi perah dan menganalisis hubungan antar karakteristik peternak dengan jaringan komunikasi pada kelompok peternak Tegal Mandiri Kabupaten Bogor. Penelitian statistik deskriptif dan inferensial dengan pendekatan kuantitatif dan metode SNA. Unit analisis dalam penelitian ini adalah anggota kelompok tani Tegal Mandiri. Struktur komunikasi kelompok dianalisis dengan menggunakan sentralitas *degree* dan *closeness* dan hubungan antara karakteristik responden dan jaringan komunikasi dianalisis dengan menggunakan korelasi *rank Spearman*. IBM SPSS Statistics 26 dan UCINET 6 digunakan sebagai alat analisis. Hasil penelitian menunjukkan bahwa: 1) nilai rata-rata derajat sentralitas kelompok menunjukkan nilai 1,00 – 2,20 dan nilai rata-rata sentralitas keeratan kelompok menunjukkan nilai 400,00 – 558,10. 2) Karakteristik individu petani berhubungan signifikan dengan jaringan komunikasi kelompok. Kinerja berdasarkan struktur komunikasi jaringan komunikasi kelompok tani Tegal Mandiri menunjukkan konektivitas yang rendah dan belum menjadi wadah koordinasi yang baik.

Kata kunci: komunikasi agribisnis, sentralitas, informasi sapi perah, kelompok, SNA

Introduction

The agricultural sector is crucial in supporting national economic development and providing employment opportunities in Indonesia. Around 35.2 million people in Indonesia depend on agriculture for their livelihoods (Kementerian Pertanian, 2021). There are issues in the agribusiness sector related to the need for more effective teamwork. The unique properties of biological products require close collaboration among team members (Saragih, 2001). (Gandasari, 2014) identified low individual

characteristics, low group characteristics, and inadequate process characteristics as the main obstacles to successful teamwork. In light of these challenges, the research aims to answer two questions: 1l) what is the communication structure formed in the Tegal Mandiri farmer group? 2) is there a correlation between individual characteristics and the communication structure of the group? The study will examine the communication structure of the Tani Tegal Mandiri group and explore the relationship between individual characteristics and group communication.

Social Network Analysis (SNA) is used to study communication structures. This method differs from other research methods that rely on attribution data like surveys and experiments. SNA focuses on data related to relationships, relationship contexts, and actors' positions in the structure. By emphasizing actors and relationships, SNA provides an overview of the process of forming communication phenomena and the actors that determine the communication structure (Eriyanto, 2014). In this research, SNA is utilized to analyze the communication and exchange of information between members of a particular group. The primary aim of SNA is to study and understand the communication structure of the group by analyzing relational data regarding the flow of communication using various types of interpersonal relationships as the unit of analysis. The method determines relationships and maps among farmers in their group. Rogers and Kincaid (1981) define SNA as a tool that allows researchers to determine the structure of communication in a group by analyzing the flow of communication.

Network analysis methods involve measuring the structure and position of actors in a network. To do this, images are needed that display the actors' positions and relationships. However, the calculations can be challenging if there are hundreds or thousands of actors. Fortunately, the UCINET application makes it easier by allowing the simple and quick creation of sociogram images (Eriyanto, 2014). According to Sendjaja, the use of the SNA method in Indonesia has undergone significant changes. Initially, it was utilized in the 1980s to explain the diffusion of innovation. However, its application has diversified over time, and it is currently used in multiple areas, including group communication, organizations, politics, marketing, and communication technology (Eriyanto, 2014). Sendjaja noted that this trend is not unique to Indonesia but is prevalent in many countries worldwide. For instance, while there were only dozens of journals in the 1970s, the number grew to hundreds in the 1990s and nearly five times in the 2000s (Eriyanto, 2014).

SNA publications on agricultural topics have increased almost five times since the 2000s. However, in the last ten years, only 100 agriculture-related documents have been published in the Scopus database. These documents come from 5 primary sources, including Sustainability Switzerland with five documents; Preventive Veterinary Medicine with 4 documents; Atmospheric Chemistry and Physics with 3 documents; Journal of Agricultural Education and Extension with 3 documents; and the Journal of Agromedicine with 3 documents. When we look at the top 10 most published countries, China ranks first with 28 documents, followed by the United States with 17, Italy with 11, Germany with 10, and Mexico with 6. Brazil, Netherlands, and Spain have each published five documents, while India and Iran have each published four documents. Surprisingly, only two publications from Indonesia on SNA related to agriculture exist. Therefore, it can be concluded that SNA publications on agricultural topics from Indonesia are still very limited.

There are several publications from SNA on agricultural topics such as farming cooperatives (Kustepeli *et al.*, 2023), communication among stakeholders (Cramer *et al.*, 2022; Gandasari *et al.*, 2022; Guerrero-Ocampo, Díaz-Puente and Nuñez Espinoza, 2022), cocoa innovation system

(Onumah, Asante and Osei, 2021), agricultural trade (Simon *et al.*, 2021; Xavier *et al.*, 2023), evolution or map of SNA (Scribani *et al.*, 2021; Aguilar-Gallegos and Romero-García, 2023), and agricultural extension services services (Devi and Tripathi, 2020). However, publications related to the dairy cattle business are still rare. This research is valuable as it contributes to agricultural research by applying the SNA method to dairy cattle agribusiness.

Materials And Method

This study employs quantitative research methods to investigate the communication networks between the Tegal Mandiri farmer group members. The data was collected from 20 group members using sociometric surveys that asked questions about from whom they obtain spesific information. The research design utilized a complete network type, which analyzes all actors (nodes) in the network. The level of analysis used in this research is the actor level (single), which focuses on the actor (node) of the network. The UCINET version 6 analysis tool was employed to examine the communication activities of dairy farmers, while the SPSS 26 was used to explore the correlation between the respondents' characteristics and the communication structure

The research is based on communication network theories by Rogers and Kincaid (1981), and Borgatti et al., 2013). The obtained results are:

SNA graph metrics.

Degree centrality is a metric used to measure an actor's popularity in a social network. It's the simplest measure and is determined by the number of ties a node has. The interpretation of degree centrality varies depending on the type of network ties. For instance, if the type of tie is trust, then it could be assumed to relate to the number of people who can be directly influenced by the node. Degree can be further classified into indegree (the number of ties leading to the actor) and outdegree (the number of links leaving the actor). Theoretically, the maximum number of degree centralities for an actor is N-1. In degree centrality, the higher the value, the better. The highest number of degrees indicates the actor's role as a center of information or a star (Eriyanto, 2014). The degree formula, as per Valente (2010) cited in Eriyanto (2014), is as follows:

$$C_D = \Sigma \frac{d_1}{N-1}$$

C_D : degree centrality
d : number of links
N : number of population

Closeness centrality measures of how close an actor or node is to all other actors in a network. It is calculated by summing up the geodesic distances from one node to another. In other words, it measures the inverse of centrality, where a large number indicates that a node is very peripheral, and a small number indicates that a node is more central. Closeness centrality is determined by how many steps an actor can take to contact or be contacted by other actors in the network. Closeness centrality is the opposite of degree centrality. In degree centrality, the higher the value, the better. Meanwhile, in terms of closeness centrality, the smaller the value, the better. A small value indicates the proximity of an actor (node) to other actors in a network. The lowest closeness value indicates an actor's role that is sociable and close to all members in the network (Eriyanto, 2014). The formula for closeness centrality, according to Valente (2010) in Eriyanto (2014) is as follows:

$$C_c = \frac{N-1}{\Sigma D_{ij}}$$

Cc : closeness centrality
D : shortest path to another actor
N : number of population

A sociogram is a type of network diagram that consists of a group of dots representing nodes

and a series of lines representing connections. Different features of dots and lines, such as color, size, and shape, can be utilized to convey information about the nodes and the interlinks.

Descriptive and Inferential Statistical Analysis with IBM SPSS Statistics 26. Quantitative research is research in the form of numbers and analysis using statistics (Sugiyono, 2020). Descriptive analysis is used in this research to determine the proportion/percentage of the observed variables. Meanwhile, the Inferential Statistics in this research is the Spearman Rank Correlation. Spearman Rank correlation is used to find relationships between variables (Sugiyono, 2020). The following is the Spearman Rank Correlation Formula:

$$r_s = 1 - \frac{6\Sigma d_i^2}{(n^3 - n)}$$

r_s : spearman rank correlation coefficient
n : number of pairs between variables
d : amount of difference between the rankings for xi and yi

Results and Discussion

Respondents' Social Demographic Characteristics

Table 1 displays the distribution of demographic characteristics of the participants. The majority of the participants were male (61.5%). The age of the respondents ranged from 25 to 79 years. Most of them had completed their elementary school education. On average, the members had been part of the farmer group for 9 years, and farming was their primary occupation.

Communication Network Analysis

Communication network analysis created a sociogram that depicts the communication structure between the Tegal Mandiri farmer group members. On the other hand, the analysis of the communication network at the individual level was done to measure a node's position in the network of individual members of the Tegal Mandiri farmer group. The communication network analyzed was based on information related to dairy cattle agribusiness, which included cattle production, animal health, and wholesale prices (as shown in Table 2).

In the main system of production information, there were three stars (node 1, 5, 18) that constituted a group. Among them, node 5 had the highest degree score of 9. The group leader, node 1, had the second-highest score with a degree of 8. Node 18 had the third-highest score with a degree of 6.

There was no star in the dairy cattle health information. All members of the Tegal Mandiri were seeking information outside the group. They asked the professional in dairy cattle health information namely Veterinary Paramedic.

The main component system in wholesale price information consisted of two stars. Node 1 was the leader of the group and had the highest degree of 11. Node 5 was one of the group members and held the second highest position with a value of 6.

The average degree of these three communication networks was found to be between 1-2, which means that farmers could contact one or two other farmers in the group to gather agribusiness information. This finding is in line with the research conducted by Gandasari et al. (2022), which found that members within the system can build relationships with only 1-2 individuals. Node 1, which was the group leader, still played a crucial role as a source of information for its members, and even members could access two other sources of information, both inside and outside the group. The leader was in a very central position and had the status of an advisor, possessing knowledge and skills that were sought after by others. This is consistent with the findings of Gandasari et al. (2022) and Ensor and de Bruin (2022). According to Devi and Tripathi (2020), nodes with higher centrality can activate more members in a network, making them an effective influence spreader.

Table 1. The characteristics of respondents from 20 members of the Tegal Mandiri farmer group

Category	Number of respondents	Valid percentage
Gender		
Female	6	30,00
Male	14	70,00
Age		
21-30	2	10,00
31-40	3	15,00
41-50	4	20,00
51-60	5	25,00
61-70	4	20,00
71-80	2	10,00
Joint the Group		
5 years	4	20,00
6 years	1	5,00
7 years	7	35,00
8 years	7	40,00
Education level		
≤Elementary school	15	75,00
Junior high school	1	5,00
Senior high school or vocational school	4	20,00
Primary Occupation		
Self-employed	20	100,00
Secondary Occupation		
Agricultural and industrial trade	2	10,00
Company-employed	5	25,00
Farming Experience		
5-10	3	15,00
11-15	0	0
16-20	1	5,00
>20	16	80,00
Business scale		
<5	13	65,00
5-10	5	25,00
11-15	1	5,00
>15	1	5,00

The average scores for closeness centrality were 489.55 (out-farness) and 558.1 (in-farness) for production information, ranging from 260 to 650. For animal health information, the scores were 400.00 (out-farness) and 420.000 (in-farness), ranging from 400 to 420. For wholesale prices, the scores were 413.05 (out-farness) and 442.35 (in-farness), ranging from 118 to 506 (Tabel 1).

These scores indicate that dairy cattle farmers in the Tegal Mandiri farmer group still had a high average closeness score, meaning that they were still close to the maximum level of agribusiness information. This suggests that the flow of information within the farmer group networks was still slow and that the ability of farmers to contact one another within the group was still low.

This low level of connectivity shows that the farmer group still needs to become a good coordination forum because the average closeness centrality is still close to a maximum (Gandasari *et al.*, 2022). Consequently, the farmer group members' ability to access all members in the system is still not good (Gandasari *et al.*, 2022). Furthermore, the group members lack cooperation and information sharing (Puspanjani, 2012; Herman, Madarisa and Syahrial, 2018).

Table 2. The centrality value of agribusiness topic in the Tegal Mandiri farmer group

No.	Node	Production Information				Animal Health Information				Wholesale Price Information			
		Out degree	*In degree*	*Out farness*	*In farness*	*Out degree*	*In degree*	*Out farness*	*In farness*	*Out degree*	*In degree*	*Out farness*	*In farness*
1.	1	4	8	479	260	1	0	400	420	2	11	441	118
2.	2	2	1	436	625	1	0	400	420	1	0	422	506
3.	3	4	0	454	650	1	0	400	420	3	0	378	506
4.	4	3	4	479	264	1	0	400	420	2	0	420	506
5.	5	4	9	478	261	1	0	400	420	3	6	440	122
6.	6	1	0	461	650	1	0	400	420	1	0	484	506
7.	7	1	0	625	650	1	0	400	420	2	0	379	506
8.	8	1	0	625	650	1	0	400	420	2	0	379	506
9.	9	1	1	460	625	1	0	400	420	1	0	422	506
10.	10	1	0	460	650	1	0	400	420	1	0	422	506
11.	11	2	0	435	650	1	0	400	420	1	0	380	506
12.	12	3	0	443	650	1	0	400	420	1	0	422	506
13.	13	3	0	455	650	1	0	400	420	2	0	420	506
14.	14	2	1	459	625	1	0	400	420	2	2	441	137
15.	15	2	0	415	650	1	0	400	420	2	2	370	506
16.	16	1	1	625	460	1	0	400	420	1	1	422	506
17.	17	1	0	625	650	1	0	400	420	1	1	422	506
18.	18	4	6	478	267	1	0	400	420	4	4	397	374
19.	19	1	1	444	625	1	0	400	420	1	1	380	506
20.	20	3	0	455	650	1	0	400	420	2	2	420	506
Average Value		2.2	1.6	489.55	558.1	1	0	400	420	1.75	1.5	413.05	442.35

To improve the flow of information, group members must strengthen their connectivity. They must actively seek, share, and disseminate knowledge and innovation they develop (Onumah, Asante and Osei, 2021). Improving member performance is necessary for the farmer group to function effectively.

The minimum closeness score for production owned by node 1 was 261. He was the leader of the group. The minimum closeness score for animal health owned by node 27 was 420. He was a paramedic veterinary and was not a group member. The minimum closeness score for wholesale price owned by node 1 as the leader was 118. According to Gandasari *et al.* (2022) the individual with the lowest value of closeness centrality in the communication network is the fastest in contacting everyone in the system. When the information is general, the leader becomes the person with the lowest closeness centrality and the highest degree centrality. Still, for information that is very specific and requires expertise, the person who has that expertise is the person with the lowest closeness centrality and the highest degree centrality. This is in line with the findings of (Gandasari *et al.*, 2022).

To provide a visual representation, we have included network maps of three topics related to the Tegal Mandiri farmer group in Figures 1, 2, and 3. In the network maps, farmer members were represented by blue squares inside the area, while non-members were represented by blue squares outside the area. The red squares denoted a source of information actor. Stars represented by the nodes that had more connections to other actors in the network. All members were located in the inner parts of the network (nodes 1-20), while non-members were located in the outer parts of the network (nodes 21, 22, etc.).

According to Cramer et al. (2022), some actors may have higher status or power in a network than others. The central actor in the network is referred to as a "star" because they act as a channel through which many communication flows pass. While some actors

only receive information due to limited contact or one-way relationships, others can give and receive information through two-way relationships with other actors (Cramer *et al.*, 2022).

According to Figure 1, there were three nodes that act as key sources of information or a star. These nodes were 1, 5, and 18. Node 1 was the group leader while nodes 5 and 18 were members of the group. As a star, they become a source of information for other farmers in the group. Almost everyone in the group contacted these three nodes. However, only three group members, nodes 7, 8, and 17, tried to find information outside the group.

Nodes 1, 5, and 18 were not only important sources of information, but they also had access to more information than the other nodes in the group. As a "star," they actively sought out information about other farmers or people, whether they were part of the group or not. This is why they had both high indegree and high outdegree scores. In other words, they not only receive a lot of information, but they also share a lot of information with others (Simon *et al.*, 2021).

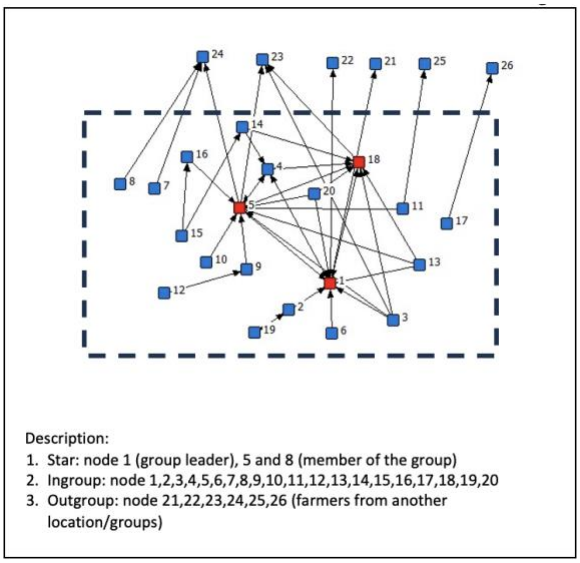

Figure 1. Net draw in Production Information of Dairy Cattle of Tegal Mandiri Farmer Group

In Figure 2, all the members of Tegal Mandiri who were looking for information outside the group had been identified.

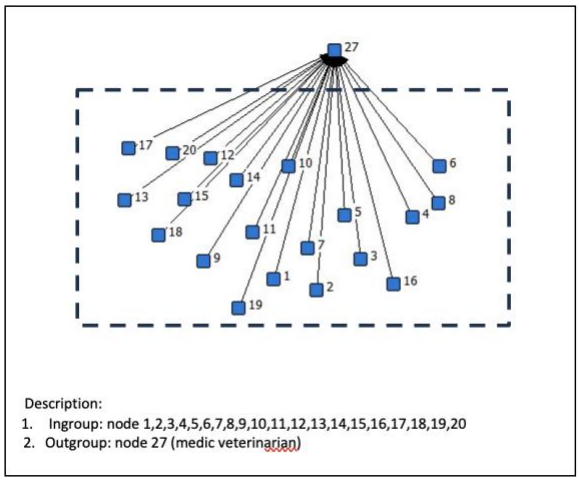

Figure 2. Net draw in Animal Health Information of Dairy Cattle of Tegal Mandiri Farmer Group

They required expert guidance to obtain information related to animal health. To acquire dairy cattle health information, they consulted a Veterinary Paramedic, the only one available in their neighborhood.

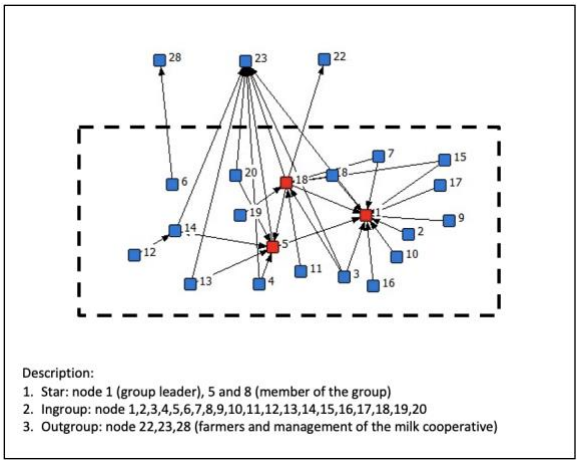

Figure 3. Net draw in Wholesale Price Information of Dairy Cattle of Tegal Mandiri Farmer Group

In Figure 3, the wholesale price topic had a net draw that reveals three nodes operating as a star. These nodes were nodes 1, 5, and 18, with node 1 being the group leader, and nodes 5 and 18 being the group members. As a star, they focused on gathering information on other farmers, particularly in the wholesale price. They became a source of information for other farmers in the group and were contacted by almost everyone in the group. Only one group

member tried to obtain information outside the group, which is node 6.

Figures 1 and 3 show only three individuals acting as stars, one of them being the leader of the farmer group. As per the research conducted by Gandasari *et al.* (2022), the group leader plays a crucial role in driving the group's development, facilitating knowledge sharing, and promoting teamwork. This finding is also supported by Ensor and de Bruin (2022). The significance of leader centrality in advising networks depends on the team's need for leadership to address communication and coordination challenges (Yuan and van Knippenberg, 2021). The research results also indicate that some group members may become stars or reach out to people outside their group to seek answers to their queries. According to de Roo *et al.* (2021), farmers often hold both formal and informal positions in society, and entrepreneurs who have a good social standing in the community act as essential sources of new information and knowledge (Yuan and van Knippenberg, 2021). Social interactions based on trust are instrumental in building social capital (Kustepeli *et al.*, 2023). The acquisition of more information helps overcome market failures, reduces transaction costs, and addresses the problem of asymmetric information.

The second network in Figure 2 differed from the others as it did not have actors serving as stars. According to Chapot *et al.* (2023),, animal production systems are becoming increasingly complex, creating numerous opportunities for disease spread. Therefore, timely access to high-quality animal health information is crucial for designing disease control management strategies (Chapot *et al.*, 2023). Gandasari et al. (2020) mention that collecting information on animal health is difficult as it requires particular expertise in livestock health management. Obtaining information about animal diseases involves the role of an expert in the field of disease. In Figure 2, all farmers sought information outside their system, specifically from the veterinary paramedic on duty in their area.

Comparing the three images above, we can observe that the network structures are distinct. This difference in network structure leads to dissimilarities in the spread of information. Therefore, it is crucial to comprehend the structure and dynamics of information networks to develop an effective and acceptable livestock information system. This research used a communication network approach to understand the flow of information and the role played by different stakeholders in disseminating information in dairy cattle agribusiness. Sociograms were used to illustrate how communication patterns and relationships exist between farmers and other stakeholders. Technical service providers, including veterinarians and group leaders, had been identified as information sources and mediators in the information exchange network. They played an essential role in dealing with farmer group members.

The Correlation Between Respondents' Characteristics with Communication Structure

Explanatory research was conducted to investigate whether there is a relationship between respondent characteristics and communication networks. The study examined the characteristics of respondents, including age, education, length of time in the group, farmer experience, and business scale, as independent variables, and communication structure, including degree and closeness centrality, as dependent variables. Table 2 presents the results of the Spearman correlation test.

Based on Table 3, the Spearman correlation test results show a relationship between the education level of the farmers, the length of time joining the group, and the business scale with the farmers' communication networks. Education was significantly and positively related to closeness centrality with a value of r =

0.446* (outfarness). This means that the highest education farmers are, the less often they seek information on agribusiness. The number of farmers who had a high school education was only four people, and they were around 25 years old and only had 3 heads of dairy cow. Even though they have the highest education, they still have no experience in business. So, they still needed to be more active in looking for information about agribusiness. This is not in line with Gandasari's findings. Their research did not find a significant relationship between education level and communication network (Gandasari *et al.*, 2020).

It has been found that the duration of time spent in a farming group was positively correlated with both outdegree (r = 0.454) and closeness centrality (r = -0.454). This indicates that the longer a farmer was a part of the group, the more communication networks they would have access to, making it easier for them to acquire information about dairy cattle agribusiness. The Tegal Mandiri farmer group was also supported by Polbangtan Bogor and received a great deal of coaching and training. As a result, many people in the group adopted this information, making it a valuable source of knowledge for all members.

It has been found that there was a strong and positive correlation between the scale of a business and its degree of centrality, with a correlation coefficient of 0.477. This indicates that as a business grew more extensive, it required and created more communication networks. This finding is consistent with the research conducted by Gandasari *et al.* (2020), where farm scale was found to have a highly significant and positive correlation with the degree centrality of beef cattle agribusiness.

The performance of Tegal Mandiri farmer group was evaluated based on their communication structure. The results showed that the information exchange network between farmers in the group was still low. It was also found that the communication networks were significantly related to the farmer characteristics for all information. The information sources were found to be playing a crucial role in increasing farmers' capacity in knowledge, attitudes, and skills. This study contributes to filling critical knowledge gaps in the dairy sector and can help stakeholders and decision makers intervene and create policies to improve farmer welfare. The findings recommend the role of change agents, such as extension workers, who can increase connectivity and communication within group members through their outreach activities. According to Onumah, Asante, and Osei (2021), network development in agricultural systems is essential for several reasons: Increasing the flow of information, thereby reducing information asymmetry between actors in the network; facilitating the diffusion of innovation; providing access to resources for actors who have limited resources; and building members' capacity and social capital. Farmer groups can increase capacity and social capital by opening access to social relationships or interactions (Simon *et al.*, 2021).

Table 3. The Correlation between the characteristics of the respondent and Communication Network

The characteristics of the respondent	Communication network			
	Degree Centrality		Closeness Centrality	
	OutDegree	InDegree	OutFarness	InFarness
Age	-0,410	-0,421	-0,261	0,421
Education	0,313	0,335	**0.446***	-0,335
Length of time Joining the Group	0,063	**0.454***	0,411	**-0.454***
Farming experience	-0,330	0,013	-0,087	-0,013
Business scale	**0.477***	0,139	-0,312	-0,139

Conclusions

The study found that the communication structure in the Tegal Mandiri farmer group was weak, with low connectivity and poor coordination. The communication networks on agribusiness information were significantly related to the characteristics of the farmers. Unfortunately, the group members were not cooperating and sharing information effectively. To improve the system, group members must become more active in seeking and sharing information, and disseminating the knowledge and innovation they develop. Although the group leader played a role as a source of information for its members, they should not solely rely on the leader's advice, knowledge, and skill.

This study is unique in its application of the SNA tool to the dairy cattle agribusiness system, making a valuable contribution to the literature. However, it only focuses on information seeking within the agribusiness aspect. Therefore, it is recommended that further research be conducted to analyze information seeking in the Good Dairy Farming Practice (GDFP) aspect. Such research will contribute to the sustainability of dairy farming.

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