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ANALYSIS OF FARMERS' COMMUNICATION NETWORK IN REPLANTING OIL PALM IN TRI MULYA JAYA VILLAGE

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Abstract. This research aims to understand the communication network in the context of independent oil palm cultivation in Tri Mulya Jaya Village. Through interviews and questionnaires involving 15 oil palm farmers, the study utilized non-probability sampling methods such as purposive and snowball sampling. The results indicated internal and external conditions supporting the adoption and implementation of oil palm cultivation. Factors like productive age, upper secondary education, and moderate land area collaborated with the effectiveness of extension officer visits and income levels. The farmers' use of smartphones reflected the effectiveness of agricultural extension. The communication network pattern formed a circular structure with equal roles and strengths, promoting optimal participation. Central figures, particularly HN and AS, played a key role in information dissemination. Despite JM having the highest closeness, the centrality of HN and AS marked popularity in the communication network. Centrality analysis highlighted the central role of association figures in supporting oil palm replanting activities. Communication patterns and functional relationships played a crucial role in forming an effective network in Tri Mulya Jaya Village.

Keywords: Oil palm, Self-supporting pattern, The communication network

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INTRODUCTION

Oil palm, as a major plantation crop in Indonesia, requires effective management to achieve optimal production. In Riau Province, the management of oil palm plantations by independent farmers has not yet been fully optimal, resulting in suboptimal productivity. Oil palm plantations in Riau are categorized into two types: plasma plantation and independent plantation. In independent plantations, all activities—from land clearing to harvesting—are borne by the farmers themselves. Common problems faced by independent farmers include aging trees that are no longer productive. The government offers a solution through a rejuvenation or replanting program to improve oil palm plantation productivity (Azhar et al., 2023). The Amanah Independent Oil Palm Association, which comprises 501 farmers in Riau Province, plans to implement replanting in the year of 2025 to enhance

productivity and welfare. With higher yields from replanting, farmers' incomes are expected to increase, which in turn can improve their living conditions and overall quality of life (Syarfi et al., 2020).

The government-supported Smallholder Oil Palm Replanting Program (*Program Peremajaan Sawit Rakyat/PSR*) aims not only to increase crop productivity but also to contribute to the achievement of the Sustainable Development Goals (SDGs), particularly in the economic, social, and environmental dimensions (Purba, 2019). However, the success of this program is highly dependent on the utilization of communication technologies, especially smartphones. Studies indicate that smartphone use can accelerate replanting activities and improve communication networks within farmer communities. Effective communication among farmers is essential for information dissemination, experience sharing, and coordination, all of which play a key role in the success of replanting programs (Kumar et al., 2021). International studies further show that the flow of farmer information largely occurs through existing communication networks within farmer groups (Jäckering *et al.,* 2019).

Oil palm plays a vital role in Indonesia's economy and agricultural development, making significant contributions to export and employment (Jelsma et al., 2024). In Tri Mulya Jaya Village, Ukui District, Pelalawan Regency, oil palm is managed by independent farmers who are self reliant in financing their farming operations and selling what they produce. Replanting represents an important strategy to increase land productivity and maintain the continuity of farming operations. Replanting 4% of old oil palm areas annually is considered an optimal strategy for achieving high and stable productivity (Fosch et al., 2023). Replanting can provide numerous benefits, including increased productivity, improved quality, enhanced sustainability, and reduced risks of pest and disease attacks (Azhar et al., 2023). The success of replanting is correlated with various internal farmer factors such as education, experience, landholding size, and motivation. Farmers' socio-demographic characteristics, goals, motivations, and other factors are also associated with their decisions regarding replanting (Taramuel-taramuel et al., 2023).

Similar research by Ambarwati et al., (2020) highlights the importance of the relationship between farmers' characteristics and their behavior in agricultural communication. More specifically, studies on communication network analysis among independent oil palm farmers, such as that conducted by Rosadi et al*.,* (2020) in Surya Indah Village, found that the communication network formed tended to be dominated by a wheel pattern structure. This structure is characterized as highly centralized, in which information dissemination depends heavily on one or several central actors (the star). However, such a centralized network structure may become an obstacle to replanting programs that require high levels of participation and consensus from all association members due to the substantial risks and costs involved. Therefore, a research gap exists regarding how communication network patterns are formed and function when farmers are confronted with long term strategic decisions such as replanting, rather than merely routine agribusiness activities, and whether the resulting network structures remain the same or have changed.

Therefore, the main novelty of this study lies in examining and analyzing the communication network patterns of farmers within the context of the Oil Palm Replanting Program in Tri Mulya Jaya Village. This study aims to explore whether the network patterns formed in the replanting context are centralized (as found by Rosadi et al*.,* 2020) or decentralized (circular), which promote information equality. Focusing on the replanting context offers a theoretical contribution by identifying the role of actor centrality in mediating trust and risk, rather than merely the speed of information diffusion. Practically, this analysis will provide a strong foundation for the development of more targeted policies and extension programs, thereby supporting the sustainability of independent oil palm farming.

METHOD

This study was conducted in Ukui District, Pelalawan Regency, primarily focusing on Tri Mulya Jaya Village. The village was selected because it implements oil palm replanting activity, it still applies

independent oil palm farming system, and it has the largest oil palm plantation area in the region. The study was carried out over a six month period, from June to November 2023. The research methods include field surveys, data collection and processing, proposal preparation, and final report writing. Sample was collected using non-probability sampling techniques, combining purposive sampling and snowball sampling. Tri Mulya Jaya Village was identified as a strategic location for understanding the dynamics of communication networks in the context of independent oil palm replanting scheme.

This study employs both primary and secondary data and adopts qualitative and quantitative approaches. Primary data were obtained through direct interviews with farmers using structured questionnaires, covering farmer characteristics such as age, education, household dependents, farming experience, and landholding size. Secondary data were collected from relevant institutions and from analyses of the primary data, including records from the Agricultural Extension Service (BPP), the Tri Mulya Jaya Village monograph, the Plantation Service of Ukui District of Pelalawan Regency, the Statistics Indonesia, as well as other relevant literature.

RESULT AND DISCUSSION

Communication Network Flow

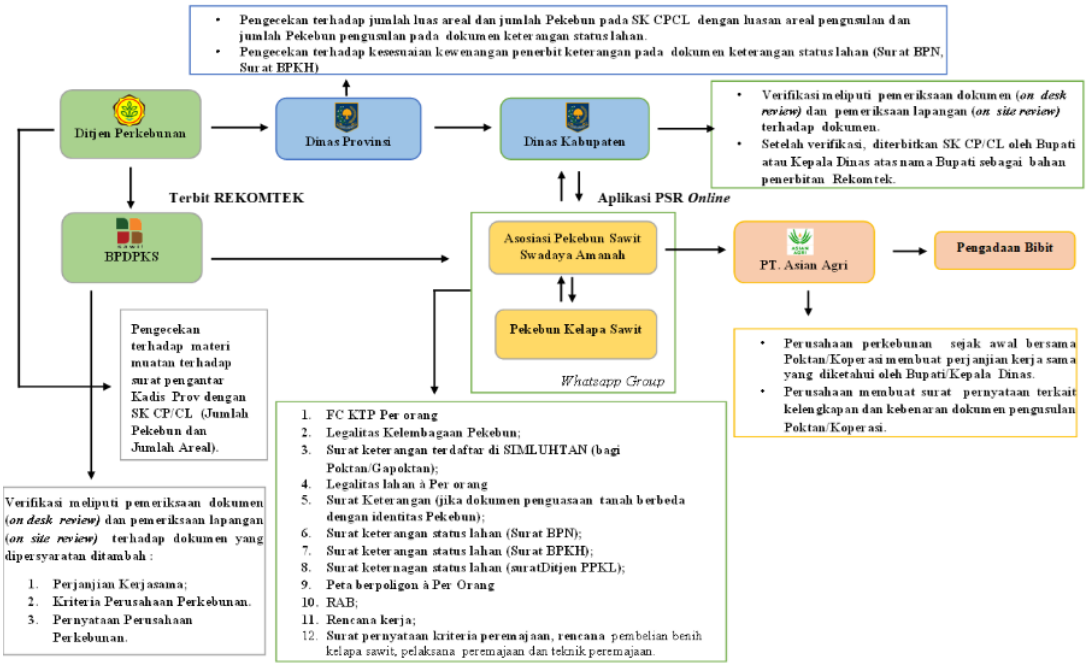
The important role of information and communication technology for farmers is reflected in the findings of a World Bank study in 2007 which revealed that information and communication technology has transformed farmers' capacity, particularly that of large scale and commercially oriented farmers, to benefit from new technologies developed elsewhere. Thus, it is unsurprising that modern farmers are those who have mastered information and communication technology. For progressive farmers, advances in technology and information are highly beneficial, as they facilitate rapid access to information and thus provide greater opportunities to capture broader markets. Conversely, among less advanced farmers, the advances in technology and information have a negative correlation with the development of farming operations, because the farmers tend to carry out farming activities merely as routine practices (Damanik & Tahitu, 2020)

Based on communication network theory, information seeking at the farmer level requires a strong network structure with their neighbors and other information sources. A communication network is understood as a channel that connects one actor to other actor in the process of message exchange. The essence of communication networks is often associated with the principle of homophily, namely the tendency of individuals to interact with others who share similar attributes, values, or experiences. Nevertheless, interactions may also occur among actors with different attributes (heterophily), particularly when they require information that is not available within their own group.

Communication network analysis plays an important role in identifying information flows and understanding the roles of individuals within a network, including the identification of central individuals, namely opinion leaders, who play a key role in communication among oil palm farmers, as well as in examining the relationship between farmer characteristics and communication networks (Ikhsan et al., 2020). Previous studies indicate that communication network theory is effective for understanding how agricultural information disseminate among farmers. Borgatti & Halgin (2011) further emphasize that social network analysis helps identify individuals' strategic positions within a network, including actor with high levels of centrality who functions as opinion leaders. Jäckering et al., (2019) show that within farmer groups, agricultural information flows primarily through established relationships, and central figures in the network serve as the main drivers of information diffusion. Consistent with earlier findings on the role of social networks in information dissemination, recent studies demonstrate that farmers' communication networks strongly determine how information regarding cultivation practices, technologies, and managerial decisions circulates among group

members. The presence of central actors within the network accelerates the diffusion process and encourages the adoption of innovations (Anggreany et al., 2023).

Thus, communication network theory not only explains patterns of relationships within farmer communities but also provides a basis for understanding how farmers' sociodemographic characteristics—such as age, education, and level of cosmopolitanism—are related to their communication behavior. This theory helps researchers explain why some farmers are more active in information exchange and how the role of central actors may be positively correlated with the success of oil palm replanting programs. Therefore, communication network analysis becomes a relevant approach and supports the argument that the success of replanting is closely linked to information flows and the roles of actors within the network.



Source: Data Processed, 2025

Figure 1. Communication flow

Based on Figure 1, the flow of information regarding the implementation of replanting in Tri Mulya Jaya Village, Ukui District, Pelalawan Regency, which is organized under the Amanah Independent Oil Palm Farmers Association, begins with the Directorate General of Plantations issuing a Technical Recommendation (RekomTek) as a technical prerequisite for obtaining approval. The Amanah Association then registers farmers' plantation area with the People's Oil Palm Replanting Program (Program Peremajaan Sawit Rakyat/PSR) administered by the Oil Palm Plantation Fund Management Agency (BPDPKS) and obtains information through BPDPKS social media channels. This is followed by verification by the provincial authorities. One of the requirements to participate in this replanting program is that the farmer must be a member of a recognized farmer institution and possess legal land ownership of maximum four hectares per individual. The submission of replanting documents for Tri Mulya Jaya Village is conducted through the district or municipal government offices. Field agricultural extension officers (PPL) from the local agencies provide information on replanting and the administrative procedures for submitting replanting applications. Document management becomes more efficient after the initial stage, as association administrators collect farmers' documents through the online PSR application. The Amanah Association manages its replanting program independently, including seed procurement in collaboration with PT Asian Agri.

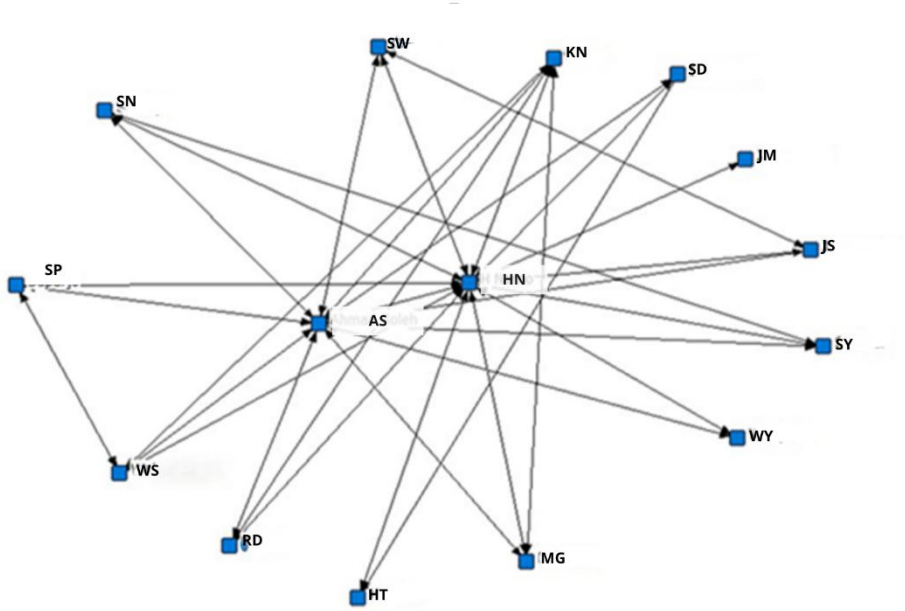
The duties and responsibilities of the partner involve establishing cooperation agreements with farmer groups to provide business facilitation and to ensure the smooth implementation of oil palm replanting. The partner is also responsible for ensuring the availability of high-quality seeds/seedlings, monitoring the replanting process, and ensuring that the group achieves profitable outcomes. The Amanah Association has established a partnership with PT Asian Agri in implementing the replanting program, in which PT Asian Agri is responsible for supplying oil palm seedlings.

The distribution of seedlings by the partner, PT Asian Agri, utilizes superior Topaz-type seedlings. The use of high quality seedlings is a key factor in revitalizing oil palm plantations and has the potential to increase productivity. In supplying the seedlings, the partner conducts site surveys and adjusts distribution according to the needs and conditions of local farmers. Communication between the Amanah Association and farmers in Ukui District is carried out through social media, primarily using smartphones. Farmers and administrators of Farmers' Group Association (Gapoktan) make use of WhatsApp to obtain information related to the replanting program. Tri Mulya Jaya Village is currently in the preparation stage for replanting, and the Amanah Association is in the process of preparing documents for the initial phase of the Smallholder Oil Palm Replanting Program. The administrative process at the initial stage needs approximately one year.

Farmers receive information regarding replanting from the management of the Amanah Independent Oil Palm Farmers Association. Communication between farmers and association managers is two-way, and the use of smartphones through WhatsApp accelerates communication flows in Tri Mulya Jaya Village. Effective communication enables farmers to better understand and adopt agricultural recommendations. The presence of smartphones helps accelerate the administrative processes of replanting, which previously required considerable time. This has a positive impact on the speed of communication and the distribution of information received by farmers, supporting the independent management of replanting, as illustrated in the attached information flow.

Information Network Pattern

Organizational communication is a crucial element that requires attention, development, maintenance, and dissemination to both internal and external members. The application of appropriate communication patterns within an organization, as explained by, is expected to foster organizational development, enable better growth, and allow organizations to compete in a healthy manner with others. In the context of the Amanah Independent Oil Palm Farmers Association in Tri Mulya Jaya Village, communication networks play a key role. These networks reflect interpersonal relationships through which individuals exchange information, particularly in the context of oil palm replanting. Well established communication patterns can facilitate information delivery and help in controlling or managing problems (Agustini et al., 2020).



Source: Data Processed, 2025

Figure 2. Communication network pattern

Based on Figure 2, the results of the communication network analysis among farmers involved in replanting in Tri Mulya Jaya Village reveal a circular pattern, a finding that contrasts with Rosadi *et al.,* (2020) who identified a wheel pattern in the communication network of Surya Indah Village. This difference carries important implications. The wheel pattern, as reported by Rosadi *et al.,* (2020) indicates efficiency in rapid information dissemination but is vulnerable to failure if the central actor encounters problems. In contrast, the circular pattern observed in the replanting study suggests that farmers tend to prioritize participatory equality and information validation through interactions among fellow members and key figures (HN and AS). This pattern is essential for reducing the risks associated with replanting decisions, which involve high costs and long time horizons. The shift from a wheel to a circular pattern indicates that the nature of decision making is closely related to the communication network structure that emerges.

This network pattern is formed through interactions among farmers in providing, receiving, and disseminating information with relevant government agencies and partners. The communication network functions not only as a channel for information exchange but also as an effective resource for farmers. Through social learning processes, farmers learn from one another and share experiences, thereby increasing their motivation to adopt new technologies. The network pattern reflects a circular structure that grants each member equal roles and influence, enabling optimal participation and balanced relationships within the organization. Importance of this structure in ensuring that every member is connected to others within the organization, particularly to the chairperson and secretary of the Amanah Association, HN and AS, who play central roles in obtaining information on oil palm replanting in Tri Mulya Jaya Village. This study is consistent with Jäckering et al., (2019), who found a relationship between an actor's central position and the intensity of their involvement in information dissemination.

Actors of Communication Network

Based on the study of communication networks among independent farmers in Tri Mulya Jaya Village, it can be concluded that, in this context, an actor refers to an individual or entity that is part of a network. Although an actor may be a member of a group, the network involves interactions that extend

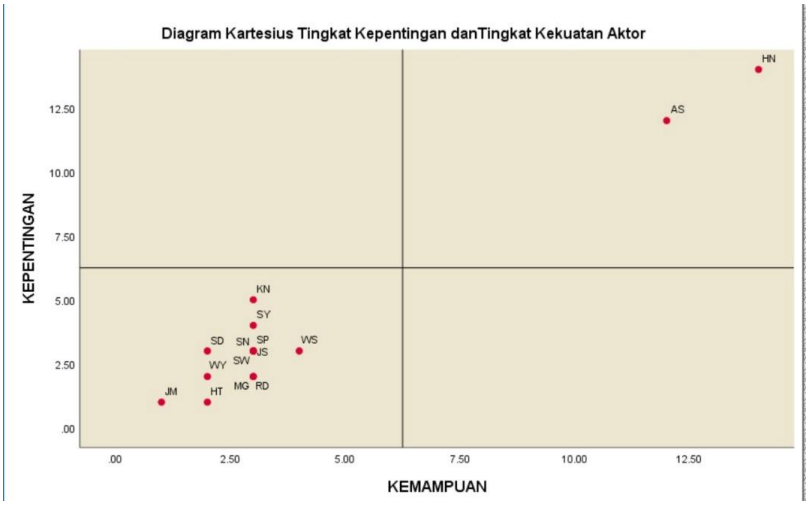
beyond the group itself. The concept of a network comprises elements such as actor (node) and the relationships between actors (edge). Within farmers' communication networks, several types of actors can be identified, including stars and bridges. Farmers with well-developed social networks are better able to access and utilize information (Vishnu et al., 2019). A star refers to an individual or node that is most recognized and frequently contacted by other members of the network. The analysis indicates that certain individuals, such as HN and AS, are identified as stars because they receive the highest number of nominations from other members. The importance of collaboration within communication networks between farmers and other agricultural stakeholders is also emphasized, as such collaboration enables information and innovations to be conveyed more effectively to farmers (Ejem et al., 2023).

In addition, an important role is also played by individuals or nodes acting as bridges, namely administrators of Farmers' Group Association such as HN and AS. They function as intermediaries that connect information flows among independent oil palm farmers in Tri Mulya Jaya Village. The presence of both stars and bridges indicates an effective network structure for information dissemination and for facilitating communication among members. Overall, this communication network structure shows that interactions among farmers are supported by individuals who serve as stars and bridges, such as HN and AS. Consequently, this network pattern provides a clear depiction of how information regarding oil palm replanting is disseminated and accessed in Tri Mulya Jaya Village. The impact of effective communication patterns can enhance farmers' productivity and welfare, as shown as Table 1 (Waaswa et al., 2021).

Table 1. Actors of communication network

No	Initial	Social Position	Role	Ranking
1	HN	The Head of Amanah Independent Oil Palm Farmers Association	Farmers' information sources within the communication network, or those who communicate with government agencies and partners of the replanting program implementation.	14
2	AS	The Secretary of of Amanah Independent Oil Palm Farmers Association	Source of administration information of the replanting program implementation.	11

Source: Data Processed, 2025



Source: Data Processed, 2025

Figure 3. Cartesian diagram

Figure 3 illustrates the distribution of power levels and interest levels among the 15 actors involved in the communication network of the Amanah Association during the implementation of oil palm replanting. The analysis identifies two main quadrants in the figure. First, Quadrant II shows two actors, HN and AS, who have above average levels of power and interest. Those two actors serve as the Amanah Association's head and its secretary, respectively, indicating their strong potential to provide accurate and relevant information on replanting. This condition should be maintained, as the positions held by HN and AS within the association enable sustained communication with plantation service agencies and related stakeholders, thereby ensuring strong and reliable information flows. Communication plays an important role in the formation and implementation of agricultural indicators in the form of bonds, bridges, and linkages to create synergy within and beyond the indicators themselves (Oktarina et al., 2020).

Second, Quadrant IV indicates that 13 actors—namely KN, SY, SD, SN, SP, WS, WY, SW, RD, MG, HT, JM, and JS—have below average levels of power and interest. This finding suggests the need to strengthen and improve the information capacity provided by these actors. Factors contributing to the low level of information power in Quadrant IV include farmers' limited access within farmer groups and associations to obtain information directly from reliable sources. As a result, some farmers receive information late or lack adequate information regarding the implementation of replanting. Financial conditions and other considerations also play an important role in farmers' decisions in Tri Mulya Jaya Village regarding the adoption of replanting. Therefore, efforts to improve information access and understanding of farmers in Quadrant IV are necessary to support the effectiveness of the oil palm replanting program.

Individual Level Communication Network

Table 2. Communication network

Communication Network Index	Local Centrality
Maximum	14.000
Minimum	1.000
Mean	4.067
	Global Centrality
Maximum	1.000
Minimum	0.519
Mean	1.000
	Togetherness
Maximum	134.833
Minimum	0.000
Mean	12.400
	Eigenvector
Maximum	0.496
Minimum	0.082
Mean	0.233

Source: Data Processed, 2025

Based on Table 2, the communication structure within the network of independent oil palm farmers in Tri Mulya Jaya Village was analyzed using various centrality concepts. Local centrality, which describes the number of connections an individual can establish within the network, shows an average local centrality value of 4.067. This measurement indicates that actors in the network have varying levels of connectivity. Furthermore, global centrality, which reflects the number of ties required for an individual to be connected to others in the network, ranges from 0.519 to 1.000, with an average

value of 1.000. Further analysis of global centrality highlights the togetherness and relationship among actors, with JM exhibiting the highest level of closeness to other actors.

Furthermore, in the context of indegree centrality, HN stands out as the most popular actor in the communication network, having the highest number of incoming connections. This indicates that HN plays a central role in providing information to association members. The important role of communication in agricultural development—through the establishment of effective communication among various stakeholders, including farmers, government agencies, and agricultural institutions—is essential to ensure the success of agricultural development programs.

In terms of eigenvector centrality, HN and AS exhibit the highest values which is close to one, indicating that both possess extensive networks with influential individuals. This finding suggests that HN and AS can be regarded as key figures within the association, as they are connected to important actors whose influence may be correlated with the association's decision-making and reputation. Accordingly, this centrality analysis provides an overview of the communication structure within the network of independent oil palm farmers, highlighting the roles of specific actors—such as HN and AS—who maintain significant connections in the provision and dissemination of information related to the replanting program in Tri Mulya Jaya Village..

The Relationship between Farmers' Internal Characteristics and the Communication Behavior of Oil Palm Farmers

The implementation of an innovation is closely related to the acceptance and behavior of oil palm farmers in Tri Mulya Jaya Village. Farmers' characteristics, such as age, education, and farming experience, are associated with the acceptance of agricultural technologies (Johnson *et al.,* 2023). Farmers' participation in the replanting program through media is generally quite good, as they engage via social media—particularly through WhatsApp groups—to share information on oil palm farming activities, including replanting, and to maintain communication among fellow farmers. The use of media as an information source provides positive benefits and fosters favorable behavioral impacts among farmers (Beaudoin, 2023). However, farmers' behavior in producing and creating media content remains relatively low, as shown in Table 3.

Table 3. The relationship between farmers' internal characteristics and the communication behavior of oil palm farmers

Spearman's rho	Age (X1)
Correlation Coefficient	0.592*
Sig. (2-tailed)	0.020
N	15
Spearman's rho	Education (X2)
Correlation Coefficient	0.367
Sig. (2-tailed)	0.179
N	15
Spearman's rho	Number of Family Member (X3)
Correlation Coefficient	0.474
Sig. (2-tailed)	0.074
N	15
Spearman's rho	Experience (X4)
Correlation Coefficient	0.381
Sig. (2-tailed)	0.161
N	15
Spearman's rho	Land Area (X5)
Correlation Coefficient	0.288
Sig. (2-tailed)	0.298
N	15
Spearman's rho	Cosmopolitanism (X5)
Correlation Coefficient	0.592*
Sig. (2-tailed)	0.029
N	15

Source: Data Processed, 2025

The study in Tri Mulya Jaya Village highlights the relationship between age, education, number of household dependents, level of cosmopolitanism, and the communication behavior of oil palm farmers. The results indicate that farmers' age is correlated with communication behavior, with significance at the 5% level. The positive correlation signifies a unidirectional relationship, meaning that older farmers tend to exhibit higher levels of communication behavior. Although age shows a relationship with communication behavior, the significance value confirms that this relationship is statistically significant. The positive correlation suggests that older farmers are more likely to demonstrate stronger communication behavior; however, this relationship does not imply causality (Rodríguez-Barillas & Poortvliet, 2023). Similarly, the education level of farmers in Tri Mulya Jaya Village shows a positive correlation with communication behavior, but without statistical significance at the 5% level. Although most farmers have attained upper secondary education, other factors are likely associated with this finding. Despite the positive direction of the correlation, the result is not statistically significant; therefore, the relationship between education and communication behavior cannot be strongly concluded in Tri Mulya Jaya Village. Burnham *et al.,* (2023), in their study on the relationship between education and farmers' behavior in the context of soil conservation, found that education may be associated with farmers' behavior regarding soil conservation; however, other factors—such as farmers' perceptions of the benefits of soil conservation and social support—also play important roles.

The correlation between the number of family dependents of farmers in Tri Mulya Jaya Village and communication behavior is positive, indicating a unidirectional relationship; however, the significance value shows that this relationship is not statistically significant. Therefore, although the positive correlation suggests a tendency toward a direct relationship, it is not sufficiently strong to draw a firm conclusion. Similarly, the relationship between education level and communication behavior also

shows a positive correlation, but statistical significance is not achieved at the 5% level, indicating that other variables are likely associated with this relationship.

The relationship between the level of cosmopolitanism and farmers' communication behavior shows a correlation coefficient of 0.592*, indicating a relatively strong relationship, with statistical significance at the 5% level reinforcing this finding. This result is consistent with the study by (Wibisonya, 2023), which reported a significant relationship between the level of cosmopolitanism and the adoption of Siamese orange cultivation technologies. In Tri Mulya Jaya Village, the level of cosmopolitanism is associated with farmers' interactions and communication, reflecting their active participation in social activities both within and beyond their immediate environment. This relationship is correlational in nature and therefore cannot be used as a basis for inferring a direct causal relationship. Understanding farmers' characteristics—such as age, education, number of household dependents, and level of cosmopolitanism—can help in designing more effective communication strategies to support information exchange and collaboration among oil palm farmers. Although some relationships may be strong, further research is needed to understand other factors associated with the dynamics of farmers' communication behavior (Widiarso *et al.,* 2022).

The Relationship between Farmers' External Characteristics and the Communication Behavior of Oil Palm Farmers

The relationship between farmers' external characteristics and their communication behavior is highly important and closely interconnected. Extension agents play a key role in shaping farmers' behavior, as information related to the replanting program—an essential aspect of agricultural activities—is primarily obtained from extension services. The intensity of extension activities, the accuracy of extension channels, and the number of information sources play crucial roles in relation to farmers' communication behavior.

Table 4. The relationship between farmers' external characteristics and the communication behavior of oil palm farmers

Spearman's rho	Intensity of Extention (X5)
Correlation Coefficient	0.383
Sig. (2-tailed)	0.159
N	15
Spearman's rho	Accuracy of Extension Channel (X5)
Correlation Coefficient	0.239
Sig. (2-tailed)	0.390
N	15
Spearman's rho	Number of information sources (X5)
Correlation Coefficient	0.441
Sig. (2-tailed)	0.100
N	15

Source: Data Processed, 2025

Based on Table 4, the results of the correlation test between the intensity of extension services received by farmers and their communication behavior yield a coefficient of 0.383, indicating a moderately strong and positive relationship between the two variables. This correlation suggests that higher extension intensity is positively associated with farmers' communication behavior; however, it cannot be concluded that extension intensity causes changes in communication behavior. Significance testing of external characteristics in relation to extension intensity produced a value of 0.159, indicating no statistically significant relationship. This implies that although extension intensity may be related to

external characteristics, the relationship cannot be considered significant. Furthermore, the correlation analysis shows that the accuracy of extension channels has a positive but statistically insignificant relationship with farmers' communication behavior ($p > 0.05$). Theoretically, extension channels that are accurate and easy to understand can help enhance farmers' knowledge and interactions. However, the findings of this study are not sufficiently strong to support such a relationship. This lack of significance may be attributed to other external factors, such as variations in the quality of field extension, limited access to information, and uneven infrastructures which support communication. These factors may cause the accuracy of extension channels is not correspond directly with farmers' communication behavior in the context of this study. Therefore, the relationship between the accuracy of extension channels and communication behavior should be interpreted as merely correlational (Fatmasari, *et al.,* 2017).

Their communication behavior shows a correlation coefficient of 0.239, indicating a weak and positive relationship. Although the significance test of external characteristics in relation to the accuracy of extension channels yields a value of 0.390, no statistically significant relationship is observed. Therefore, external characteristics do not play a significant role in determining the level of accuracy of extension channels in Tri Mulya Jaya Village. While the accuracy of extension channels may be related to communication behavior, the findings of this study indicate that the correlation is weak and not statistically significant (Anwarudin *et al.,* 2020).

The condition of communication channel utilization in extension activities in Tri Mulya Jaya Village is considered suboptimal, primarily due to the low frequency of meetings between farmers and extension agents and the limited use of technology. Although Microsoft PowerPoint is used as an extension medium, it has not been sufficient to ensure farmers are fully understand. Therefore, the adoption of other technological media as extension channels needs to be enhanced. Strengthening the use of additional technological media is necessary to improve the delivery of extension services. The low level of extension agents' communication behavior is partly attributed to limitations in data technology, which create several challenges, including shifts in communication behavior between the millennial generation and the digital era generation. These changes can be observed in daily life, particularly in the lack of face-to-face interactions during direct communication, which in turn disrupts communication efficiency (Rizqi dan Pradana, 2019)

The correlation test yields a coefficient of 0.441 with a positive direction; however, the significance value of 0.100 indicates that the relationship is not statistically significant at the 5% level. Similarly, the significance test of external characteristics in relation to extension intensity also produces a value of 0.100, suggesting the absence of a significant relationship. This underscores the importance of other factors that may be associated with extension intensity in Tri Mulya Jaya Village, beyond the external characteristics examined in this study. Farmers' communication behavior in Tri Mulya Jaya Village reflects the extent to which they are able to understand, accept, and apply information received through extension activities. Higher levels of extension intensity, together with supportive external characteristics, tend to enhance farmers' engagement in communication processes. Farmers who experience high extension intensity are more open to adopting sustainable agricultural practices and are better able to share experiences with fellow farmers. Conversely, when extension intensity is low or external characteristics are not supportive, farmers may face barriers in understanding information and implementing it in their daily farming practices.

Although the number of information sources shows a positive correlation with farmers' communication behavior, the significance value of 0.100 indicates that this relationship is not statistically significant at the 5% level. Therefore, the data from this study are not sufficiently strong to conclude that the number of information sources is significantly associated with communication behavior (Surya *et al.,* 2021). Nevertheless, access to diverse information obtained through the internet can have positive effects and create opportunities for farmers (Huang *et al.,* 2023). Farmers with broader

access to information may have better understanding; however, in this study, the relationship is not significant and thus cannot be strongly concluded. Research by Alotaibi *et al.,* (2021) highlights the relationship between the number of information sources and farmers' behavior in the context of organic agriculture. The study shows that the main sources of information used by organic farmers to obtain knowledge related to organic production are other organic farmers and organic agricultural organizations.

CONCLUSIONS

The internal and external conditions of farmers in Tri Mulya Jaya Village support the successful adoption and implementation of oil palm replanting. Internal factors such as age, education, and landholding size, together with external factors including the effectiveness of extension services, income, and extension channels, contribute in a harmonious manner. The use of smartphones by farmers demonstrates the positive impact of extension activities in shaping their attitudes toward replanting. The circular communication network structure in the village, involving a sample of 15 farmers, encourages equal participation, with key figures such as HN and AS playing central roles in information dissemination. Although the correlation between the accuracy of extension channels and communication behavior is weak, the circular network structure supports equality of interaction among farmers.

This study acknowledges several key limitations. First, the sample size is relatively small (N = 15) and was selected through non-probability sampling techniques (purposive and snowball sampling). Consequently, the findings regarding communication network patterns and the centrality of key actors are contextual to Tri Mulya Jaya Village and the Amanah Independent Oil Palm Farmers Association. The results therefore cannot be generalized to all independent oil palm farmers in other regions with different social contexts and network structures. In addition, the communication network data are cross-sectional in nature (collected at a single point in time) and thus do not capture the dynamic changes in communication networks as the replanting program progresses.

To support the success of the oil palm replanting program in Tri Mulya Jaya Village, several strategic measures need to be undertaken. First, the intensity of extension services should be increased through more frequent visits and improved information quality, along with closer collaboration between extension agents and relevant government agencies. Second, the use of technology—particularly smartphones—should be optimized by providing adequate training for farmers so they can effectively utilize digital tools to access information and communicate. Third, communication networks should be strengthened by establishing more structured platforms to ensure information is disseminated evenly and in a coordinated manner, while also reinforcing the roles of key actors within the network. Fourth, further research is needed to address existing limitations, such as studies with broader geographic coverage and larger sample sizes, in order to better understand challenges and solutions in replanting implementation more comprehensively. Finally, the pilot model developed by the Amanah Independent Oil Palm Farmers Association can be shared with other districts to promote the adoption of best practices and successful strategies. Through these measures, the replanting program is expected to become more effective and sustainable.

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