

Information Sharing, Trust, and Competitive Advantage: Impact on Business Performance in Plasma Farmer Groups

Information Sharing,
Trust, and Competitive
Advantage

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ABSTRACT

Plasma farmer groups smallholder farmers linked contractually to larger nucleus companies in the palm oil industry face challenges in maintaining consistent fresh fruit bunch (FFB) quality. These challenges, primarily due to the use of uncertified seeds and fluctuating yields, negatively affect their business performance. To address these issues, this study investigates how information sharing and trust influence business performance, both directly and indirectly, through competitive advantage. A quantitative approach was adopted using a five-point Likert-scale questionnaire administered to 83 plasma farmer groups selected through probability sampling. Structural equation modeling via SmartPLS was used to analyze the data. Results show that both information sharing and trust significantly enhance business performance, directly and via competitive advantage. Effective information sharing improves coordination and operational efficiency, while trust strengthens reliable partnerships, leading to higher productivity and profitability. Competitive advantage achieved through superior product quality and cost efficiency amplifies these effects. The study concludes that fostering transparent communication and trust-based collaboration is critical to strengthening the competitiveness and sustainability of plasma farmer groups within the palm oil supply chain.

Keywords: Business Performance, Competitive Advantage, Information Sharing, Supply Chain Management, Trust.

ABSTRAK

Kelompok tani plasma, petani kecil yang terhubung secara kontrak dengan perusahaan inti yang lebih besar di industri kelapa sawit, menghadapi tantangan dalam menjaga kualitas tandan buah segar (TBS) yang konsisten. Tantangan-tantangan ini, terutama karena penggunaan benih yang tidak bersertifikat dan hasil panen yang berfluktuasi, berdampak negatif pada kinerja bisnis mereka. Untuk mengatasi masalah ini, studi ini menyelidiki bagaimana berbagi informasi dan kepercayaan memengaruhi kinerja bisnis, baik secara langsung maupun tidak langsung, melalui keunggulan kompetitif. Pendekatan kuantitatif diadopsi dengan menggunakan kuesioner skala Likert lima poin

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yang diberikan kepada 83 kelompok tani plasma yang dipilih melalui pengambilan sampel probabilitas. Pemodelan persamaan struktural melalui SmartPLS digunakan untuk menganalisis data. Hasil menunjukkan bahwa berbagi informasi dan kepercayaan secara signifikan meningkatkan kinerja bisnis, secara langsung dan melalui keunggulan kompetitif. Berbagi informasi yang efektif meningkatkan koordinasi dan efisiensi operasional, sementara kepercayaan memperkuat kemitraan yang andal, yang mengarah pada produktivitas dan profitabilitas yang lebih tinggi. Keunggulan kompetitif yang dicapai melalui kualitas produk yang unggul dan efisiensi biaya memperkuat efek ini. Studi ini menyimpulkan bahwa mendorong komunikasi yang transparan dan kolaborasi berbasis kepercayaan sangat penting untuk memperkuat daya saing dan keberlanjutan kelompok tani plasma dalam rantai pasok kelapa sawit.

Kata Kunci: Kinerja Bisnis, Keunggulan Kompetitif, Pembagian Informasi, Agribisnis Pedesaan, Manajemen Rantai Pasokan, Kepercayaan.

INTRODUCTION

The palm oil industry is a cornerstone of Indonesia's economy, with plasma farmer groups playing a vital role in the supply chain of companies like PT. Perkebunan Nusantara IV Regional III. These groups, operating under partnership agreements, face challenges in maintaining consistent Fresh Fruit Bunch quality due to the use of uncertified seeds during replanting outside the Community Oil Palm Rejuvenation program. As illustrated in Figure 1, Fresh Fruit Bunch production from Sei Garo increased from 2019 to 2021 but declined from 2021 to 2023. In contrast, Sei Pagar saw a rise in 2023 after a decline, while Sei Galuh experienced a steady decrease due to pricing disputes. These fluctuations highlight inefficiencies in resource utilization and partnership dynamics, impacting Crude Palm Oil and Palm Kernel Oil production. Effective resource management is essential for superior performance, as supported by the resource-based view by Ferreira et al. (2022) and Lee and Lévesque (2023). Collaborative practices, such as information sharing and trust, enhance supply chain efficiency, enabling firms to achieve competitive advantage and improved outcomes (Tuya & Tuya, 2019; Widhiningsih, 2020).

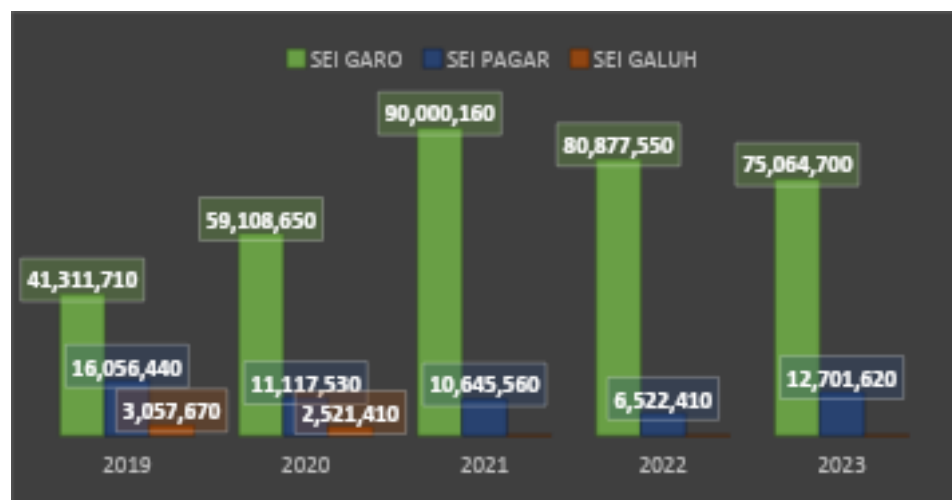


Figure 1. Number of TBS (KG) from Plasma Farmer Groups

Figure 1, information sharing and trust are crucial for fostering collaboration between plasma farmer groups and companies, facilitating better coordination and decision-making. Regular exchange of production and market data improves supply chain responsiveness, ensuring alignment with industry demands (Ploenhad et al., 2019; David et al., 2020; Puška et al., 2022; Cahyono et al., 2023; Anwar et al., 2025). According to Han and Shen (2025), trust strengthens partnerships by reducing opportunistic behavior,

which is crucial in the palm oil sector where farmers independently manage replanting. Similarly, Wang et al. (2019) emphasize that information sharing enhances operational efficiency, reducing costs and improving product quality. These practices are particularly relevant for plasma farmer groups, as inconsistent Fresh Fruit Bunch quality affects their competitiveness (Mangala, 2023; Rahman & Liu, 2023). Effective collaboration also mitigates issues that can disrupt supply chain stability (Hamid et al., 2020; Johannsen & Zak, 2021).

Despite the recognized importance of information sharing and trust, empirical findings on their impact on competitive advantage and business performance are inconsistent. According to Rodgers (2019), information sharing significantly enhances supply chain performance through improved coordination, yet Abusaq (2023) found no significant effect on competitive advantage in manufacturing contexts. Similarly, Hoai Nam et al. (2021) reported that trust does not significantly impact operational performance in some settings, contrasting with findings by Panahifar et al. (2018), which highlight trust's role in collaboration. These discrepancies suggest a research gap in understanding how information sharing and trust influence competitive advantage and business performance in the unique context of plasma farmer groups. The specific dynamics of these groups, including independent replanting and selective Fresh Fruit Bunch deposits, require further exploration (Ibrahim & Abiddin, 2025; Mehregan et al., 2023; Hong et al., 2024).

This study aims to address this research gap by analyzing the influence of information sharing and trust on business performance through competitive advantage in plasma farmer groups at PT. Perkebunan Nusantara IV Regional III. The research seeks to provide insights into how effective information exchange and trust-building enhance competitiveness and performance, offering practical strategies for improving supply chain collaboration in the palm oil sector. By leveraging findings from multiple studies, the research examines how trust fosters reliable partnerships and how information sharing enhances the quality of decision-making. The results are expected to contribute to both theoretical understanding and practical applications for sustainable palm oil production.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

Information Sharing, Trust and Competitive Advantage

Effective supply chain management enhances business performance by leveraging information sharing, fostering trust, and gaining a competitive advantage. According to Kumar and Gupta (2024), supply chain practices improve efficiency, reduce costs, and strengthen competitive positions, directly impacting performance metrics like profitability and productivity. Information sharing enables partners to align strategies, reducing inefficiencies such as the bullwhip effect, which distorts demand signals (Jiang, 2019). Trust fosters collaboration, ensuring honest and professional interactions among partners (David et al., 2020). Competitive advantage, rooted in unique resources, drives superior performance through product quality, innovation, and cost efficiency (Lieberman, 2021). These factors collectively contribute to achieving organizational goals in dynamic markets.

Business performance is multifaceted, encompassing efficiency, productivity, and profitability. Chand et al. (2020) emphasize that efficient resource utilization, measured by operational costs and asset use, is critical for performance. Strategic partnerships, as noted by Osei and Asante-Darko (2024), foster collaboration and innovation, resulting in enhanced customer satisfaction and improved financial outcomes. Information sharing supports decision-making quality, enabling firms to respond swiftly to market changes (Alduais et al., 2023). Trust reduces conflicts and builds long-term loyalty, further strengthening performance (Liza et al., 2021). The interplay of these elements is particularly relevant in agricultural supply chains, such as palm oil, where coordination is vital (Lombardi et al., 2020; Tai et al., 2022; Filatov, 2022).

The integration of information sharing, trust, and competitive advantage creates a synergistic effect on business performance. According to Cho and Lee (2024), process innovation and partnerships in supply chains enhance performance through improved

coordination. However, the specific impact of these factors in the context of plasma farmer groups remains underexplored, warranting further investigation. Based on this literature, the following hypotheses are proposed:

H1: Information sharing has a positive and significant effect on business performance.

H2: Trust has a positive and significant effect on business performance.

H3: Competitive advantage has a positive and significant effect on business performance.

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Impact of Information Sharing and Trust on Competitive Advantage

Information sharing and trust are critical drivers of competitive advantage in supply chains. According to Panahifar et al. (2018), information sharing enhances coordination by providing timely data on inventory, demand, and production schedules, enabling firms to achieve a competitive edge. Effective communication systems, supported by technology, improve the quality of shared information, reducing operational inefficiencies (Cai & Dang, 2015). In the palm oil industry, where plasma farmer groups collaborate with companies, accurate information exchange is essential for maintaining consistent Fresh Fruit Bunch (FFB) quality and achieving market competitiveness (Teese et al., 2022).

Trust plays a pivotal role in fostering collaboration and reducing opportunistic behavior among partners (Zhang et al., 2019). Lee and Kim (2023) highlight that trust strengthens commitment and information exchange, contributing to a firm's competitive position. Trust encompasses competence, integrity, and goodwill, which enhance the reliability of partnerships (Moalusi & Coetzee, 2018). In agricultural contexts, trust encourages farmers to share critical data, improving supply chain efficiency (Kramarz & Runowski, 2024). The absence of trust can lead to conflicts and reduced collaboration, undermining competitive advantage (Chalker & Loosemore, 2016). Thus, trust is a foundational element for achieving superior performance.

Competitive advantage arises from unique resources and capabilities that are valuable, rare, and inimitable. According to Qehaja and Kutllovci (2020), firms leveraging information sharing and trust can develop dynamic capabilities to adapt to market changes. These capabilities enable cost leadership, product differentiation, and innovation, which are critical for sustained competitiveness (Saad & Alnuaimi, 2019). The following hypotheses are proposed:

H4: Information sharing has a positive and significant effect on competitive advantage.

H5: Trust has a positive and significant effect on competitive advantage.

Competitive Advantage as a Mediating Factor

Competitive advantage serves as a mediator in the relationship between information sharing, trust, and business performance. According to Reklitis et al. (2021), competitive advantage mediates the impact of supply chain practices on performance by enabling firms to differentiate their offerings and optimize resources. Information sharing enhances decision-making and operational efficiency, which translate into competitive strengths such as cost efficiency and product quality (Paradies et al., 2017). These strengths, in turn, drive business performance by , such as those in the palm oil industry.

Trust facilitates collaboration, which strengthens competitive advantage and subsequently enhances performance. Kacperska and Ukasiewicz (2020) argue that trust fosters knowledge sharing, enabling firms to innovate and maintain a competitive edge. This innovation leads to improved business outcomes, including higher productivity and customer satisfaction (Farida & Setiawan, 2022). In the context of plasma farmer groups, trust with partners can enhance their ability to adopt innovative practices, boosting performance through competitive advantage (Raza-Ullah & Kostis, 2020). The mediating role of competitive advantage is thus critical in linking trust to performance.

The dynamic capabilities perspective further supports the mediating role of competitive advantage. According to Fabrizio et al. (2022), firms that adapt to

environmental changes through unique capabilities achieve sustained performance. Competitive advantage, driven by information sharing and trust, enables firms to respond effectively to market demands, enhancing overall performance (Ploenhad et al., 2019). The following hypotheses are proposed:

H6: Competitive advantage mediates the relationship between information sharing and business performance.

H7: Competitive advantage mediates the relationship between trust and business performance.

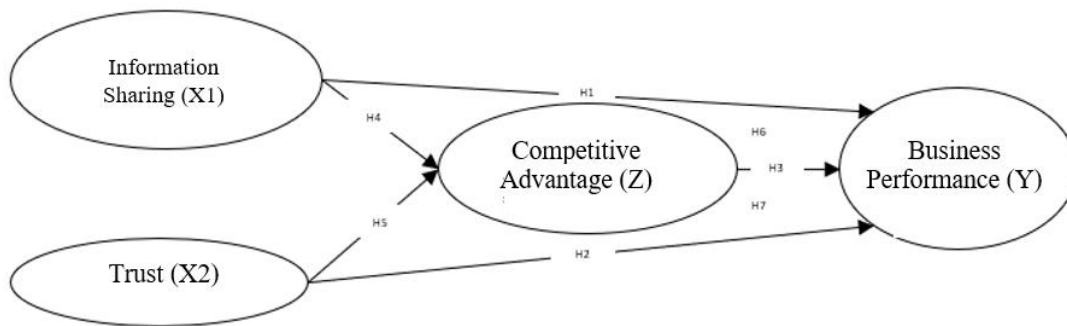


Figure 2. Research Model

This study examines the relationships among information sharing, trust, competitive advantage, and business performance in plasma farmer groups at PT. Perkebunan Nusantara IV Regional III. The research model, as illustrated in Figure 2, depicts information sharing and trust as independent variables that directly and indirectly influence business performance through competitive advantage, serving as a mediating variable. The model integrates hypotheses H1 to H7, providing a framework to test these relationships using SmartPLS. The framework is grounded in the resource-based view and supply chain management theories, emphasizing the role of collaboration in achieving superior performance.

RESEARCH METHOD

This research was conducted at PT. Perkebunan Nusantara IV Regional III, located in Pekanbaru, Indonesia, focuses on plasma farmer groups engaged in palm oil production. A quantitative approach was employed, utilizing numerical data analyzed through statistical methods to examine the relationships between information sharing, trust, competitive advantage, and business performance. The population consisted of 484 plasma farmer groups partnered with the company. To determine the sample size, the Slovin formula was applied, calculated as

$$n = N / (1 + N * e^2)$$

Where N is the population size and e is the margin of error (set at 0.1 for a 90% confidence level), yielding a sample of 83 farmer groups. This probability sampling technique ensured a representative selection, allowing for generalizable findings within the study context (Yustianto et al., 2020).

Data collection involved both primary and secondary sources to ensure comprehensive insights. Primary data were gathered through structured interviews and questionnaires distributed via Google Forms to the 83 sampled farmer groups. The questionnaire used a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) to measure variables: information sharing (e.g., frequency of data exchange on production schedules), trust (e.g., reliability and integrity in partnerships), competitive advantage (e.g., product quality and cost efficiency), and business performance (e.g., profitability and productivity). Secondary data, including FFB production records, were obtained from company reports.

To ensure validity, a pilot test was conducted with 10 farmer groups, and expert consultation refined the questionnaire items, confirming their relevance and clarity (Hair et al., 2021).

The analysis utilized Structural Equation Modeling (SEM) with a Partial Least Squares (PLS) approach, processed using SmartPLS version 4. This method is suitable for examining complex relationships between latent variables, as it accommodates multiple indicators and mediating effects. The measurement model assessed validity through outer loadings (>0.70) and the Fornell-Larcker criterion, ensuring discriminant validity. Reliability was evaluated using Cronbach’s alpha and composite reliability (>0.70). The structural model tested path coefficients, with hypotheses accepted if t-statistics exceeded 1.96 and p-values were below 0.05. The R-square value, targeted above 0.5, indicated the model’s explanatory power. This rigorous approach ensured robust analysis of the relationships among the study variables (Cho & Lee, 2024).

RESULTS

This study involved 83 respondents from plasma farmer groups partnered with PT. Perkebunan Nusantara IV Regional III in Pekanbaru, Indonesia, provides a diverse sample to explore the relationships between information sharing, trust, competitive advantage, and business performance. Table 1 presents the demographic and operational profiles of these respondents, including garden location, gender, education level, land area, ownership status, group size, and farming experience. The sample included 24 groups from Sei Garo (29%), 23 from Sei Pagar (28%), and 36 from Sei Galuh (43%). Gender distribution showed a male dominance, with 73 males (88%) and 10 females (12%), reflecting the male-centric nature of farming in this region. Education levels varied, with 35 respondents (42%) holding high school diplomas, 15 (18%) holding bachelor’s degrees, 10 (12%) holding diplomas, 13 (16%) having completed junior high school education, and 10 (12%) having completed elementary education. Land ownership was split, with 49 groups (59%) owning their land and 34 (41%) renting, while land sizes ranged from less than 10 hectares (24%) to over 30 hectares (31%). Group sizes varied, with 27 groups (33%) having over 30 members, and farming experience spanned from less than 5 years (16%) to over 25 years (18%). These characteristics provide context for interpreting the findings, as factors like education and experience may influence information sharing and trust.

Table 1. Characteristics Distribution

No	Characteristics	Lots	%
Garden Location	Sei Garo	24	29%
	Sei Pagar	23	28%
	Sei Galuh	36	43%
Gender	Gender		
	Man	73	88%
	Woman	10	12%
Level of education	Elementary School	10	12%
	Junior High School	13	16%
	Senior Hight School	35	42%
	Diploma	10	12%
	under Graduate	15	18%
Average Land Area	< 10 Hectares	20	24%
	10-20 Hectares	19	23%
	20-30 Hectares	18	22%
	>30 Hectares	26	31%
Ownership Status	One's own	49	59%
	Rent	34	41%
Number of Members	5-10 Farmers	22	27%
	10-20 Farmers	20	24%
	20-30 Farmers	14	17%
	>30 Farmers	27	33%
	< 5 Years	13	16%

Length of gardening	5-10 Years	15	18%
	10-15 Years	23	28%
	15-20 Years	17	20%
	>25 Years	15	18%

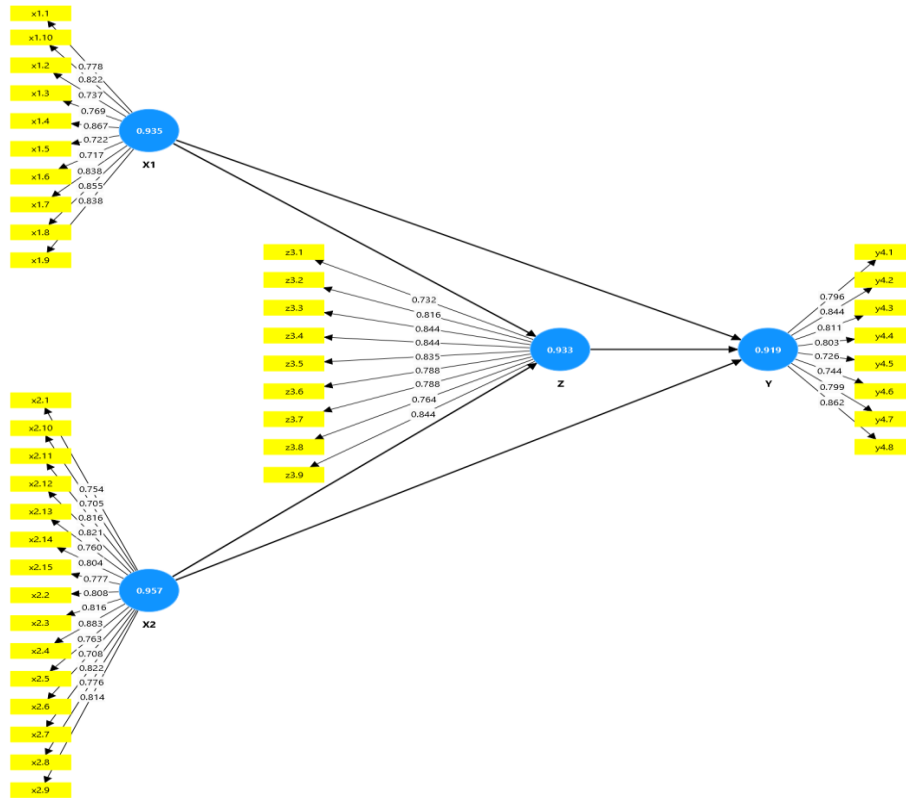


Figure 3. Loading Factor

The validity of the measurement model was assessed using the loading factor and Fornell-Larcker criterion, ensuring the constructs accurately measured the intended variables. Figure 2 illustrates the outer loadings for each indicator, all of which exceed the threshold of 0.70, indicating that the indicators for information sharing, trust, competitive advantage, and business performance are valid. This high loading factor confirms that each indicator strongly correlates with its respective construct, ensuring measurement accuracy.

Table 2. Fornell-Larcker Criterion Test Results

Variables	X1	X2	AND	WITH
X1	0.918			
X2	0.867	0.915		
AND	0.908	0.888	0.915	
WITH	0.796	0.790	0.799	0.807

Table 2 further validates the model by comparing the square root of the Average Variance Extracted (AVE) for each construct against its correlations with other constructs. The AVE square roots were 0.918 for information sharing, 0.915 for trust, 0.915 for business performance, and 0.807 for competitive advantage, all exceeding their respective correlation values. This indicates no discriminant validity issues, as each construct is distinct from the others, supporting the robustness of the measurement model. The clear separation of constructs aligns with findings by Cho and Lee (2024), emphasizing the importance of discriminant validity in supply chain studies.

Reliability tests confirmed the consistency of the measurement instruments. Table 3 presents the Cronbach's alpha and composite reliability scores, all surpassing the 0.70 threshold, indicating reliable constructs. Specifically, information sharing achieved a Cronbach's alpha of 0.935 and a composite reliability of 0.945. Trust scored 0.957 and 0.961, competitive advantage scored 0.933 and 0.944, and business performance scored 0.919 and 0.934. The AVE values, ranging from 0.624 to 0.651, further confirm that the constructs explain a substantial portion of the variance in their indicators. These results ensure that the questionnaire responses were consistent and dependable, aligning with standards for reliable measurement in quantitative research. The high reliability scores suggest that the farmer groups provided accurate and consistent responses, which is critical for drawing meaningful conclusions about their supply chain practices.

Table 3. Reliability & Validity

Variable	Cronbach's alpha	(rho_a)	Composite reliability	(AVE)
IS (X1)	0.935	0.941	0.945	0.634
T (X2)	0.957	0.958	0.961	0.624
CA (Y)	0.919	0.921	0.934	0.639
BP (Z)	0.933	0.934	0.944	0.651

Table 4. Hypothesis Testing

Hypotheses	Original sample	Mean	Standard deviation	t-statistics	p-values
IS (X1) → CA (Y)	0.454	0.458	0.084	5.379	0.000
IS (X1) → BP(Z)	0.464	0.455	0.103	4.492	0.000
T (X2) → CA(Y)	0.213	0.225	0.109	1.991	0.049
T (X2) → BP(Z)	0.512	0.522	0.107	4.788	0.000
KB(Z) → CA(Y)	0.307	0.294	0.127	2.424	0.015
IS (X1) -> BP(Z)-> Y	0.143	0.136	0.069	2.073	0.038
T (X2) -> BP(Z) -> BP(Z)	0.157	0.150	0.072	2.198	0.028

Hypothesis testing was conducted using the structural model in SmartPLS version 4, with results presented in Table 4. The analysis tested seven hypotheses, with acceptance criteria of t-statistics greater than 1.96 and p-values less than 0.05. Information sharing significantly influenced business performance (original sample = 0.454, t = 5.379, p = 0.000) and competitive advantage (original sample = 0.464, t = 4.492, p = 0.000), supporting H1 and H4. Trust also had a significant effect on business performance (original sample = 0.213, t = 1.991, p = 0.049) and competitive advantage (original sample = 0.512, t = 4.788, p = 0.000), confirming H2 and H5. Competitive advantage positively impacted business performance (original sample = 0.307, t = 2.424, p = 0.015), supporting H3. The mediating role of competitive advantage was evident in the relationships between information sharing and business performance (original sample = 0.143, t = 2.073, p = 0.038) and trust and business performance (original sample = 0.157, t = 2.198, p = 0.028), confirming H6 and H7. These findings align with those of Reklitis et al. (2021), who found that competitive advantage mediates the impact of supply chain practices on performance.

The structural model's explanatory power was assessed through the R-square values, which were 0.888 for business performance and 0.738 for competitive advantage, indicating that the model explains a substantial portion of the variance in these constructs. These high R-square values suggest a strong relationship between the variables, consistent with supply chain studies emphasizing the role of information sharing and trust (Panahifar et al., 2018). The demographic characteristics, such as the predominance of male farmers and varying education levels, may influence the degree of information sharing and trust, as less educated farmers might face barriers in adopting collaborative practices (Kramarz & Runowski, 2024).

The results indicate that plasma farmer groups with higher levels of information sharing and trust achieve greater competitive advantage and business performance. The

significant mediating effect of competitive advantage underscores its role in translating collaborative practices into tangible outcomes. These findings are particularly relevant in the palm oil industry, where effective partnerships can address challenges like inconsistent FFB quality. The diverse characteristics of the respondents, such as land ownership and farming experience, suggest that tailored strategies may be needed to enhance collaboration across different group profiles (Farida & Setiawan, 2022). The robust statistical outcomes provide a solid foundation for further discussion on practical implications for PT. Perkebunan Nusantara IV Regional III and similar agricultural contexts.

DISCUSSION

The findings of this study reveal a significant relationship between information sharing, trust, competitive advantage, and business performance, which aligns with Rodgers (2019), who found that effective information exchange improves supply chain coordination, leading to increased operational efficiency. In the context of plasma smallholder groups, sharing data on production schedules and market demand allows farmers to align their efforts with company requirements, thereby reducing inefficiencies such as the bullwhip effect (Jiang, 2019). However, Abusaq (2023) reported no significant effect of information sharing on competitive advantage in manufacturing, suggesting that its impact may be context-specific. The agricultural setting of this study, with its reliance on timely FFB quality data, likely amplifies the role of information sharing, highlighting the need for specific strategies within the palm oil supply chain (Oliveira et al., 2024).

Trust also significantly impacts business performance. According to Ho et al. (2023), trust fosters collaboration and reduces conflict, increasing the reliability of partnerships. In this study, trust in the form of integrity and goodwill between farmers and companies strengthened collaborative efforts, leading to higher productivity and profitability. This contrasts with Hoai Nam et al. (2021), who found no significant impact of trust on operational performance in specific contexts, possibly due to different partnership dynamics. The unique structure of plasma smallholder groups, where farmers independently manage replanting and storage of Fresh Fruit Bunches (FFB), underscores the crucial role of trust in ensuring consistent collaboration (Kramarz & Runowski, 2024). The significant influence of trust on competitive advantage further supports its role in enabling farmers to achieve cost efficiency and product quality, in line with the findings of Panahifar et al. (2018).

Competitive advantage has a significant impact on business performance, mediating the relationship between information sharing and trust with business performance. According to Reklitis et al. (2021), competitive advantage acts as an important mediator by translating collaborative practices into tangible outcomes such as market share and profitability. In this study, competitive advantage, driven by superior FFB quality and cost-effective practices, improved farmer groups' ability to meet market demand, supporting the findings of Ploenhad et al. (2019). The high R-squared values (0.888 for business performance and 0.738 for competitive advantage) indicate a robust model, suggesting that these factors explain most of the variance in performance. However, the predominance of male farmers (88%) and varying education levels may introduce bias, as less educated farmers may face challenges in adopting information-sharing technologies, potentially limiting the generalizability of the findings (Farida & Setiawan, 2022; Ferreira et al., 2022).

CONCLUSION

This study confirms that information sharing and trust significantly enhance business performance among plasma farmer groups at PT. Perkebunan Nusantara IV Regional III, both directly and through the mediating role of competitive advantage. Effective information sharing ensures timely data exchange on production schedules and market demands, enabling farmers to improve Fresh Fruit Bunch (FFB) quality and operational efficiency. Trust fosters reliable partnerships, reducing conflicts and encouraging

collaborative efforts that boost productivity and profitability. Competitive advantage, driven by superior product quality and cost efficiency, strengthens the link between these factors and business performance. These findings underscore the crucial role of collaboration in addressing challenges such as inconsistent FFB yields in the palm oil industry.

The results offer valuable implications for theory and practice while acknowledging limitations and future research directions. Theoretically, the study reinforces the importance of collaborative practices in enhancing supply chain performance within agricultural settings. Practically, plasma farmer groups and companies can adopt digital platforms to facilitate real-time information sharing and conduct training to build trust through transparent contracts. However, the study is limited by its focus on a single company and a sample of 83 farmer groups, which may not fully represent the diverse contexts of plasma farmers. The reliance on quantitative methods also restricts insights into qualitative factors like farmer motivations. Future research should expand the sample size, include multiple regions, and incorporate mixed methods to explore additional variables such as technological adoption or cultural influences on collaboration.

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