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A Pls–Sem Approach To Analyse Factors Affecting Farmers' Accessibility Towards Markets And Its Relation To Farmers' Bargaining Position: A Case Of Gambir Farmer In West Sumatera

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Abstract: *This study investigates factors influencing Gambir farmers' market accessibility and their bargaining position with middlemen in West Sumatra, using Partial Least Squares Structural Equation Modeling (PLS-SEM). Despite West Sumatra contributing over 80% of global Gambir production, small-scale farmers face challenges such as weak market access, dependency on middlemen, and limited negotiation power. This study integrates Transaction Cost Economics (TCE) and Social Capital Theory to identify critical factors—such as infrastructure, farmer groups, and knowledge—that influence market accessibility and examines their impact on farmers' bargaining positions. The results indicate that improved infrastructure and farmer group participation significantly enhance market access, while dependency on middlemen limits farmers' ability to negotiate favorable terms. The findings contribute to the existing literature by providing a theoretical understanding of market dynamics in oligopsony markets and proposing actionable solutions to enhance farmers' market participation and bargaining power.*

Keywords: *Gambir Farming, Structural Equation Modeling (SEM), Market Accessibility, Farmer Bargaining Power, Agriculture Middlemen.*

1. INTRODUCTION

West Sumatra possesses valuable export commodities, specifically Gambir. Gambir has a significant economic value in international trade, with West Sumatra being responsible for fulfilling at least 80% of the global demand for Gambir (Malik et al., 2020). Lima Puluh Kota Regency (LPKR), play a crucial role in the production of Gambir in West Sumatra. Gambir is derived from the dried sap of Uncaria Gambir Roxb (Ug) leaves and twigs. The main components of Gambir are catechins (7-33%) and tannins (20-50%), which have significant applications in the textile, pharmaceutical, and cosmetics industries (Fauza, 2016; Hendri et al., 2020).

The production of Gambir involves a series of steps, including boiling, pressing, depositing, draining, molding, and drying. This knowledge of Gambir production is passed down from one generation of farmers to the next. The process occurs in Kampo houses, where reliance on simple technology caps production capacity at 20-25 kg daily. Kampo house built in the middle of Ug field relatively long distance with a closest distance about 5 km from where farmer reside and mostly located on a hill side. Currently, Gambir is distributed or sell to local middlemen within the local area. Even though there is a local market, the prices offered by these local middlemen are not substantially different from what one would get at the local market. This is because local middlemen dominate the collector role within the local market. It is understandable why farmers continue to depend on local middlemen as their primary buyers, as depicted in Figure 1.

This study applies Transaction Cost Economics (TCE) to understand how high transaction costs—such as transportation expenses, information asymmetry, and middlemen dependency—affect farmers' market access. Additionally, Social Capital Theory highlights the role of trust, networks, and collaboration within farmer groups in improving farmers' bargaining power and reducing economic vulnerability.

Market access is vital for farmers, yet challenges such as insufficient information, high transportation costs, and dependence on local middlemen often restrict direct access. The market referred to the domestic market or export, which is dominated by pharmaceutical and cosmetic producers or provincial traders located in Padang. Meanwhile, the price offered in the domestic and export market is higher if the Gambir meets the requested specifications. There are several factors believed to influence the

bargaining position of farmers today, making it difficult for them to access the market directly (Elida et al., 2025).

The role of middlemen in the agricultural industry, particularly in developing nations, has always been a topic of debate. This is particularly true for exotic products like coffee, cocoa, rubber, banana, cassava, and others, as these goods are often controlled by middlemen. There are those who believe that middlemen are beneficial as they help farmers by selling their products in the market, thereby reducing their workload. However, there are also those who oppose their presence, arguing that they can harm farmers by offering unfair prices, exerting control over production, and perpetuating an unjust payment system (Abebe et al., 2016; Hayami et al., 1999; Sudrajat & Isytar, 2021).

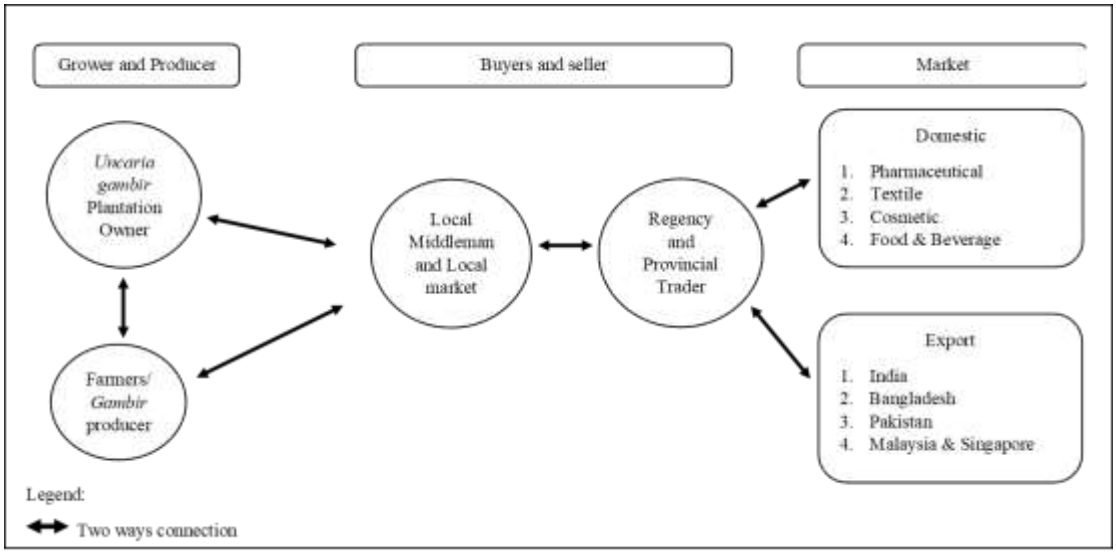

Figure 1. Present Gambir Distribution Channel, Source: Field Survey 2017-2022

There are three main dimensions to accessing the market: physical aspects of accessing the market, market structure, and lack of skills, information, and farmer groups (Oduor et al., 2017; Novaliendry et al., 2023). The physical aspect of accessing the market is the physical infrastructure of transportation itself. Information, including knowledge of prices and competitors, is also included. Studying other factors that limit farmers' access to the market is very important because from here we can determine what policies should be implemented to achieve the welfare of Gambir farmers in West Sumatra in the future.

Although previous studies largely emphasize Gambir production techniques and price dynamics, limited attention has been given to the interplay between market accessibility and bargaining power in oligopsony markets. This study contributes to bridging this gap by integrating TCE and Social Capital Theory to analyze structural and relational factors that influence farmers' ability to access markets and negotiate favorable terms. By doing so, it provides both theoretical and practical insights for improving the livelihoods of Gambir farmers in West Sumatra.

By conducting this study, the researchers aim to shed light on the factors that affect the accessibility of Gambir farmers in West Sumatera. This analysis will provide insights into the challenges and opportunities faced by farmers in accessing the market. Additionally, the study will explore the relationship between market accessibility and the bargaining position of farmers in their interactions with local middlemen. Understanding these dynamics is crucial for developing strategies and interventions that can enhance the accessibility of Gambir farmers to the market and improve their bargaining position. By addressing these issues, it is possible to create a more equitable and efficient Gambir market, benefiting both the farmers and the overall industry.

In conclusion, this study seeks to fill the gap in previous research by analyzing the factors influencing Gambir farmers' access to the market and their bargaining position. By doing so, it aims to contribute to a better understanding of the challenges faced by farmers and provide insights for improving their market accessibility and bargaining power. Furthermore, the purpose of this research is twofold: (i) to examine the factors that impact the accessibility of Gambir farmers in West Sumatera, and (ii) to analyze the

correlation between market accessibility and the bargaining power of farmers in relation to local middlemen (Novaliendry et al., 2025).

2. METHOD

This comprehensive research was conducted in LPKR, targeting four districts notable for their Gambir production: Mahat, Kapur IX, Talang Maur, and Sarilamak (Figure 2). The study involved a carefully selected sample of 251 Gambir farmers, chosen through purposive sampling based on specific criteria. The data collection period extended from 2018 to August 2023.

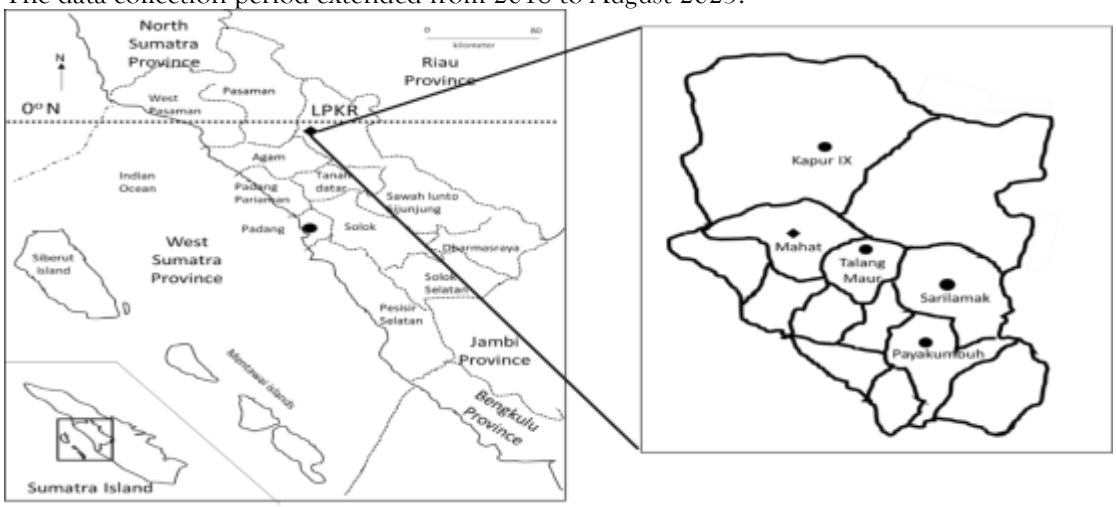

Figure 2. Study sites: LKPR

TCE guided the identification of structural barriers such as infrastructure and transaction costs, while Social Capital Theory informed the analysis of relational factors like trust and collaboration within farmer groups. The research framework integrates TCE to assess the influence of transaction costs (e.g., infrastructure, transportation) and Social Capital Theory to evaluate the role of trust and collaboration within farmer groups.

The research was structured around two primary sets of variables. The first set, primary variables, included factors directly impacting the farming process and market dynamics, such as access to infrastructure, the nature of relationships with middlemen, motivational aspects, knowledge levels, the existence and role of farmer groups, market accessibility, and the bargaining position of farmers. These variables were critical in understanding the operational and market challenges and opportunities faced by Gambir farmers.

The second set, characteristic variables, focused on demographic and personal attributes of the farmers, like age, family size, educational background, area, experience, and income. This helped in creating a more detailed and nuanced picture of the Gambir farming community, contributing to a deeper understanding of how personal and demographic factors might influence farming practices and market interactions.

Data was meticulously gathered through questionnaires, ensuring a comprehensive and representative collection of information. The analysis was conducted using Structural Equation Modeling (SEM) with the Partial Least Square (PLS) approach, employing the SmartPLS 3.0 software. This advanced analytical approach allowed for a more precise and nuanced understanding of the complex relationships between the various variables.

Variable	Indicator	Code
Infrastructure Accessibility (IA)	Transportation facilities are readily accessible.	IA1
	Roads are conveniently accessible from various distances.	IA2
	Information can be collected from the internet, websites, or marketplaces.	IA3
	Thoroughly informed about the requirements for products.	IA4
	Gambir prices are available online.	IA5
	Information and telecommunication facilities are accessible.	IA6

Bonding with middlemen (BM)	Farmers obtain financial loans through middlemen.	BM1
	Farmers experience pressure from middlemen.	BM2
	Farmers and middlemen reach an agreement on methods of payment and collection.	BM3
	Farmers produce goods according to the requests of middlemen.	BM4
Motivation (MV)	Reliable	MV1
	Short Cut	MV2
	Time efficient	MV3
	Effort less	MV4
Knowledge (KN)	Workshop	KN1
	Technology on production	KN2
	Product quality	KN3
Farmer Group (FG)	Active encouraging farmer	FG1
	Active in marketing	FG2
	Active in organization	FG3
Market Accessibility (MA)	Gaining easy access to the market.	MA1
	Can efficiently distribute products in the market.	MA2
	Successful in penetrating the market.	MA3
	Capable of collecting information from the market.	MA4
Farmers' Bargaining Position (FBP)	Price determination based on middlemen	FBP1
	Able to encounter middlemen pressure	FBP2
	Able to control payment and collective system	FBP3

Table 1. Research Variables of the Analysis Factors Which Are Affecting Farmers Accessibility To Market

The research was underpinned by a robust model analysis framework. This framework served as a guide, aiding in the clear and effective comprehension of the research objectives. It facilitated a systematic analysis of the exogenous and endogenous latent variables, using reflective indicators. These were instrumental in validating the research hypotheses and are detailed in Figure 3 of the study.

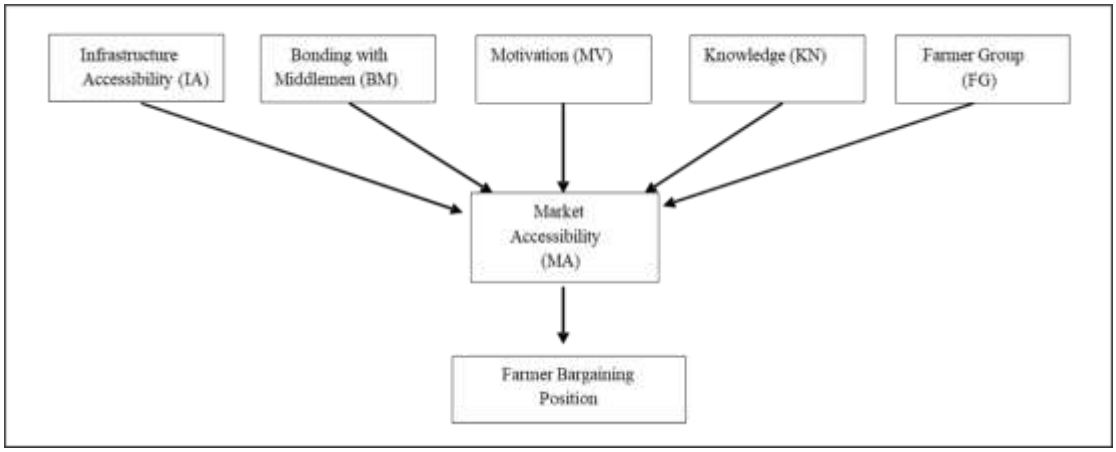

Figure 3. Research Framework

The study hypothesizes that H1: Infrastructure accessibility (TCE) reduces transaction costs, enhancing market accessibility. H2: Participation in farmer groups (Social Capital Theory) strengthens trust and collaboration, improving market accessibility. H3: Enhanced market accessibility significantly improves farmers' bargaining power.

In essence, this research provided a holistic and in-depth analysis of the Gambir farming sector in LPKR, offering valuable insights into the operational, demographic, and market dynamics that shape the livelihoods of Gambir farmers.

3. RESULTS AND DISCUSSION

3.1. Respondents Characteristics

A significant proportion (Table 2), 55%, of the farmers fall within the 41-50 age bracket, indicating a workforce that is experienced yet still within a productive age range. Notably, the 61-70 age group is the least represented, accounting for only 2% of the population, which may suggest a decline in farming as a viable occupation for the older generation.

The family structure predominantly comprises four members, making up 44.2% of the sample. This family size could be indicative of the traditional family unit prevalent in the farming community. Educational attainment among these farmers shows a skew towards junior high school education, with 45.8% having completed this level. This educational profile suggests a basic to moderate level of formal education, which may impact their farming practices and access to newer agricultural technologies.

Land ownership and management patterns reveal that a vast majority, 70.9%, cultivate Ug on plots smaller than 2 hectares. This finding highlights small-scale farming as a common practice, potentially reflecting limitations in resources, financial capacity, or land availability. In contrast, a minority, about 4%, manage more extensive land areas exceeding 4 hectares, pointing to a small segment of farmers who might be better resourced or have access to larger land holdings.

Experience in farming is a noteworthy aspect, with a significant majority, 93.2%, possessing over five years of experience in cultivating and processing Gambir. This high level of experience underscores a deep familiarity with and commitment to Gambir farming, potentially leading to a rich knowledge base and skill set within the community.

The income data presents an interesting perspective: the majority of farmers, 50.6%, fall within the 2 to 4 million IDR monthly income range. This income bracket suggests a moderate economic standing, where farmers are likely able to sustain their livelihood but might not have significant financial flexibility. The income range also reflects the economic realities of small-scale farming and the market conditions for agricultural products like Gambir.

Characteristic	Frequency	Percentage	Characteristic	Frequency	Percentage
Age (year)			**Number of Family (person)**		
21 – 30	37	14.7	**1 – 2**	60	23.9
31 – 40	51	20.3	**3 – 4**	111	44.2
41 – 50	138	55	**5 – 6**	72	28.7
51 – 60	20	8	**7 – 8**	8	3.2
61 – 70	5	2			
Characteristic	**Frequency**	**Percentage**	**Characteristic**	**Frequency**	**Percentage**
Education		**Area (ha)**			
SD (elementary)	102	40.6	**< 2**	178	70.9
SMP (junior)	115	45.8	**2**	63	25.1
SMA (senior)	34	13.5	**> 2**	10	4
Experience (year)			**Income (IDR in million/month)** *		
<5	4	1.6	**2**	8	3.2
5	13	5.2	**2 – 4**	127	50.6
>5	234	93.2	**> 4**	116	46.2

*IDR = Indonesian Rupiah (1 USD = Rp 14,575, June 2020)

Table 2. The Characteristic of Gambir Farmer (respondents)

3.2. Market Accessibility Factors

The positive influence of infrastructure accessibility aligns with TCE, demonstrating how reduced transaction costs improve market participation. Similarly, the role of farmer groups reflects Social Capital Theory, which emphasizes trust and collective action in overcoming market barriers.

The SmartPLS3 analysis, shown in Figure 4, identified that the loading factors for four indicators (IA1, IA5, IA6, and FBP1) were below 0.6. According to (Sarstedt et al., 2017), in exploratory research, loading

factors should ideally be between 0.6 and 0.7. Consequently, it is advisable to remove indicators with loading factors under 0.6 for more effective hypothesis testing. Additionally, the study indicated that the Average Variance Extracted (AVE) for each construct was above 0.5, suggesting that the model does not have convergent validity issues. Reliability was evaluated using Cronbach's Alpha and Composite Reliability, both exceeding 0.7 for every construct, which confirms their reliability. Table 3 details the validity and reliability metrics for each criterion. Further, the structural model was evaluated by estimating the path coefficient to understand the influence of one latent construct on another. This assessment included reviewing the SmartPLS 3.0 bootstrapping output to analyze direct effects and the T-Statistic to determine the significant impacts of constructs.

The hypothesis testing, executed via the Bootstrapping method in SmartPLS 3, established those variables such as farmer group, infrastructure accessibility, and knowledge significantly influenced farmer accessibility to the Gambir market in LPKR. However, bonding with middlemen and motivation did not significantly affect market access, as indicated P Value 0.139 and 0.168 respectively which is below the threshold at a 0.05 significance level (Figure 4).

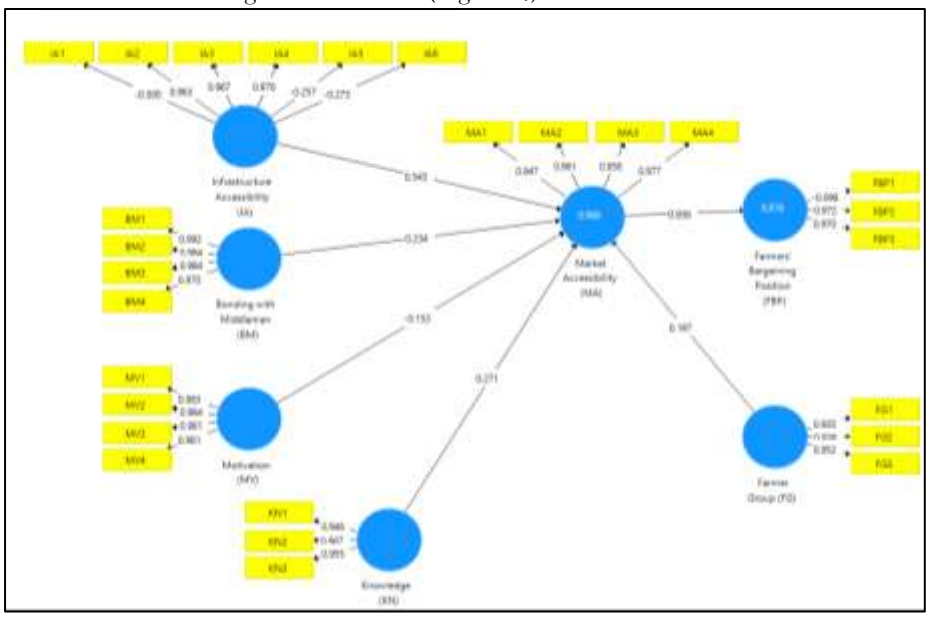

Figure 4. Result of Measurement Model

The findings confirm Transaction Cost Economics (TCE) by illustrating how infrastructure reduces transaction costs, thereby facilitating market access. Similarly, Social Capital Theory is reflected in the positive impact of farmer groups, which foster trust, collaboration, and collective action to improve farmers' market participation.

In markets where a small number of buyers or middlemen hold significant control, the dynamics, and relationships between producers, such as farmers, and these middlemen are distinctly different from those in more competitive environments. Farmers often find themselves with limited alternatives for selling their produce, leading to a forced compliance with the terms set by these few dominant buyers. This situation often results in the farmers operating under unfavorable conditions, accepting minimal profit margins or even incurring losses, just to sustain their livelihoods.

The power dynamics in these markets are heavily skewed in favor of the middlemen. Even highly motivated farmers can face substantial challenges in accessing markets, as these entities exert considerable control over market entry and pricing. This creates a dependency, where farmers are often compelled to accept lower prices or unfavorable terms, just to access the market.

Moreover, the relationship between bonding with middlemen and the motivation to deal with them can vary based on market structure. In some contexts, such as small family farms, decisions to market crops through middlemen are influenced by factors like selling prices, crop quantities, and market availability. This indicates that economic and practical considerations often drive these relationships more than personal bonding (Purnawan et al., 2021).

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Bonding with Middlemen (BM)	0.988	1.002	0.991	0.965
Farmer Group (FG)	0.930	0.932	0.955	0.877
Farmers' Bargaining Position (FBP)	0.939	0.939	0.970	0.943
Infrastructure Accessibility (IA)	0.976	0.976	0.984	0.954
Knowledge (KN)	0.953	0.954	0.970	0.914
Market Accessibility (MA)	0.971	0.972	0.979	0.920
Motivation (MV)	0.988	0.993	0.991	0.965

Table 3. The analysis result from some criterions of test measurement model

In different market settings, such as the container shipping industry, the nature of the relationship, including the type of bonding strategy employed, can significantly impact customer satisfaction and loyalty. For instance, financial bonding strategies were found to have the most direct effects on customer satisfaction, while social bonding strategies had a stronger impact on customer loyalty. This illustrates that in certain business contexts, relational dynamics can play a critical role in shaping business relationships (Balci et al., 2019; Novaliendry et al., 2023).

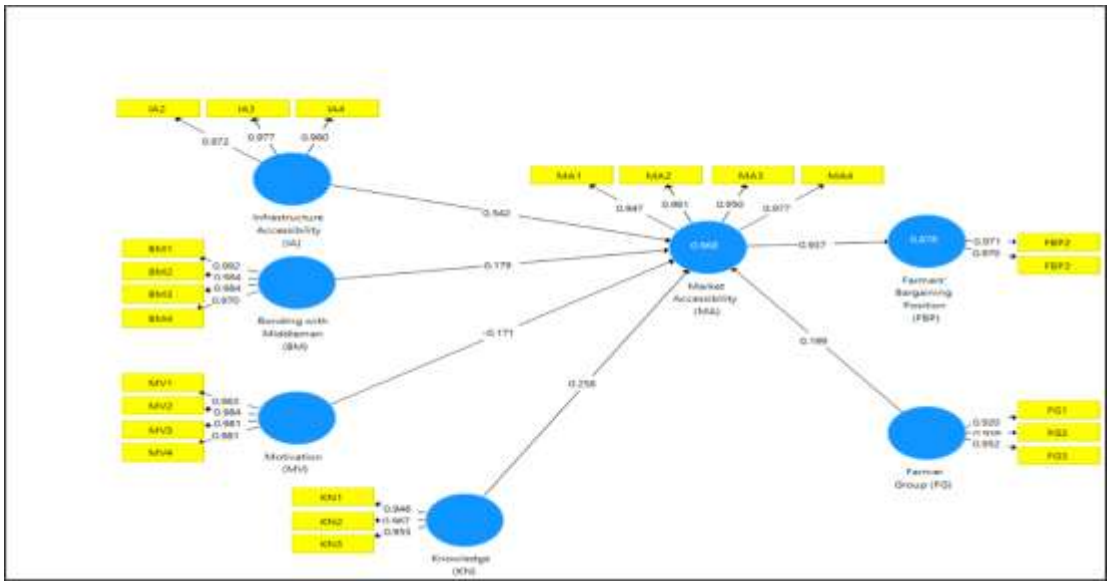

Figure 5. Result of improved measurement model

These insights reveal how market structure and power dynamics crucially shape the interactions and relationships between Gambir farmers and middlemen. In oligopsony markets, where competition is limited and a few middlemen dominate, economic pressures and market access necessities often overshadow the importance of personal relationships between the involved parties.

These findings align with TCE's premise that reduced transaction costs (e.g., improved infrastructure) enhance market participation. Additionally, Social Capital Theory is evident in the role of farmer groups, which foster trust and collaboration, facilitating better market access.

3.3. Farmers Bargaining Position

Farmers' bargaining position in this study was about price determination based on middlemen, the ability of farmers to encounter middlemen pressure on the sale of Gambir, able to control the payment method and collective system. Based on the results of the descriptive analysis, 64.5% of respondent they were not involved in determining the price of their Gambir. It meant that farmers just followed the price set by middlemen without bargaining. In the case of encountering middlemen pressure, only 23.5% of respondent able to encounter middlemen pressure, these number of respondents nearly similar with farmer ability to control payment and collective system which is about 22.7%.

The weak bargaining power of Gambir farmers aligns with TCE's assertion that high transaction costs and market asymmetry disadvantage small-scale producers. Furthermore, the absence of strong social

capital—such as trust-based networks and organized farmer cooperatives—exacerbates dependency on middlemen, limiting negotiation capacity, as predicted by Social Capital Theory.

Many farmers operate on a small scale, individually producing limited quantities of Gambir. This small scale limits their market influence compared to larger producers or buyers. Small-scale farmers often face economic challenges due to the high cost of transportation. This can hinder their ability to scale their operations and meet the demands of larger markets. Studies have identified these economic barriers as significant factors affecting small-scale farmers in various regions, including South Africa and the USA (Al-aziz & Monalisa, 2023; Pratama et al., 2023). The limited capacity for scaling up operations further exacerbates these challenges (Dhillon & Moncur, 2023; Farming, 2021). Al-aziz, H., & Monalisa, S.

Lack of proper storage facilities means farmers cannot store their produce to sell when market prices are more favorable. This situation compels them to sell immediately after produced Gambir, often when market prices are lowest due to high supply. This situation is not unique to one region but is a common challenge faced by small-scale farmers globally (Oluremi et al., 2021;Novaliendry et al., 2021).

Many farmers need immediate cash maybe to pay off debts or cover living expenses, pushing them to sell quickly rather than wait for a better price. Similarly with previous research which explain about farmers in India often face a range of problems at the time of selling their produce, including the absence of protection, high costs of inputs, and issues with transportation and storage. These problems are coupled with financial constraints, further complicating the situation for farmers (Mandala et al., 2021).

The study highlights the precarious position of small-scale Gambir farmers in the agricultural market. Their limited bargaining power, coupled with operational and financial constraints, places them at a significant disadvantage, particularly in their interactions with middlemen. Addressing these challenges requires a multifaceted approach, including policy interventions, infrastructure improvement, and support systems that enhance farmers' negotiating power and market access. The study supports Social Capital Theory by demonstrating how strong networks and organized farmer groups can mitigate power imbalances in oligopsony markets.

By integrating TCE and Social Capital Theory, this study provides a holistic view of the factors influencing Gambir farmers' market accessibility and bargaining power. Improved infrastructure reduces transaction costs, while farmer groups enhance trust and collective action, addressing structural and relational challenges in the agricultural market. The influence of market accessibility on farmers' bargaining position

The market access of farmers significantly influences their negotiating power with middlemen, as indicated by a P-value of 0.000. Farmers with better market access have more control over pricing and payment terms when dealing with middlemen. Conversely, those with limited market access, particularly those reliant on middlemen, often find themselves in a weaker bargaining position.

In the study "Analysing Agricultural Diversification as a Risk Management Strategy with the Minimum Regret Model," agricultural diversification is examined as a method for managing risk (Etten & International, 2019). This research shows that diversifying crop varieties can help farmers minimize risks by optimizing their crop portfolio, using a model that predicts the least regrettable outcome. It underscores the necessity of strategic crop selection to balance potential gains and losses under various scenarios, reinforcing the importance of diversification in agricultural risk management.

Improving product quality and differentiation in agriculture is crucial for enhancing competitiveness and market access. Research has shown that higher levels of product quality can lead to increased organizational performance and competitive advantage. Furthermore, effective quality management systems are essential for maintaining competitiveness, although they might incur additional costs (Onegina et al., n.d.).

The study integrates TCE and Social Capital Theory to demonstrate that improved infrastructure and organized farmer groups reduce transaction costs and foster trust, thereby enhancing market accessibility and bargaining power. These findings provide a theoretical framework to address structural challenges in oligopsony markets.

3.4. Managerial Implication

Farmers' market access limitations are not just due to bonds with middlemen or transport issues; other factors also influence their decisions to sell crops through intermediaries. This research implies a need for an understanding of marketing management among farmers and stakeholders. Enhancing farmers' market knowledge involves educating them about market objectives, pricing, competitors, and transaction methods.

Moreover, increasing farmers' access to markets through improved use of existing infrastructure is essential. Training should extend beyond cultivation skills to include marketing activities, enabling easier market access for farmers. This would empower farmers with greater bargaining power and ensure a fair distribution of benefits from their products, even when engaging with middlemen.

4. CONCLUSION

This study contributes to the theoretical discourse on agricultural market dynamics by integrating TCE and Social Capital Theory to address challenges in market accessibility and bargaining power. The findings show that improved infrastructure reduces transaction costs, enabling farmers to access markets more efficiently, while farmer groups foster trust and collaboration to strengthen bargaining positions. However, weak relationships with middlemen and limited market information continue to constrain farmers' ability to negotiate favorable terms. To address these challenges, policymakers should prioritize infrastructure development, promote organized farmer groups, and implement training programs to enhance farmers' market knowledge and negotiation skills. By bridging transaction cost barriers and fostering social capital, these strategies can create a more equitable and competitive market for Gambir farmers. This study advances the theoretical discourse by demonstrating the complementary roles of TCE and Social Capital Theory in addressing market accessibility and bargaining power challenges in oligopsony markets. Policymakers should prioritize infrastructure investment to reduce transportation costs and strengthen organized farmer groups to enhance social capital. Training programs focused on market knowledge and negotiation skills are essential for empowering farmers to achieve equitable outcomes.

Declaration of Conflicting Interests

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