Economic Engineering of the Profit-Sharing System as an Effort to Improve the Welfare of Rice Farmers in Pinrang Regency

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ABSTRACT

Rice farming in Pinrang faces an imbalance in the distribution of profits between tenant farmers and landowners, which results in low incomes and increased economic vulnerability of farmers, especially when production is not optimal. This study aims to design and analyze a profit-sharing system for rice farming based on an economic engineering approach in Pinrang District, South Sulawesi. The current profit-sharing system shows inequality between tenant farmers and landowners, both in terms of profit sharing and production costs. The research method used a qualitative approach with the support of quantitative analysis through simulation of net income in two production scenarios (optimal and non-optimal). The results show that sharecroppers bear most of the farming costs, while profit sharing does not consider cost contributions fairly. Under non-optimal production conditions, tenant farmers' net income is below the minimum wage and close to the poverty line. The proposed farming economic engineering model is a 50:50 cost and yield sharing system and initial financing by the owner or financial institutions without interest. This system is considered more efficient and fair in increasing farmers' income and economic resilience. The findings can serve as a basis for regional policy formulation related to an equitable and sustainable profit-sharing system.

Keywords*: Economic Engineering, Farmer Income, Inequality, Production Sharing System, Rice Farming Business.*

INTRODUCTION

The profit-sharing system in rice farming is a traditional form of agrarian cooperation that has long existed in rural Indonesia. This system is intended to provide a fair partnership between landowners and landless tenant farmers by sharing production outcomes (Musdalifah & Mansyur, 2021; Adam & Agegnehu, 2023). However, in practice, profit-sharing arrangements often create inequality, particularly in the distribution of yields and production costs. These imbalances contribute to low income among tenant farmers and increase their economic vulnerability, frequently placing them at or near the poverty line (Damayanti, 2022; Halim & Faisal, 2022; Parinsi et al., 2025).

Although Law Number 2 of 1960 on Production Sharing Agreements formally regulates the rights and obligations of landowners and tenant farmers, its implementation remains strongly influenced by local customs. In regions such as Pinrang Regency, South Sulawesi, profit-sharing agreements are often informal and unwritten, which weakens legal protection and fairness. As a result, prevailing practices frequently disadvantage tenant farmers, who are socially and economically weaker than landowners (Priyadi & Shidiqie, 2015; Shidiqie, 2017; Widi et al., 2025).

Pinrang Regency is one of the major rice production centers in South Sulawesi Province and contributes significantly to regional rice output (Badan Pusat Statistik Provinsi Sulawesi Selatan, 2023). Most residents depend on rice farming for their livelihoods, either as landowners or tenant farmers. Despite relatively high rice

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productivity, improvements in farmer welfare have not followed at the same pace. This gap indicates structural problems within the rice farming management system, particularly in the distribution of profits and production costs.

Previous studies have identified unequal cost structures as a key factor behind the low income of tenant farmers. In traditional profit-sharing systems, tenant farmers bear nearly all production costs, including seeds, fertilizers, pesticides, labor, and harvesting expenses, without any cost reimbursement prior to profit distribution. Meanwhile, landowners often play a passive role but still receive a large share of the harvest. When crop failure or low yields occur, tenant farmers absorb the entire risk of loss. This situation is further reinforced by unequal and limited land ownership structures (Winarso, 2012; Bawohan et al., 2021).

To address these challenges, an economic engineering approach is needed to design a profit-sharing system that is both socially just and economically efficient. Economic engineering in agriculture serves as an analytical tool to examine, simulate, and optimize cooperation systems using real input and output data. This approach enables the development of profit- and cost-sharing models that reflect each party's contribution and distribute production risks more proportionally, leading to a more transparent and sustainable system (Sutiknjo & Artini, 2019).

Several scholars emphasize the importance of fairness and institutional balance in economic cooperation. Fromm (2010) highlights the need for balanced power relations, while Giddens (1984) underscores the role of fair institutional structures in shaping social compliance. In agriculture, injustice in profit-sharing arrangements can be understood as institutional inequality that normalizes practices inconsistent with rational and equitable economic principles. Therefore, reforming profit-sharing systems requires improvements in institutional design, incentive mechanisms, and objective cost and risk allocation.

Based on these considerations, this study aims to design and analyze a rice farming profit-sharing system using an economic engineering approach in Pinrang Regency. The research focuses on developing a model that reduces inequality in yield and cost distribution and simulates its impact on tenant farmers' income. Additionally, the study seeks to provide policy recommendations that can be implemented at the local level through regional regulations or formal agreements, contributing to a fair, efficient, and sustainable agricultural system.

LITERATURE REVIEW

Concept of Profit-Sharing in Agricultural Systems

The concept of profit-sharing, commonly known as the sharecropping system, is rooted in classical agrarian economics and is viewed as a cooperative arrangement between landowners and cultivators aimed at optimizing agricultural land productivity (Arif et al., 2025; Zuhirsyan et al., 2025). Within this framework, profit-sharing is expected to create mutually beneficial relationships through proportional sharing of outputs and production risks. In Indonesia, this system is formally regulated under Law Number 2 of 1960 on Agricultural Production Sharing Agreements, which seeks to ensure fairness and protect the rights of tenant farmers as the economically weaker party. The regulation emphasizes balanced rights and obligations between landowners and cultivators in agricultural production.

Despite this legal framework, empirical evidence suggests that the implementation of profit-sharing arrangements often deviates from formal regulations. Studies by Winarso (2012) and Rahman (2025) indicate that local customs and informal agreements frequently override statutory rules, leading to unequal benefit distribution. This imbalance is commonly reflected in unequal contributions to production costs and disproportionate risk-bearing responsibilities. As a result, tenant farmers often face persistent income inequality and economic vulnerability within rural farming communities.

From an economic perspective, traditional profit-sharing models tend to apply fixed sharing ratios, such as 2:1 or 1:1, without accounting for actual input costs or external economic factors, including fertilizer price fluctuations and climate-related risks (Ma et

al., 2024; Atinga et al., 2024; Serbouk et al., 2025). Such rigidity contradicts the principle of equitable efficiency, which argues that profit distribution should align with productivity levels and cost participation (Tham et al., 2025; Cruz, 2025). Therefore, structural re-engineering of the profit-sharing mechanism is necessary to achieve distributive justice and improve the sustainability of agricultural economic systems.

Theoretical Foundations: Economic Justice and Institutional Design

The issue of fairness in production-sharing systems can be explained through the perspectives of institutional economics and structuration theory. According to Giddens (1984), inequality within social systems persists through institutionalized practices that legitimize unequal power relations among actors. In the context of agricultural production sharing, this imbalance is evident in the relationship between landowners and tenant farmers, where long-established practices shape expectations and normalize unequal outcomes. These recurring practices become embedded within local institutions, causing tenant farmers to accept disadvantageous arrangements as customary rather than unjust. As a result, profit-sharing systems are not merely economic mechanisms but are also deeply influenced by social structures and power dynamics that sustain inequality over time.

From a complementary perspective, Fromm (2010) argues that economic justice can only be achieved when cooperation is based on rational consent, shared risk, and mutual benefit, rather than domination by one party. When agricultural cooperation lacks these elements, profit-sharing arrangements tend to favor landowners while transferring most production costs and risks to tenant farmers. This imbalance undermines the principles of fairness and sustainability within rural economic systems. Therefore, justice within agricultural institutions requires alignment between each party's contribution and the distribution of returns, proportional sharing of production risks, especially in cases of crop failure, and transparent agreements that are formally documented and supported by local governance structures.

These theoretical perspectives provide a foundation for reforming the traditional profit-sharing system through an economic engineering approach. By translating abstract principles of fairness and efficiency into measurable economic indicators, such as cost contribution, risk exposure, and net income distribution, economic engineering offers a practical framework for institutional reform. This approach enables the design of profit-sharing systems that are not only economically efficient but also socially just and sustainable, ensuring balanced cooperation between landowners and tenant farmers (Ihsadi, 2024).

Economic Engineering Approach in Agriculture

Economic engineering is an approach that applies quantitative optimization methods to evaluate economic feasibility, cost structures, and profit allocation models within a business system (Gallina et al., 2024; Jayarathna et al., 2024). In agricultural contexts, this approach is widely used to simulate multiple production scenarios in order to determine more efficient and equitable cost- and profit-sharing arrangements. Halim and Faisal (2022), in their study of profit-sharing practices in agriculture, demonstrate that net income simulations under optimal and non-optimal production conditions are effective in revealing income disparities between farming actors.

Several empirical studies support the application of economic engineering to reform traditional profit-sharing systems. Winarso (2012) finds that income inequality among tenant farmers in Indonesia largely results from profit-sharing schemes that fail to account for actual cost contributions and production risks. Similarly, Xie and Rong (2024) and Nichols (2025) show that unequal cost structures force tenant farmers to bear most production risks, while landowners continue to receive dominant profit shares. Musdalifah and Mansyur (2021) further confirm that traditional profit-sharing arrangements governed by local customs often neglect principles of economic fairness and efficiency, reinforcing structural inequality within rural farming systems.

At the international level, Shukla et al. (2023) and Susandi et al. (2025) provide evidence that quantitative approaches in agricultural project analysis across developing countries improve transparency, efficiency, and risk management in agrarian cooperation. Their findings suggest that data-driven evaluation of costs, risks, and returns enables the design of fairer and more sustainable profit-sharing mechanisms. Thus, these studies indicate that economic engineering serves as an empirical bridge between informal agrarian practices and modern economic rationality, providing a strong analytical foundation for institutional reform of agricultural profit-sharing systems.

Profit-Sharing Inequality

Empirical evidence from Indonesia and other Southeast Asian agrarian economies shows that tenant farmers often receive a smaller share of profits despite bearing a higher proportion of production costs. Damayanti (2022) finds that in Ogan Ilir Regency, tenant farmers' net income falls below the regional minimum wage, mainly due to inequitable cost-bearing mechanisms within traditional profit-sharing arrangements. Similarly, Hadiana (2017) identifies inefficiencies in the profit-sharing system in Sumedang, where cultivators contribute up to 80% of operational costs but receive only around 50% of the harvest.

Comparable patterns are observed in other regions, where income disparities are explained more by institutional asymmetry than by differences in productivity (Fadinger et al., 2022; Zeineddine et al., 2022). Winarso (2012) further demonstrates that traditional profit-sharing systems in Indonesia frequently disregard tenant farmers' cost contributions and risk exposure, thereby reinforcing structural inequality in agrarian relationships. In addition, Musdalifah and Mansyur (2021) report that profit-sharing practices governed by local customs tend to weaken tenant farmers' bargaining power and limit the application of formal principles of economic fairness. Supporting these findings, Bawohan et al. (2021) show that unequal financing structures increase tenant farmers' vulnerability to production risks, particularly during periods of crop failure.

Together, these studies highlight the urgent need for a revised cost–yield allocation formula in agricultural profit-sharing systems (Ihsadi, 2024). In this context, the economic engineering approach adopted in the present study represents methodological advancement by enabling the simulation of fairer sharing alternatives based on real production data and detailed cost structures. This approach allows for an objective evaluation of how different profit-sharing scenarios affect tenant farmers' income and provides an empirical foundation for designing more equitable and sustainable agrarian systems (Hoole et al., 2023).

Conceptual Framework of Equitable Profit-Sharing

Based on the synthesis of existing literature, the conceptual framework of this study integrates three interrelated dimensions that collectively guide the redesign of agricultural profit-sharing systems (Campana et al., 2025). First, the principle of input–output balance emphasizes that profit distribution should be proportional to each party's contribution in terms of capital, labor, and risk exposure. Fairness in profit sharing cannot be achieved when output allocation is detached from actual production inputs. Second, efficiency optimization highlights the importance of designing systems that minimize total production costs without sacrificing equity. An efficient profit-sharing mechanism should enhance net farm income for all parties, particularly tenant farmers, while maintaining incentives for landowners. Third, institutional legitimacy plays a crucial role in ensuring that profit-sharing arrangements are transparent, enforceable, and socially accepted. Formalized agreements supported by local governance instruments, such as Regional Regulations (*Peraturan Daerah*/Perda) or facilitation through Village-Owned Enterprises (*Badan Usaha Milik Desa*/BUMDes), strengthen compliance and reduce the potential for exploitative practices.

According Salle et al. (2024), this framework, economic engineering is positioned as a transformative instrument capable of translating normative principles of justice into

measurable economic outcomes. By employing data-driven analysis and simulation, economic engineering enables the objective evaluation of alternative profit-sharing scenarios and supports evidence-based policy formulation. This approach aligns with the broader goals of inclusive rural development and contributes directly to the achievement of the Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty) and SDG 10 (Reduced Inequalities). Thus, the literature converges on the view that sustainable and equitable profit-sharing systems must integrate economic rationality with social justice. This study contributes theoretically by bridging institutional justice theory and engineering economics, and empirically by offering a replicable framework for fair and sustainable agricultural cooperation.

RESEARCH METHODS

This research used a descriptive qualitative approach with the support of quantitative data analyzed using economic engineering principles. This approach was chosen because the focus of the research was to design a more efficient and fair system of sharing the results and costs of rice farming based on real conditions in the field. The economic engineering approach was used to evaluate and simulate the efficiency of cost and yield distribution, and to compare the current system with the proposed system based on the principle of proportional sharing.

The research location was determined purposively, namely in Pinrang District, South Sulawesi, which is one of the largest rice production centers in the region. The selection of the location was based on the fact that most of the population earns a living as sharecroppers, and the profit-sharing system is still implemented traditionally without a standardized written reference. Data were collected from three main sources: people (informants), places (farm locations), and documents (written and unwritten) (Arikunto, 2010). The informants in this study were selected purposively and consisted of tenant farmers, landowners, community leaders, agricultural extension workers, and village officials. The criteria for tenant farmer informants were those who had undergone the profit-sharing system for at least the last five planting seasons. Data collection techniques were conducted through in-depth interviews, direct observation, and documentation. In addition, researchers also conducted Focus Group Discussions (FGDs) to obtain data validation from farmer groups and landowners related to the prevailing cost and yield sharing practices.

The data obtained were analyzed using an engineering economic analysis approach, which included identification of production cost components, crop yield values, simulation of yield sharing based on two production scenarios (optimal and non-optimal), and comparison between the existing system and the proposed system. The analysis was conducted by compiling cost and yield sharing tables, calculating net income per party, and assessing the potential efficiency and fairness of distribution in each scenario. In addition, Data analysis using Qualitative Data Analysis (QDA) software programs consists of exploring data, coding data, attaching code labels, combining codes into themes, and themes as titles in the findings in the report (Creswell & Báez, 2020).

To maintain data validity, this study used source triangulation techniques, comparing interview results with observations and supporting documents. Quantitative data such as grain prices, production input costs, and average yields were confirmed with data from BPS Pinrang and the local agriculture office. Analysis was conducted systematically from data reduction, presentation of data in the form of tables and graphs, to drawing conclusions and proposing improvements to the economic engineering-based profit-sharing system model.

RESULTS

Implementation of the Rice Profit-Sharing System in Pinrang Regency

The rice farming system in Pinrang District has shifted to the detriment of most tenant farmers. Initially, the profit-sharing system was 2:1, where sharecroppers received 66.67% of the harvest while the landowner received 33.33%. However, with the fragmentation of

landownership due to inheritance and the increasing number of sharecrops amidst the increasingly narrow available land, the system has changed to 3:2, even to 1:1. A 1:1 profit sharing means that the tenants and the landowner both get 50.0 percent of the harvest.

When examined in depth, some cultivators show that the 1:1 profit-sharing system implemented has been directed to the profit-sharing 2:3 (40.0 percent of the cultivation farmers and 60.0 percent of landowners). This can be understood in relation to the burden of farming costs that must be borne by farmers. In fact, the distribution of results is 1:1, but the cost burden that must be borne by farmers is far more than the burden of the cost borne by the landowner, as in Table 1.

Table 1. Distribution of Farming Costs in the Profit-Sharing System in Pinrang Regency (2023)

No.	Rice Farming Activities	Cultivating Farmers	Landowner
1.	Procurement of rice seeds	VV	VV
2.	Nursery	VV	XX
3.	Soil treatment (until ready to plant)	VV	XX
4.	Planting (Labor Services)	VV	XX
5.	Procurement of urea fertilizer	VV	VV
6.	Procurement of NPK Phonska fertilizer	VV	VV
7.	Procurement of herbicides	VV	XX
8.	Pesticide procurement	VV	VV
9.	Maintenance (labor wages)	VV	XX
10.	Harvesting (Cost of Harvest Equipment)	VV	VV
11.	Transporting yields from paddy fields	VV	VV
12.	Property tax	XX	VV

Information:
VV: Bearing the cost
XX: Not bearing the cost

In Table 1, the cost that must be borne by the cultivators includes 11 types of farming activities, while the landowners only bear the cost of 7 types of farming activities out of a total of 12 types of farming activities. In a sense, almost all the burden of farming activities must be borne by the cultivators, while the landowners only bear the burden of certain costs. In connection with the burden of the risk of farming loss due to low production or crop failure, so far, it has been entirely charged to cultivators. Thus, there is an imbalance in loading the cost and risk of farming loss that makes the net income received by the cultivators in every planting season much smaller than the net income received by the landowner after profit sharing.

Net income of Cultivating Farmers after Profit Sharing with Landowners

Based on information from tenant farmers, the highest rice production ever achieved ranged from 7,000 to 7,015 kg of harvested dry grain per hectare, while the lowest production was approximately 3,450–3,500 kg per hectare. These figures are consistent with official statistics from BPS Pinrang, which report rice productivity in Pinrang Regency during 2020–2022 ranging from 4,493 to 6,679 kg of harvested dry grain per hectare, a level considered relatively high compared to other regions.

However, all rice farming costs are initially borne by tenant farmers based on long-standing unwritten practices. Limited access to capital forces many farmers to borrow from capital providers at interest rates of around 15%, including BUMDes, banks, financial institutions, and middlemen. These debts, including interest, must be repaid immediately after profit sharing. Profit distribution between tenant farmers and landowners is conducted in cash from the sale of harvested dry grain at prices starting from IDR 5,800 per kilogram, which ultimately reduces tenant farmers' net income each planting season.

Table 2. Net Income under Optimal and Non-Optimal Production (15% Interest Rate)

Classification	Description	Total (IDR/ha)	Cultivating farmers (IDR/ha)	Landowner (IDR/ha)
Optimal production (7.015 kg/ha)	Production value before profit sharing	40.687.000	-	-
	Financing is borne together	7.502.600	3.751.300	3.751.300
	Production value after profit sharing	33.184.400	16.592.200	16.592.200
	Financing is not calculated when profit sharing	4.897.500	4.697.500	200.000
	Net income per planting season	28.286.900	11.894.700	16.392.200
	Net income per month	7.071.725	2.973.675	4.098.050
Production is not optimal (3.450 kg/ha)	Production value before profit sharing	20.010.000	-	-
	Financing is borne together	4.773.650	2.386.825	2.386.825
	Production value after profit sharing	15.236.350	7.618.175	7.618.175
	Financing is not calculated when profit sharing	4.897.500	4.697.500	200.000
	Net income per planting season	10.338.850	2.920.675	7.418.175
	Net income per month	2.584.713	730.169	1.854.544

Based on Table 2, the net income of tenant farmers under optimal production conditions reaches IDR 11,894,700 per hectare per planting season, or approximately IDR 2,973,675 per month. In comparison, landowners receive a net income of IDR 16,392,200 per planting season, equivalent to IDR 4,098,050 per month. This indicates that, even when production is optimal, landowners earn about 37.8 percent more net income than tenant farmers.

Under non-optimal production conditions, the disparity becomes more pronounced. Tenant farmers' net income declines sharply to IDR 2,920,675 per planting season, or around IDR 730,169 per month. Meanwhile, landowners still obtain a net income of IDR 7,418,175 per planting season, or IDR 1,854,544 per month, which is approximately 154.0 percent higher than the income of tenant farmers. These figures are calculated after accounting for total farming costs financed at an interest rate of 15.0 percent.

The main source of this income inequality lies in the financing structure of rice farming. All production financing is borne by tenant farmers and is not considered in the profit-sharing calculation, amounting to IDR 4,697,500 per season. In contrast, landowners only incur minimal costs of about IDR 200,000. This significant imbalance shows that the existing profit-sharing arrangement in Pinrang Regency is inequitable and contributes to the persistent low welfare and poverty vulnerability of tenant farmers.

Implementation of the Rice Profit-Sharing System in Pinrang Regency

Table 3 illustrates the simulation of a profit-sharing system with an economic engineering approach, where production costs and yields are shared equally (50:50) between tenant farmers and landowners. In the optimal production scenario of 7,015 kg/ha, the total gross income reached IDR 40,687,000. After deducting the total production cost of IDR 12,400,100, a net profit of IDR 28,286,900 is obtained. With a 50:50 sharing system, each party earned IDR 14,143,450 per growing season, or around IDR 3,535,862 per month. In a non-optimal production scenario of 3,450 kg/ha, the production value decreases to IDR 20,010,000, with production costs of IDR 9,671,150. After deducting costs, the net profit available is IDR 10,338,850. With the same sharing scheme, sharecroppers and landowners each earned IDR 5,169,425 per growing season, or around IDR 1,292,356 per month. These results show that proportional sharing of yields and costs allows both parties to continue to earn a balanced and fair income, even when production declines. This model promotes efficiency and transparency and improves the bargaining position of sharecroppers in farm management.

Table 3. Cost and Profit Sharing; 50:50

Classification	Description	Total (IDR/ha)	Cultivating farmers (IDR/ha)	Landowner (IDR/ha)
Optimal production (7.015 kg/ha)	Production value before profit sharing	40,687,000	-	-
	Cost Production	12,400,100	6,200,050	6,200,050
	Net income per planting season	28,286,900	14,143,450	14,143,450
	Net income per month	7,071,725	3,535,862	3,535,862
Production is not optimal (3.450 kg/ha)	Production value before profit sharing	20,010,000	-	-
	Cost Production	9,671,150	4,835,575	4,835,575
	Net income per planting season	10,338,850	5,169,425	5,169,425
	Net income per month	2,584,713	1,292,356	1,292,356

Table 4. Interest-free Initial Financing

Classification	Description	Total (IDR/ha)	Cultivating farmers (IDR/ha)	Landowner (IDR/ha)
Optimal production (7.015 kg/ha)	Production value before profit sharing	40.,687,000	-	-
	Cost Production	12,400,100		12,400,100
	Net income per planting season	28,286,900	14,143,450	14,143,450
	Net income per month	7,071,725	3,535,862	3,535,862
Production is not optimal (3.450 kg/ha)	Production value before profit sharing	20,010,000	-	-
	Cost Production	9,671,150		9,671,150
	Net income per planting season	10,338,850	5,169,425	5,169,425
	Net income per month	2,584,713	1,292,356	1,292,356

Table 4 illustrates a simulated rice farming profit-sharing model in which all initial production financing is fully borne by the landowner, with no interest charged to tenant farmers. Under this scheme, the landowner covers all production inputs, including seeds, fertilizers, pesticides, labor, and harvesting costs, and profit sharing is conducted only after total production costs are deducted.

In the optimal production scenario (7,015 kg/ha), total production value reaches IDR 40,687,000 per hectare. After reimbursing production costs of IDR 12,400,100, the remaining net profit of IDR 28,286,900 is shared equally. Both the tenant farmer and the landowner receive IDR 14,143,450 per planting season, or about IDR 3,535,862 per month. In the non-optimal production scenario (3,450 kg/ha), total revenue declines to IDR 20,010,000. After deducting production costs of IDR 9,671,150, the remaining profit of IDR 10,338,850 is divided equally, resulting in IDR 5,169,425 per season, or around IDR 1,292,356 per month for each party. This model benefits tenant farmers by eliminating capital constraints, debt, and interest burdens. However, it shifts all financial risk to landowners, which may create perceptions of imbalance, as landowners bear full production risk while receiving the same profit share as cultivators.

DISCUSSION

The findings indicate that the prevailing rice farming profit-sharing system in Pinrang Regency tends to disadvantage tenant farmers. Initially, the system applied a 2:1 ratio, allowing sharecroppers to receive 66.67% of the harvest. However, changes in land ownership patterns and the increasing number of tenant farmers have shifted this ratio to 1:1, and in practice, even to 2:3, which favors landowners. This inequality is further

intensified by the fact that tenant farmers bear nearly all production costs, while the returns they receive do not reflect their contributions to costs and farming risks.

These findings are consistent with Hadiana (2017) and Baruah et al. (2022), who argue that traditional profit-sharing systems often ignore tenant farmers' cost contributions, resulting in incomes far below economic feasibility. Similarly, Damayanti (2022) and Gao et al. (2025) highlight that unequal profit sharing significantly contributes to tenant farmer poverty, especially when risk-protection mechanisms and fair cost recovery are absent. To address these issues, this study designs and simulates a profit-sharing model based on an economic engineering approach that emphasizes proportional cost and yield sharing. In this model, production costs are divided equally (50:50) between tenant farmers and landowners, and profit sharing is conducted only after all production costs are deducted from total revenue. The model is tested under two scenarios: optimal production (7,015 kg/ha) and non-optimal production (3,450 kg/ha).

Simulation results show that under optimal production, both tenant farmers and landowners earn equal net incomes of IDR 14,143,450 per planting season. Under non-optimal production, both parties still receive the same net income of IDR 5,169,425. This outcome contrasts sharply with the conventional system, where landowners continue to receive a larger share despite minimal or no capital contribution. Through the economic engineering approach, the profit-sharing system becomes more rational, transparent, and aligned with the principles of proportional contribution and shared risk.

This model aligns with the work of Sutiknjo and Artini (2019) and Carvajal et al. (2024), who emphasize the importance of optimizing and fairly distributing farmers' income through profit-sharing systems grounded in real economic calculations. They argue that profit sharing cannot be separated from cost structures and equitable risk distribution. In this regard, economic engineering functions not only as a technical analytical tool but also as a policy instrument for designing fair and sustainable agricultural institutions.

The study also evaluates an interest-free initial financing scheme in which all production costs are borne by the landowner and later reimbursed from harvest revenue before profit sharing. While this scheme reduces capital constraints for tenant farmers and eliminates high-interest debt, it remains a partial solution from an economic engineering perspective because it does not fully address structural justice in profit distribution. This finding supports the views of Fromm (2010) and Giddens (1984), who argue that economic inequality is often sustained by imbalanced power relations embedded within institutional structures.

Thus, the implementation of an economic engineering-based profit-sharing system in Pinrang Regency shows strong potential for broader adoption, particularly in regions facing similar land distribution and income inequality challenges. However, successful implementation requires institutional support, including local regulations governing profit-sharing arrangements, cost-recovery mechanisms, and risk protection for tenant farmers. The proposed model can serve as a foundation for local regulations (*Peraturan Daerah*/Perda) and the strengthening of farmer institutions such as cooperatives or Village-Owned Enterprises (BUMDes), contributing to higher farmer incomes and a more equitable and sustainable agricultural system.

CONCLUSION

This study concludes that the rice farming profit-sharing system in Pinrang Regency exhibits structural inequalities in the distribution of yields and production costs, which disadvantage tenant farmers and contribute to poverty. The main finding highlights that the imbalance arises because profit sharing is not aligned with the cost burdens borne by tenant farmers, resulting in incomes that are insufficient to improve their economic welfare. Using an economic engineering approach, this study demonstrates that a more equitable and efficient profit-sharing system can be designed. Simulation results indicate that a 50:50 cost and yield sharing scheme, combined with an initial financing arrangement borne by the landowner and a cost-recovery mechanism prior to profit

distribution, can significantly increase tenant farmers' income. This finding implies that a data-driven and economically measurable approach can serve as a viable alternative to traditional profit-sharing systems that rely primarily on informal practices.

Nevertheless, this study has limitations, as the analysis is based on simulation results and focuses on a single research area, which limits the broader generalization of the findings. In addition, external factors that may influence farming outcomes are not explicitly incorporated into the analysis. Based on these limitations, future research is recommended to test the proposed model in different regions and under varying conditions to strengthen its validity. Further studies should also assess the empirical implementation of the model in real farming settings. From a policy perspective, the proposed model can be used as a foundation for formulating regional regulations aimed at establishing a fair and sustainable agricultural profit-sharing system.

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