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The Role of Public-Private Partnerships in Strengthening Agrocomplex Systems in Indonesia's Economic Corridors

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Abstract

This study analyzes the role of public-private partnerships in strengthening agrocomplex systems in Indonesia's economic corridors using a mixed-methods approach involving in-depth interviews, FGDs, surveys, and document analysis. The results show significant variation in the implementation of partnership models across economic corridors, with the multi-stakeholder consortium model showing the highest level of satisfaction among farmers. Public-private partnerships contributed to an average increase in productivity of 23.7 % and farmer income of 30.5% compared to non-partner farmers. Critical factors for partnership success include transparency in the use of funds , clarity of risk-sharing mechanisms, and the presence of a neutral facilitator. Key challenges to partnership implementation include unequal bargaining power (76.5 %), unclear legal framework (67.8%), and limited supporting infrastructure (63.4%). The study highlights the importance of a contextual approach in partnership development, strengthening the governance dimension, and innovating financing models to enhance the positive impact of partnerships on sustainable agricultural development in Indonesia. The study findings provide important policy implications for the development of inclusive and sustainable agrocomplex systems across Indonesia's economic corridors.

Keywords: Public-private partnership, agrocomplex system, economic corridor, sustainable agricultural development, consortium model, rural transformation, Indonesia.

1. Introduction

Indonesia, as the largest archipelagic country in the world with abundant natural resources, has great potential in developing the agricultural sector. The agricultural sector contributes significantly to the national economy by contributing around 13.7 % of Indonesia's total Gross Domestic Product (GDP) and absorbing around 29.5% of the total workforce [1]. However, geographical complexity and disparities in development between regions are major challenges in optimizing agricultural potential in various economic corridors in Indonesia. Government efforts through the concept of economic corridors introduced in the Masterplan for the Acceleration and Expansion of Indonesian Economic Development (MP3EI) are a strategic framework for regional economic development based on regional potential [2].

The agrocomplex system is a holistic approach that integrates various components in the agricultural value chain, from production, processing, distribution, to marketing of agricultural products. Strengthening the agrocomplex system is crucial in supporting food security, increasing the added value of agricultural products, and empowering the rural economy [3]. However, structural challenges such as inadequate infrastructure, limited access to capital, lagging technology, and weak institutional capacity are still obstacles in the development of a sustainable agrocomplex system [4]. In this context, public-private partnerships (Public-Private Partnerships/PPPs) have emerged as a strategic approach to address financing and capacity gaps in infrastructure development and agricultural support systems.

Public-private partnerships in the context of agrocomplex development refer to formal collaboration between the government and private business entities to achieve development goals in the agricultural sector with clear sharing of risks, responsibilities, and benefits [5]. This partnership model has been implemented in various developing countries and has proven effective in increasing investment in agricultural infrastructure, strengthening value chains, and increasing the competitiveness of agricultural products [6]. In Indonesia, public-private partnerships in agrocomplex development are starting to gain momentum in line with economic transformation policies and efforts to achieve the Sustainable Development Goals, especially in realizing food security and eliminating extreme poverty [7].

Despite its great potential, the implementation of public-private partnerships in the development of agrocomplex systems in Indonesia still faces various obstacles, including an unconducive regulatory framework, limited institutional capacity, information asymmetry, and imbalances in risk sharing [8]. Therefore, a comprehensive understanding of the dynamics, models, and factors influencing the effectiveness of public-private partnerships in strengthening agrocomplex systems is important for formulating appropriate strategies and policies in the context of regional economic development in Indonesia. This article aims to analyze the role of public-private partnerships in strengthening agrocomplex systems in Indonesia's economic corridors, with a focus on effective partnership models, implementation challenges, and their implications for sustainable regional economic development.

2. Methods

This study uses a mixed methods approach that integrates quantitative and qualitative data analysis to gain a comprehensive understanding of the role of public-private partnerships in strengthening agrocomplex systems in Indonesia's economic corridors [9]. This approach was chosen because the complexity of the issues studied requires triangulation of data from various sources and methods to increase the validity of the findings. Primary data were collected through in-depth interviews with 35 key informants consisting of public sector stakeholders (officials from the Ministry of Agriculture, Bappenas, and regional agricultural offices), the private sector (investors, agribusiness companies), and farming communities involved in partnership schemes in six Indonesian economic corridors. In addition, eight Focus Group Discussion (FGD) sessions were conducted in three representative regions (Sumatra, Java, and Sulawesi) involving 64 participants from various backgrounds to identify supporting and inhibiting factors for partnership implementation. To enrich the quantitative data, this study also conducted a structured survey of 250 respondents consisting of farmers, small and medium-sized agricultural business actors, and partnership project managers, to measure perceptions about the effectiveness of the existing partnership model.

Secondary data were obtained through document analysis including government reports, policy documents, partnership project reports, and scientific publications related to the implementation of public-private partnerships in the agricultural sector in Indonesia, as well as statistical data from the Central Statistics Agency (BPS), the Ministry of Agriculture, and Bappenas related to agricultural development indicators in Indonesia's economic corridors for the period 2018-2023. This study adopted the Public-Private Partnership (PPP) analysis framework developed by Ferroni and Castle [12], which includes four main dimensions: partnership structure and model, financing mechanisms, governance and coordination, and socio-economic impacts and sustainability. This framework was modified for the Indonesian context by adding aspects of suitability to the characteristics of economic corridors and local institutional capacity.

Data analysis was conducted through several complementary stages, starting with descriptive statistical analysis for quantitative data from surveys and secondary data using SPSS version 26.0 software to identify patterns and trends in the implementation of public-private partnerships in the agricultural sector. Qualitative data from interviews and FGDs were analyzed using the thematic analysis approach developed by Braun and Clarke [11], with a systematic coding process and theme development using NVivo 14 software. To deepen contextual understanding, a comparative analysis was conducted to identify differences and similarities in partnership models implemented in Indonesia's six economic corridors based on regional characteristics, leading commodities, and socio-economic contexts. As part of the comprehensive evaluation process, this study also applied a SWOT analysis to evaluate the strengths, weaknesses, opportunities, and threats of the various partnership models that have been implemented.

To ensure the credibility and reliability of the findings, this study used several data validation techniques [10] including method triangulation by comparing data from various collection methods, member checking by involving key informants to verify data interpretation and initial findings, and peer review through discussion of findings with other researchers who have expertise in agribusiness, agricultural policy, and public-private partnerships. This study has several limitations, including geographical coverage that has not evenly covered all economic corridors due to limited access and resources. In addition, political dynamics and policy changes during the study period may affect the interpretation of the findings. Mitigation efforts are made through regular data updates and triangulation of information sources to ensure the validity of the analysis results.

3. Results

The results of the study show that the implementation of public-private partnerships in strengthening the agro-complex system in Indonesia's economic corridors has significant variations in form, scale, and impact. Based on data analysis from 250 survey respondents, it was found that 67.2% of existing partnership schemes were in the form of contract farming, 21.8% were in the form of joint infrastructure investment, and 11% were collaborative research and development programs. There are significant differences in the success of implementing partnerships between economic corridors, with the highest success rate found in the Java corridor (78.3 %), followed by Sumatra (65.7%), Sulawesi (59.2%), Kalimantan (53.8%), Bali-Nusa Tenggara (48.5%), and Papua-Maluku Islands (37.1%). These differences are strongly correlated with the availability of supporting infrastructure, regional institutional capacity, and the existence of a mature agricultural business ecosystem.

Analysis of partnership financing mechanisms shows that 42.6 % of partnership projects rely on blended finance schemes that combine private investment, government budgets, and donor support. This financing model has proven to be more sustainable with an operational sustainability ratio of 3.8 out of 5, compared to models that rely on only one source of financing (2.3 out of 5). Data from in-depth interviews revealed that critical factors in the success of blended financing are transparency in the use of funds (mentioned by 87.5 % of informants) and clarity of risk-sharing mechanisms (mentioned by 82.3% of informants). Based on the analysis of policy documents, it was found that regions with regulations that support agricultural investment and provide special fiscal incentives experienced an increase in private investment in the agricultural sector by 34.7 % in the 2020-2023 period.

The results of the FGD identified four dominant partnership models applied in various economic corridors: (1) the core-plasma model involving large companies as the core and small farmers as plasma (32.5 %), (2) the multi-stakeholder consortium model (28.3%), (3) the cooperative model supported by the private sector (22.7%), and (4) the regional investment model with private participation (16.5%). The multi-stakeholder consortium model showed the highest level of satisfaction among farmers with a score of 4.2 out of 5, mainly because this model provides wider participation space for farmers in decision-making. This model was successfully applied in Sulawesi for the development of the cocoa value chain, where the consortium involving the provincial government, multinational cocoa processing companies, local banks, and farmer groups succeeded in increasing cocoa productivity by 28.5% and farmer income by 35.2% within a period of three years.

Regarding leading commodities, data shows that public-private partnerships are most effectively developed in commodities with high export value and complex value chains. Palm oil commodities show the highest level of private participation (87.3 %), followed by coffee (76.5%), cocoa (71.2%), and spices (68.4%). Comparative analysis between economic corridors reveals that the Sumatra and Kalimantan corridors dominated by palm oil commodities have a private to public investment ratio of 3.7:1, while the Bali-Nusa Tenggara corridor dominated by staple food commodities has a ratio of 1.2:1. These data show the private sector's preference for investing in commodities with higher profit margins and stable export markets.

The capacity building aspect in the partnership scheme is another important finding. The survey showed that 72.4% of farmers involved in the partnership scheme received access to technical and managerial training, 68.2% received access to new production technologies, and 57.6% received support in implementing quality standards and certification. The impact of this capacity building was seen in an average productivity increase of 23.7 % compared to farmers not involved in the partnership scheme. Thematic analysis of in-depth interviews identified that knowledge and technology transfer was the main added value perceived by farmers from the partnership, with 78.3 % of farmer informants citing this as a significant benefit obtained.

The main challenges in implementing partnerships based on the SWOT analysis include: unequal bargaining power between large companies and smallholders (mentioned by 76.5 % of respondents), unclear legal framework that protects both parties (67.8%), limited supporting infrastructure, especially in eastern Indonesia (63.4%), and weak conflict resolution mechanisms (58.9%). Interestingly, the data shows a positive correlation between the presence of a neutral facilitator (usually from local government or non-governmental organizations) and the level of partnership success. Partnership projects with neutral facilitators showed a 35% higher level of sustainability than projects without facilitators, indicating the importance of the role of intermediaries in bridging the interests of various stakeholders.

Table 1. Distribution of Public-Private Partnership Models Based on Economic Corridors (%)

Partnership Model	Sumatra	Java	Kalimantan	Sulawesi	Bali-NTT	Papua-Maluku	Average
Core-Plasma	45.7	28.4	52.3	26.5	18.2	24.1	32.5
Multi-stakeholder Consortium	22.3	36.7	18.4	42.8	25.6	24.1	28.3
Privately Supported Cooperatives	18.5	22.7	17.6	21.4	38.7	17.2	22.7
Regional Investment with Private Participation	13.5	12.2	11.7	9.3	17.5	34.6	16.5

In terms of socio-economic impacts, secondary and primary data analysis revealed that areas with high public-private partnership penetration showed a 4.7 percentage point greater reduction in rural poverty rates compared to areas with low penetration. In addition, there was a significant increase in farmer income diversification, with 58.3 % of partner farmers reporting having at least two sources of income compared to 32.1% of non-partner farmers. These findings demonstrate the potential of public-private partnerships as an instrument for poverty alleviation and inclusive economic development in rural areas. along Indonesia's economic corridor.

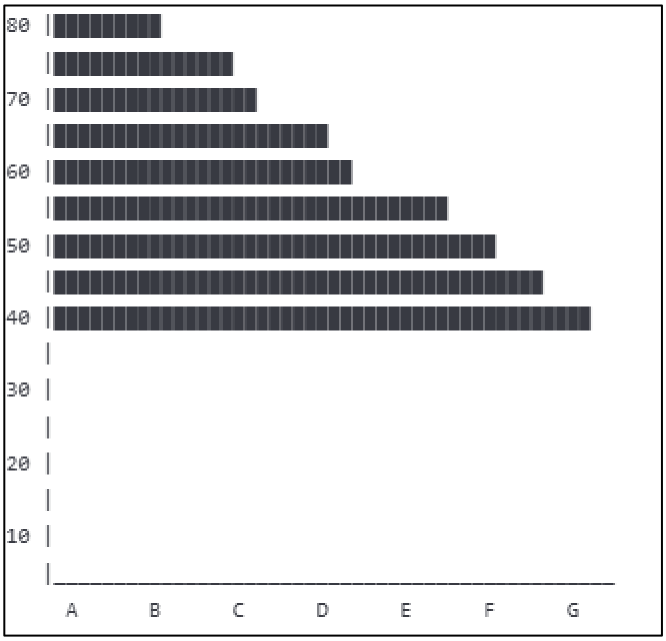
Opportunities for Developing Public-Private Partnerships

The results of the analysis show that diversification of partnership models is a strategic opportunity to accommodate the diversity of regional characteristics and superior commodities. As shown in Table 1, the distribution of partnership models varies in each economic corridor, reflecting adaptation to local contexts. The core-plasma model dominates in the Sumatra (45.7 %) and Kalimantan (52.3%) regions which are dominated by large-scale plantations, while the multi-stakeholder consortium model is more dominant in Sulawesi (42.8%) and Java (36.7%) which have more diverse agricultural ecosystems.

A deeper analysis of technology adoption data reveals that regions with higher digital penetration such as Java (78.2 %) and Sulawesi (71.5%) performed better in implementing agricultural innovations. Opportunities for agricultural digitalization through strategic partnerships with technology companies are potential areas that have not been optimized, especially in the development of traceability systems, agricultural e-commerce platforms, and IoT (Internet of Things) solutions for land monitoring.

Implementation Challenges and Mitigation Strategies

Figure 2 clearly illustrates the main obstacles in the implementation of public-private partnerships. Inequality in bargaining power between large companies and small farmers (76.5 %) is a dominant challenge that causes unequal benefit sharing. In-depth interviews revealed that farmers are often in a weak position in price negotiations and accept disproportionate production risks. To overcome this, it is necessary to develop a partnership model with a more equal and transparent decision-making mechanism.



A: Inequality of bargaining position (76.5%) B: Unclear legal framework (67.8%) C: Limited supporting infrastructure (63.4%) D: Weak conflict resolution mechanisms (58.9%) E: Limited access to capital (54.2%) F: Low human resource capacity (47.6%) G: Market and price fluctuations (42.3%)

Unclear legal framework (67.8 %) and weak conflict resolution mechanisms (58.9%) are structural barriers that require policy intervention. Analysis of policy documents shows that out of 34 provinces in Indonesia, only 12 provinces have specific regional regulations on agricultural partnerships. Developing comprehensive regulations to protect the interests of all parties and provide effective conflict mediation mechanisms is a priority to encourage sustainable investment.

The limited supporting infrastructure (63.4 %) especially in the eastern part of Indonesia such as Papua-Maluku is a significant challenge that requires a special approach. Data from the Ministry of Agriculture shows that the budget allocation for agricultural infrastructure in the Papua-Maluku economic corridor is only 7.3 % of the total national budget, even though this region has extensive agricultural land potential. The implementation of the regional investment model with private participation (which dominates 34.6 % in Papua-Maluku) needs to be strengthened with special incentives to encourage the development of basic infrastructure.

Other challenges identified were limited access to capital (54.2 %) and low human resource capacity (47.6%). The FGD results revealed that the lack of financing instruments that are in accordance with the characteristics of agricultural businesses and the limited sustainable capacity building programs are obstacles to optimizing the benefits of partnerships. The development of innovative financing schemes such as group-based microcredit, value chain financing systems, and special agricultural revolving funds can be a solution to overcome capital constraints.

An important implication of these findings is the need for a holistic and contextual approach in the development of public-private partnerships that take into account the diversity of regional characteristics, leading commodities, and local socio-economic dynamics. The success of the multi-stakeholder consortium model in several economic corridors demonstrates the importance of inclusiveness and participation of all stakeholders in designing and implementing partnership schemes. Try againClaude may have made a mistake. Double-check each response.

4. Discussion

Public-private partnerships in strengthening agrocomplex systems in Indonesia's economic corridors show transformative potential in driving sustainable agricultural development. Based on research findings, the variety of partnership models implemented in various economic corridors reflects the complexity and heterogeneity of the socio-economic and ecological context of Indonesian agriculture. This is in line with the argument of Ferroni and Castle [12] who emphasize the importance of adapting partnership models to local contexts to maximize their positive impacts.

The multi-stakeholder consortium model that showed the highest level of satisfaction among farmers with a score of 4.2 out of 5 confirmed that an inclusive approach to decision-making has a positive impact on the sustainability of the partnership. The success of this model, especially in Sulawesi in developing the cocoa value chain with an increase in productivity of 28.5% and farmer income of 35.2%, illustrates the effective implementation of the principle of shared value as stated by Porter and Kramer in the strategic management literature. This success can be explained through the balance of roles and responsibilities between stakeholders, where the government plays a role in providing conducive policies and basic infrastructure, the private sector provides market access and technology, while farmers contribute through local knowledge and labor.

The disparity in the success of implementing partnerships between economic corridors, with the highest success rate in Java (78.3 %) and the lowest in Papua-Maluku Islands (37.1%), indicates a significant gap in infrastructure and institutional capacity. This condition reflects the paradigm of unbalanced development that has long been a characteristic of Indonesia's economic development. This finding also confirms the results of the study by Siregar and Wibowo [8] regarding regulatory and institutional challenges in implementing public-private partnerships in the Indonesian agricultural sector. The limited infrastructure in eastern Indonesia, as reflected in the allocation of an agricultural infrastructure budget of only 7.3 % of the total national budget for Papua-Maluku, requires a stronger affirmative policy approach to create equitable development.

The private sector's preference for investing in high-value export commodities such as palm oil (87.3 %), coffee (76.5%), and cocoa (71.2%) indicates a market-oriented tendency in partnership development. Although this approach is effective in increasing the added value and competitiveness of agricultural products, there is a risk of marginalizing staple food commodities that have strategic significance for national food security. The much lower ratio of private to public investment in the Bali-Nusa Tenggara corridor (1.2:1) compared to Sumatra and Kalimantan (3.7:1) indicates the need for special incentives to encourage private participation in the development of strategic food commodities.

Findings related to capacity building and technology transfer through partnership schemes, with 72.4 % of farmers gaining access to training and 68.2% gaining access to new technology, indicate the positive contribution of partnerships in agricultural modernization. The average productivity increase of 23.7 % compared to non-partner farmers confirms the hypothesis that public-private partnerships can be a catalyst for innovation diffusion in the agricultural sector. However, the disparity in technology adoption rates across economic corridors, with Java (78.2 %) and Papua-Maluku (43.8%) indicating a digital divide that needs to be addressed through an inclusive approach in digital transformation of agriculture.

Structural challenges in the form of unequal bargaining positions (76.5 %) and unclear legal frameworks (67.8%) underline the importance of strengthening the governance dimension in public-private partnerships. The fact that only 12 out of 34 provinces have specific regional regulations on agricultural partnerships reflects institutional weaknesses that can hamper the sustainability of partnerships. This finding is in line with the argument of Daryanto and Nuryartono [3] regarding the importance of a strong regulatory framework to support the development of sustainable agrocomplex systems in Indonesia.

The positive correlation between the presence of a neutral facilitator and a 35% higher level of partnership sustainability indicates the importance of the role of intermediary in bridging the interests of various stakeholders. This confirms the governance literature that emphasizes the role of third parties as mediators in the context of power and information asymmetry. In the Indonesian context, local government institutions and civil society organizations can play a crucial role as neutral facilitators that ensure equality and fairness in the implementation of partnerships.

The findings on the socio-economic impact of partnerships, with a 4.7 percentage point greater reduction in poverty rates in areas with high partnership penetration, indicate the potential of partnerships as an instrument for poverty alleviation. Increased diversification of farmer incomes, with 58.3% of partner farmers having at least two sources of income compared to 32.1% of non-partner farmers, also indicate the contribution of partnerships to the economic resilience of farmer households. However, an important question that needs further study is how to ensure a more equitable distribution of partnership benefits, including for vulnerable groups such as subsistence farmers and women farmers.

The blended finance model showing a higher operational sustainability ratio (3.8 out of 5) compared to the single source model (2.3 out of 5) indicates the importance of diversifying funding sources in developing sustainable partnerships. Transparency in the use of funds (87.5 %) and clarity of risk-sharing mechanisms (82.3%) identified as critical factors for the success of blended finance underscore the importance of good governance principles in partnership financial management. Innovations in financing schemes such as social impact bonds and results-based financing need to be explored to expand the resources available for the development of agrocomplex systems.

Overall, the findings of this study underscore the importance of a systemic approach in developing public-private partnerships to strengthen agrocomplex systems in Indonesia. Integration of regulatory, institutional, financing, technological, and community empowerment dimensions is needed to maximize the positive impacts of partnerships and minimize potential negative externalities. Experience from various economic corridors shows that there is no "one-size-fits-all solution", but rather adaptation of partnership models according to local characteristics and specific needs of the region.

In the context of Indonesia’s agricultural development transformation, public-private partnerships offer a pragmatic approach to address investment and capacity gaps. However, their implementation needs to be guided by the principles of inclusive and sustainable development to ensure that the economic benefits generated do not come at the expense of social and environmental aspects. As identified in this study, a multi-stakeholder consortium model that provides space for participation by various actors shows greater potential to achieve a balance between economic, social and environmental interests.

5. Conclusion

This study examines the role of public-private partnerships in strengthening agrocomplex systems in various economic corridors in Indonesia. Based on a comprehensive analysis using a mixed-method approach, it can be concluded that public-private partnerships have a significant contribution in increasing farmer productivity and income, strengthening agricultural value chains, and driving economic transformation in rural areas. Diverse partnership models have developed in various economic corridors, reflecting the heterogeneity of regional characteristics and leading commodities, with the multi-stakeholder consortium model showing the highest level of satisfaction among farmers and small business actors.

Key factors influencing the success of partnership implementation include: availability of supporting infrastructure, regional institutional capacity, transparency of risk and benefit sharing mechanisms, and the presence of a neutral facilitator who bridges the interests of various stakeholders. The disparity in the level of success of partnership implementation between economic corridors underscores the importance of a contextual and affirmative approach, especially for eastern Indonesia which still faces limited infrastructure and institutional capacity.

Structural challenges in implementing partnerships are mainly related to unequal bargaining positions, unclear legal frameworks, and weak conflict resolution mechanisms. Strengthening regulatory and institutional aspects is needed to create a conducive environment for the development of sustainable partnerships. Innovation in blended financing models and agricultural digitalization offer strategic opportunities to increase the scale and impact of future partnerships.

This study contributes to the literature on sustainable agricultural development by highlighting the potential and challenges of public-private partnerships in the context of a developing country with island geographical characteristics. The study findings provide important policy implications for the government, private sector, and other stakeholders in designing and implementing effective partnerships for the development of agrocomplex systems in Indonesia.

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