

Impacts and Sustainable Development Guidelines of Large-Scale Agricultural Systems on Community Economic Development: a Case Study of Longan Large-Scale Farming in Mae Tha District, Lamphun Province

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Abstracts

This study aimed to: 1) examine the impacts of the large-scale longan farming system on community economic development across the economic, social, and sustainability dimensions in Mae Tha District, Lamphun Province; and 2) propose development guidelines for enhancing the sustainability of the large-scale longan farming system in order to strengthen economic capacity and community resilience. A mixed-methods research design was employed by integrating quantitative and qualitative approaches. The population consisted of 627 longan farmers participating in the large-scale farming system. Using Taro Yamane's formula at a 95% confidence level, a sample of 154 farmers was selected through simple random sampling. In addition, 15 key informants, including farm managers, farmer leaders, and government officials, were purposively selected. The research instruments comprised a five-point Likert-scale questionnaire, an in-depth interview guide, and a focus group discussion guide. The instruments were examined for content validity by experts, and the questionnaire yielded a reliability coefficient greater than 0.80. Quantitative data were analyzed using frequency, percentage, mean, standard deviation, and multiple regression analysis, while qualitative data were analyzed through content analysis and triangulation.

The findings revealed that: 1) the large-scale longan farming system had positive effects on the community economy. Average household income increased by 45%, while production costs decreased by 20% as a result of shared resource utilization. The social dimension received the highest rating ($M=4.05$, $S.D.=0.48$),

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reflecting greater cooperation, trust, and participation among members. The sustainability dimension was also rated at a high level ($\bar{X}=3.80$, S.D.=0.54). The adoption of drip irrigation, bio-fertilizers, and Smart Farming technologies helped reduce environmental risks; however, limitations remained in terms of access to finance and knowledge. The most influential factors affecting system efficiency were marketing ($\beta=0.352$), production technology ($\beta=0.295$), and leadership ($\beta=0.215$); and 2) sustainable development guidelines should be implemented at three levels: the policy level, through the establishment of permanent markets, digital marketing, low-interest credit, and technology transfer; the operational level, through joint marketing, leadership development, and production technology enhancement; and the community level, through participatory management, farmer-to-farmer learning, and the strengthening of trust-based networks. The new knowledge generated from this study indicates that the sustainability of large-scale farming systems depends on the balanced integration of economic efficiency, social capital, participatory governance, technology, and environmental management.

Keywords: Large-Scale Farming; Community Economy; Sustainable Development; Social Capital; Longan

Introduction

Agriculture has long been regarded as the cornerstone of Thailand's economy, serving not only as the primary source of food for domestic consumption but also as a major contributor to national income through agricultural exports (Jantawee, 2021). Smallholder farmers continue to represent the backbone of the agricultural workforce; however, they face persistent challenges such as high production costs, inconsistent product quality, and volatile agricultural prices, all of which contribute to economic instability among Thai farming households (Sukkasem, et al. 2025). In response to these structural challenges, the Ministry of Agriculture and Cooperatives introduced the Large-Scale Farming Project in 2016, with the objectives of reducing production costs, enhancing competitiveness, and establishing agricultural standards that meet the demands of both domestic and international markets.

Longan is one of the most important economic crops in northern Thailand, particularly in Lamphun and Chiang Mai provinces, which serve as major production

hubs and play a vital role in export markets, especially China, the primary trading partner (Upata, 2023). The establishment of large-scale longan farming in Mae Tha District, Lamphun Province, has thus become a critical mechanism for enhancing local farmers' production and marketing capacity. According to the Mae Tha District Agricultural Office (2023), farmers participating in the program reported an average income increase of 40–60% compared to the period before participation. Nevertheless, the system continues to face structural limitations, including restricted access to financial markets, price volatility, and inconsistent technological support (Danawan, 2023). These complexities highlight that the impacts of large-scale farming extend beyond household income and economic well-being, encompassing community solidarity, cooperation among members, and long-term sustainability. This aligns with Social Capital Theory, which emphasizes that trust, cooperation, and social networks are essential factors enabling communities to build resilience and adapt to economic and environmental changes (Dapilah, Nielsen, & Friis, 2020). At the same time, the concept of *Sustainable Development* underscores the necessity of integrating economic, social, and environmental dimensions to achieve long-term balance (Hariram, Mekha, Suganthan, & Sudhakar, 2023). Accordingly, assessing both the benefits and limitations of large-scale farming and identifying sustainable development pathways is crucial for informing effective policy and practice.

Based on these considerations, the study addresses two key research questions: What are the impacts of the large-scale longan farming system in Mae Tha District on the community economy in terms of economic, social, and sustainability dimensions, What development pathways can enhance the sustainability of the large-scale longan farming system in Mae Tha District to strengthen both economic capacity and community resilience.

Research Objectives

1. To examine the impacts of the large-scale longan farming system in Mae Tha District, Lamphun Province, on the community economy across economic, social, and sustainability dimensions.
2. To propose development pathways for enhancing the sustainability of the large-scale longan farming system in Mae Tha District in order to strengthen economic capacity and community resilience.

Research Methodology

1. Research Design: This study employed a mixed methods research design, integrating both quantitative and qualitative approaches to capture statistical patterns as well as in-depth understanding. The quantitative component focused on analyzing farmers' perceptions and the economic impacts of the large-scale farming system, while the qualitative component aimed to explain the lived experiences of stakeholders. This combination allowed for more comprehensive conclusions that directly connect with strategies for fostering community sustainability.

2. Population and Sample: The study population comprised 627 longan farmers who were members of the large-scale farming system in Mae Tha District, Lamphun Province. Using Taro Yamane's formula at a 95% confidence level, the sample size was determined to be 154 farmers. Respondents were selected through simple random sampling to ensure proper representation of the population. For qualitative data collection, purposive sampling was applied to 15 key informants, including farm managers, farmer leaders, and government officials.

3. Research Instruments: Two types of instruments were employed: (1) A quantitative questionnaire divided into three parts: general demographic information, evaluation of the impacts of the large-scale farming system in economic, social, and environmental dimensions, and respondents' recommendations. A five-point Likert scale was used for measurement. (2) An in-depth interview guide designed to collect qualitative data from key informants, reflecting experiential perspectives and management practices. All instruments underwent content validity checks by three experts, and the questionnaire's reliability was tested using Cronbach's Alpha, which yielded coefficients above 0.80, indicating high reliability.

4. Data Collection: Quantitative data were collected between November 2024 and January 2025 by distributing questionnaires to all 154 farmer respondents, with data thoroughly verified before analysis. Simultaneously, qualitative data were gathered through in depth interviews and focus group discussions, conducted in an open and participatory setting that enabled informants to express their views and experiences regarding the impacts and development pathways of the large-scale farming system.

5. Data Analysis: Quantitative data were analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation, to describe the characteristics of respondents and the level of impacts. Inferential statistics,

specifically multiple regression analysis, were applied to test relationships between influencing factors and system efficiency. Qualitative data were analyzed through content analysis, with interview and focus group transcripts categorized and interpreted thematically. The results were then triangulated with quantitative findings to provide a multidimensional and comprehensive explanation of the research outcomes.

Results

The study entitled “Impacts and Sustainable Development Guidelines of Large-Scale Agricultural Systems on Community Economic Development: A Case Study of Longan Large-Scale Farming in Mae Tha District, Lamphun Province” was conducted to achieve the following objectives:

Research Objective 1 focused on examining the impacts of the large-scale longan farming system in Mae Tha District, Lamphun Province on the community economy across the dimensions of economy, society, and sustainability. The findings from both quantitative and qualitative analyses revealed a coherent and mutually reinforcing picture, thereby confirming the validity and completeness of the results. The key insights derived from these two dimensions are summarized in the following table.

Research Dimension	Quantitative Findings	Qualitative Findings
Economic Impact	Average income increased by 45% after joining the program; production costs reduced by 20% due to shared resources. (Mean=3.76, S.D.=0.57, High)	Farmers reported more stable income through direct access to export markets, especially China, and improved price negotiation.
Social Impact	Strongest dimension (Mean=4.05, S.D.=0.48, High); reflects higher cooperation, trust, and participation within the community.	Group members highlighted increased trust, transparency, and collaboration through joint decision-making and community meetings.
Sustainability Impact	Use of appropriate technologies (drip irrigation, bio-fertilizers, Smart Farming) reduced environmental risks. (Mean=3.80, S.D.=0.54, High)	Farmers noted benefits of Smart Farming but cited barriers such as insufficient funding and limited access to knowledge.

Research Dimension	Quantitative Findings	Qualitative Findings
Key Factors Influencing Efficiency	Regression analysis showed marketing ($\beta=0.352$), production technology ($\beta=0.295$), and leadership ($\beta=0.215$) significantly influenced efficiency.	Confirmed that stable markets, continuous technology support, and strong leadership networks are essential for long-term sustainability.
Challenges	Finance and funding were rated moderate (Mean=3.45, S.D.=0.61); not statistically significant in regression results.	Farmers emphasized difficulties in accessing credit, price fluctuations, and inconsistencies in government support.

Table 1 Summary of Research Findings: Quantitative vs. Qualitative Results

The findings from Research Objective 1 indicate that the large-scale longan farming system in Mae Tha District has generated clear impacts on the community economy across multiple dimensions. Economically, farmers reported an average 45% increase in income and a 20% reduction in production costs due to shared resources, while qualitative evidence confirmed greater income stability through direct access to export markets and improved bargaining power. Socially, this dimension received the highest rating, reflecting strengthened social capital through cooperation, trust, and participatory decision-making, which in turn enhanced community resilience. In terms of sustainability, the adoption of technologies such as drip irrigation and Smart Farming reduced environmental risks, though limited funding and knowledge access remained constraints. Regression analysis further demonstrated that marketing, production technology, and leadership were the most influential factors driving system efficiency, consistent with field data emphasizing stable markets, continuous technology support, and strong leadership networks. However, financial constraints and inconsistent policy support remain critical challenges that must be addressed to ensure the long-term sustainability of the large-scale farming system and its contribution to the community economy.

Research Objective 2 aimed to explore development pathways for enhancing the sustainability of the large-scale longan farming system in Mae Tha District, Lamphun Province, with the goal of strengthening both economic capacity and community resilience. The findings clearly demonstrate that this large-scale farming system generates positive impacts on the community economy, particularly in the social dimension, which reinforces cooperation and collective strength within

the community. However, the economic and sustainability dimensions still face certain limitations that require further development. Data analysis confirms that marketing, production technology, and leadership are the key factors determining system efficiency, serving as the foundation for formulating development strategies at three levels: policy, operational, and community. These pathways are essential to fostering long-term economic security and community resilience, as summarized in Table 2.

Level	Development Pathways	Expected Outcomes
Policy Level	- Establish permanent markets and strengthen export linkages. - Promote e-Marketing and digital trade platforms. - Develop low-interest credit schemes for large-scale farming groups. - Continuous policy support for technology transfer suitable to local contexts.	- Reduce reliance on middlemen. - Improve market stability and bargaining power. - Increase access to financial resources. - Enhance adoption of modern farming technologies.
Practical / Operational Level	- Encourage farmer groups to develop joint marketing strategies. - Apply digital tools for promotion and distribution. - Provide training programs to strengthen leadership in management, economics, and negotiation. - Ensure ongoing support for Smart Farming and bio-fertilizer adoption.	- Stronger group capacity for marketing. - Improved leadership and negotiation skills. - Lower production costs and higher product quality. - Greater resilience to market volatility.
Community Level	- Promote participatory management and collective decision-making. - Establish model farms and peer-to-peer learning activities.	- Increased farmer participation and ownership. - Stronger social capital and trust within the community. - Knowledge sharing and innovation diffusion.

Level	Development Pathways	Expected Outcomes
	- Build trust networks between farmers, local leaders, and institutions. - Foster community engagement in sustainable resource use.	- Long-term sustainability of the farming system and rural economy.

Table 2 Development Pathways for the Sustainability of Large-Scale Longan Farming in Mae Tha District

Academic Summary Paragraph, The findings summarized in Table Y highlight that the sustainability of large-scale longan farming in Mae Tha District requires a multi-level development approach that integrates policy, operational, and community dimensions. At the policy level, government support in establishing permanent markets, promoting e-Marketing, providing low-interest financial schemes, and ensuring continuous technology transfer is essential for enhancing stability and competitiveness. At the practical or operational level, emphasis should be placed on strengthening farmer groups through joint marketing, digital promotion, leadership development, and the application of modern production technologies, which collectively improve efficiency and resilience. At the community level, participatory management, knowledge-sharing through model farms, and the building of trust-based networks are crucial for fostering social capital and long-term sustainability. Together, these pathways demonstrate that sustainable agricultural development must not only address structural and economic factors but also reinforce the social fabric of farming communities to ensure resilience and inclusive growth.

Discussion

The findings of this study on Impacts and Sustainable Development Guidelines of Large-Scale Agricultural Systems on Community Economic Development: A Case Study of Longan Large-Scale Farming in Mae Tha District, Lamphun Province provide important insights into both the impacts of the large-scale farming system and the pathways toward sustainability. The discussion is structured around two main research objectives, aligning the empirical findings with relevant theoretical and empirical literature.

1. Impacts of the Large-Scale Farming System on the Community Economy, The results demonstrate that the large-scale longan farming system has generated significant positive impacts on the community economy across economic, social, and sustainability dimensions. Economically, farmers reported a 45% increase in income and a 20% reduction in production costs due to collective resource management. This reflects the principle of economies of scale, whereby cooperation reduces per-unit costs and enhances competitiveness (U-senyang, Sama-alee, Pongtongmuang, Nakruang, & Jiamton, 2024). Similar findings were reported by Sukkasem et al. (2025), who observed that farmer cooperatives adopting precision agriculture improved production efficiency and secured better market prices. These studies suggest that collective farming not only stabilizes income but also mitigates the vulnerability of smallholders to market fluctuations.

From a social perspective, the study found that this dimension received the highest impact score, with farmers highlighting increased cooperation, trust, and participation. This aligns with the Social Capital Theory, which posits that trust and networks within communities enhance their capacity to collaborate and solve shared problems (Putnam, 1993). In the context of northern Thailand, Prompanat (2021) emphasized that networks of longan farmers who bypass middlemen demonstrated stronger bargaining power and community solidarity. Our findings corroborate these observations, suggesting that the social dimension is the foundation for sustaining both economic resilience and adaptive capacity in farming communities. Regarding sustainability, the adoption of technologies such as drip irrigation, bio-fertilizers, and Smart Farming practices contributed to reduced environmental risks and improved long-term viability. However, qualitative findings revealed persistent challenges, including limited funding and restricted access to knowledge. This resonates with research by Chakkaew and Sittisantikul (2023), who found that technology adoption in northern Thailand often depends on continuous training and state subsidies. Without structural support, the benefits of Smart Farming remain unevenly distributed, reinforcing disparities among farmers.

The regression analysis further highlighted that marketing ($\beta=0.352$), production technology ($\beta=0.295$), and leadership ($\beta=0.215$) were the most influential factors in determining efficiency. These results align with Naruepatr (2019), who argued that effective leadership and strong market linkages are crucial for rural farmer groups to sustain competitiveness. Likewise, Supandit, Kummanee, Thungngern, and

Seeniang (2021) demonstrated that market diversification and technological innovation directly strengthen farmer resilience. Taken together, the evidence confirms that the success of large-scale farming systems depends less on access to finance alone and more on the strategic integration of marketing, leadership, and technology. Nevertheless, financial constraints emerged as a notable challenge. The mean score for financial support was moderate, and regression results showed it was not statistically significant in predicting system efficiency. This paradox suggests that while credit is important, its influence may be overshadowed by structural factors such as market access and leadership. Upata (2023) similarly reported that despite state credit schemes, northern Thai farmers continued to face income instability due to volatile export prices and insufficient organizational capacity. This underscores the need for integrated approaches that address both financial and structural barriers simultaneously.

2. Development Pathways for Enhancing Sustainability. The second research objective aimed to identify sustainable development pathways to enhance economic capacity and strengthen community resilience. The findings emphasized that sustainability must be approached at three interconnected levels: policy, operational, and community. At the policy level, the study recommends establishing permanent markets, promoting e-Marketing, developing low-interest credit schemes, and providing continuous policy support for technology transfer. These strategies reflect broader calls within the literature for market diversification and institutional support. For example, Dendup and Aditto (2020) highlighted that agricultural cooperatives in Thailand remain vulnerable when reliant on single markets, particularly China, and stressed the importance of diversified trade platforms. Sukkasem et al. (2025) also stressed that precision agriculture initiatives succeed only when supported by long-term government policies. Thus, sustained policy intervention is critical to overcoming structural constraints faced by farmers in Mae Tha District.

At the practical or operational level, the research emphasized the importance of joint marketing strategies, digital promotion, leadership training, and continuous technological support. These measures are consistent with Kongtanajaruanun and Cheamuangphan (2021), who observed that participatory management in northern Thai farming systems enhanced group capacity and lowered transaction costs. Similarly, Aksornpim and Wanapu (2021) found that integrating digital technologies into agricultural operations expanded market access and reduced dependence on

intermediaries. The convergence of evidence suggests that capacity building and digital innovation are indispensable for modernizing large-scale farming systems.

At the community level, the findings underscore the role of participatory management, peer-to-peer learning, and trust-building networks. These elements strengthen social capital, which is the foundation for resilience in the face of market and environmental uncertainties. Kaewkaunkhri (2025) and Wachiravudho and Phinyarak (2025) confirmed that communities with strong networks and trust relationships are better positioned to sustain cooperative farming initiatives. The evidence from Mae Tha District mirrors these findings, showing that community-driven mechanisms, such as model farms and collective decision-making, not only enhance knowledge diffusion but also foster a sense of ownership critical for long-term sustainability.

3. Implications and Synthesis. The overall discussion highlights that the large-scale longan farming system in Mae Tha District has contributed positively to the community economy, particularly in enhancing social cohesion and resilience. However, challenges related to financial access, price volatility, and uneven technology adoption remain. The study affirms that sustainable development pathways must integrate policy support, operational strengthening, and community empowerment. This aligns with global perspectives on sustainable agricultural development. According to Prayukvong, Srisomphol, and Kummanee (2023), the Sufficiency Economy Philosophy emphasizes moderation, resilience, and integration across economic, social, and environmental dimensions. Applying these principles to large-scale farming systems indicates that sustainability cannot be achieved through economic growth alone but requires reinforcing social structures and environmental stewardship.

In conclusion, the discussion demonstrates that the sustainability of large-scale longan farming in Mae Tha District depends on multi-level interventions that bridge markets, technology, and leadership with social capital and community participation. The integration of these elements is essential not only for ensuring the economic security of farmers but also for fostering inclusive and resilient rural development.

New Knowledge

This study generated new theoretical and empirical insights by confirming that the success of large-scale longan farming systems is not determined solely by economic factors but rather by the integration of multiple components. Marketing, production technology, and leadership emerged as the most critical drivers, while social capital reflected through trust, cooperation, and participatory engagement proved to be the foundation of long-term resilience. These findings reinforce Social Capital Theory and Participatory Management Theory, which emphasize that robust networks and participatory governance are essential to sustainability. The consistency between quantitative and qualitative results further strengthens the reliability of the findings, demonstrating the importance of structural mechanisms that mutually reinforce one another in sustaining farming systems.

In practical terms, the study proposes sustainability pathways across three levels: policy, operational, and community. At the policy level, permanent markets, e-Marketing promotion, continuous technology transfer, and support for leadership development are crucial for ensuring stability and competitiveness. At the operational and community levels, participatory management, joint learning, and trust-based networks are essential for building social strength and sustaining collective action. These contributions reveal that the success of large-scale farming cannot be measured by productivity or income alone but must be understood through a balanced integration of economic, social, and environmental dimensions, thereby ensuring long-term sustainability and inclusive rural development.

Conclusion and Suggestion

The study on Impacts and Sustainable Development Guidelines of Large-Scale Agricultural Systems on Community Economic Development: A Case Study of Longan Large-Scale Farming in Mae Tha District, Lamphun Province confirmed that large-scale farming generates clear benefits for the community economy, particularly by strengthening social cohesion and resilience. Nevertheless, challenges remain in the economic and sustainability dimensions, especially regarding financial access, price volatility, and uneven technology adoption. Based on these findings, the following recommendations are proposed:

1. Policy Recommendations

1.1 Establish permanent markets and diversify export linkages to reduce dependence on middlemen and single markets.

1.2 Promote digital trade platforms and e-Marketing to expand consumer access and strengthen competitiveness.

1.3 Provide low-interest credit schemes or revolving funds specifically tailored for large-scale farming groups to improve access to capital.

1.4 Ensure continuous policy support for technology transfer adapted to local farming contexts.

2. Practical/Operational Recommendations

2.1 Strengthen joint marketing strategies among farmer groups and apply digital tools for promotion and distribution.

2.2 Develop leadership capacity through training in management, negotiation, and economic planning.

2.3 Enhance the adoption of Smart Farming technologies and bio-fertilizers with ongoing technical and financial support.

2.4 Encourage knowledge sharing and peer-to-peer learning, including model farms and farmer-to-farmer exchanges, to diffuse innovation and best practices.

3. Future Research Recommendations

3.1 Conduct comparative studies of large-scale farming systems across different economic crops to identify shared success factors and contextual differences.

3.2 Analyze the value chain of longan farming in greater depth, from production and processing to marketing and export, to identify points for efficiency improvement.

3.3 Investigate the environmental and sustainability impacts of large-scale farming, including resource use and ecological risks, to guide long-term planning and risk reduction.

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