

Management Models and Factors Influencing the Efficiency of Large-Scale Agricultural Systems: A Case Study of Longan Large-Scale Farming in Mae Tha District, Lamphun Province

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Abstracts

The objectives of this research were: (1) to study the management model of longan large-scale farming in Mae Tha District, Lamphun Province, and (2) to analyze the factors influencing the efficiency of large-scale agricultural systems. A mixed methods research design was employed, combining quantitative and qualitative approaches. For the quantitative part, data were collected from 154 farmers who were members of large-scale farming groups, selected using simple random sampling. For the qualitative part, in-depth interviews and focus group discussions were conducted with 15 key informants, including farm managers, farmer leaders, and related government officials. Research instruments included questionnaires and interview guides, which were validated by experts and demonstrated high reliability (Cronbach's Alpha > 0.80). Quantitative data were analyzed using descriptive statistics and multiple regression analysis, while qualitative data were analyzed using content analysis.

The findings revealed that the management of longan large-scale farming was characterized by participative management, with farmers actively involved in all processes. The key factors significantly influencing system efficiency were marketing, production technology, and leadership, with marketing being the most influential factor. Overall efficiency was rated at a high level, with the social dimension achieving the highest score, reflecting the strength of farmer group collaboration and community cooperation. This study contributes new knowledge, highlighting that the success of large-scale farming relies not only on economic aspects but also on social capital, participative management, and strong leadership. Policy and practical recommendations for sustainable development are also proposed.

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Introduction

Agriculture has long been regarded as a fundamental pillar of the Thai economy. It not only serves as a primary source of food production for domestic consumption but also functions as a crucial mechanism for export revenue generation and as the main source of employment for the majority of the Thai workforce (Weerachai Pengple, 2021). Nevertheless, small-scale farmers continue to face persistent challenges, including high production costs, inconsistent product quality, and fluctuating agricultural prices, all of which result in instability in both occupation and income. Addressing these issues requires a structural approach that emphasizes collective organization to increase bargaining power and maximize the use of shared resources in line with the principle of the economy of scale (U-senyang, S., et al., 2024). In response, the Ministry of Agriculture and Cooperatives established the Large-Scale Farming Promotion Program in 2016 as a structural solution aimed at reducing production costs, improving resource efficiency, and standardizing agricultural products to meet both domestic and international market demands (Supandit, S., et al., 2021; Thongrod, K., et al., 2020). Research by Kongtanajaruanun and Cheamuangphan (2021), as well as Aksornpim and Wanapu (2021), has highlighted that large-scale farming systems managed under participative management approaches can strengthen the economic and social resilience of communities while fostering long-term sustainable development. Thus, examining large-scale farming requires not only an assessment of outputs and income but also a deeper analysis of the factors influencing management efficiency as a basis for improvement and advancement.

Longan is one of Thailand's most important economic crops, particularly in the northern region, where the climate and geography are highly suitable for cultivation. Lamphun and Chiang Mai provinces are the largest producers of longan and play a significant role in exports, especially to China, which is the primary trading partner (Office of Agricultural Economics, 2024). However, the production and marketing of longan remain at risk due to price volatility, rising production costs, and limitations in product quality. Prompanat (2021) reported that many longan farmers in northern Thailand struggle with dependence on middlemen, limited access to

financial resources, and a lack of knowledge in market management. In Mae Tha District, Lamphun Province, large-scale longan farming groups have been established since 2016 and have since expanded to four groups, emphasizing collaborative management to strengthen bargaining power and reduce production costs. Recent data indicate that members' average income increased by 40–60% after joining the program. However, several constraints persist, including management structure, continuity of technology transfer, and access to stable markets (Upata, 2023). These findings suggest that the efficiency of large-scale agricultural systems depends on multiple factors, such as leadership, marketing, production technology, and member cooperation. Yet, empirical studies that systematically analyze these components remain limited. Consequently, an in-depth study of the Mae Tha area is crucial for enhancing efficiency and providing development pathways.

Based on the above, the main research questions are as follows: What is the management model of large-scale longan farming in Mae Tha District, Lamphun Province? and What factors influence the efficiency of the large-scale agricultural system in this area? These questions are designed to deepen the understanding of management mechanisms and to examine structural factors that drive the success and sustainability of large-scale farming. The results are expected not only to address academic gaps but also to provide practical policy insights to strengthen farmers' capacities and enhance the foundation of Thailand's grassroots economy.

Research Objectives

1. To study the management model of large-scale longan farming systems in Mae Tha District, Lamphun Province.
2. To analyze the factors influencing the efficiency of large-scale longan farming systems in Mae Tha District, Lamphun Province.

Research Methodology

1. Research Design

This study employed a mixed methods research design, integrating both quantitative and qualitative approaches to obtain comprehensive data that combined statistical evidence with in-depth insights. The quantitative research utilized questionnaires to measure the opinions of farmer members of the large-scale

farming groups, while the qualitative research employed in-depth interviews and focus group discussions with key stakeholders such as farm managers, community leaders, and agricultural extension officers.

2. Population and Sample

The population consisted of 627 farmer members of four large-scale longan farming groups in Mae Tha District, Lamphun Province (Mae Tha District Agricultural Office, 2020). The sample size was determined using Taro Yamane's formula at a 95% confidence level, yielding 154 respondents. The sample was selected using simple random sampling to ensure representativeness. For the qualitative research, key informants were selected through purposive sampling, comprising 15 individuals including farm managers, farmer group leaders, and relevant government officials.

3. Research Instruments

Research instruments consisted of a quantitative questionnaire and a qualitative interview guide. The questionnaire was divided into three sections: (1) general information of farmers, (2) assessment of management models and related factors, including leadership, marketing, production technology, group management, and financial support, measured using a five-point Likert scale, and (3) assessment of the efficiency of the large-scale agricultural system in terms of economic, social, and sustainability dimensions. The in-depth interview guide was employed to collect qualitative data concerning the experiences, perceptions, and perspectives of farm managers and relevant stakeholders. All instruments were validated by three experts to ensure content validity, and reliability testing using Cronbach's Alpha coefficient produced values greater than 0.80, confirming high reliability.

4. Data Collection

This study employed both quantitative and qualitative data collection methods. Quantitative data were obtained from 154 farmer respondents through questionnaires administered between November 2024 and January 2025. To complement and triangulate these findings, qualitative data were collected through in-depth interviews and focus group discussions with 15 key informants, thereby providing richer insights and explanatory depth.

5. Data Analysis

The quantitative data were analyzed using descriptive statistics frequency, percentage, mean, and standard deviation along with multiple regression analysis to test hypotheses and identify factors influencing the efficiency of the large-scale

farming system. Qualitative data were examined through content analysis, including transcription, thematic categorization, and interpretation of meanings. The results were compared and integrated with the quantitative findings to confirm and strengthen the overall conclusions of the study.

Results

The researcher conducted a study entitled Management Models and Factors Influencing the Efficiency of Large-Scale Agricultural Systems: A Case Study of Longan Large-Scale Farming in Mae Tha District, Lamphun Province. The research findings can be summarized according to the study objectives as follows:

Part 1: A survey of 154 farmer members of the longan large-scale farming groups in Mae Tha District, Lamphun Province revealed that most respondents were male (62.34%) and aged 41–60, representing the main household workforce. Over half (55.84%) had completed primary education, and the majority had more than 10 years of longan farming experience, managing 5–10 rai on average. Their primary income came from selling fresh and dried longans. Most were household heads, indicating that the system comprises experienced members ready to engage in systematic collective management.

Part 2: Management Model of Large-Scale Longan Farming in Mae Tha District, Lamphun Province

Section . The large-scale longan farming system in Mae Tha District, Lamphun Province, is managed under a participative management model, whereby farmers are actively involved in all processes ranging from planning, production, and marketing to monitoring and evaluation. This approach reflects transparency in management and the strengthening of community cohesion. Quantitatively, farmers assessed the factors related to the large-scale farming system at a high level in almost all aspects. The highest importance was placed on farm management and maintenance ($\bar{X}=4.23$) and marketing and distribution channels ($\bar{X}=4.15$), while financial support and funding were rated at a moderate level, indicating a limitation that still requires further development. The results of the analysis, which present mean scores and standard deviations, are summarized overall in Table 1.

Factors of the Large-Scale Agricultural System	Level of Assessment		
	$\bar{X}$	S.D.	Interpretation
1. Leadership and Management	4.09	0.52	High
2. Farm Management and Maintenance	4.23	0.47	High
3. Application of Production Technology	3.95	0.56	High
4. Marketing and Distribution Channels	4.15	0.49	High
5. Financial Support and Funding	3.72	0.60	Moderate
Overall	3.79	0.53	High

Table 1 Factors of the Large-Scale Agricultural System

Section 2: The results of the multiple regression analysis further confirmed that marketing, production technology, and leadership were significant factors influencing the efficiency of the system (Sig. < 0.05). Among these, marketing had the highest influence, with a β value of 0.350. In contrast, financial support and funding were found to have no significant effect on the system's efficiency (see Table 2).

Independent Variables	Level of Assessment			
	B	Beta (β)	t	Sig.
1. Leadership and Management	0.182	0.210	2.47	0.015*
2. Production Technology	0.276	0.310	3.85	0.000**
3. Group Management	0.195	0.200	2.21	0.028*
4. Marketing and Distribution	0.322	0.350	4.02	0.000**
5.การเงินและทุนสนับสนุน	0.098	0.110	1.36	0.176
ค่าคงที่ (Constant)	1.245	–	4.92	0.000**

Note: *p < 0.05, **p < 0.01

R=0.682, R²=0.465, Adjusted R²=0.448, F=27.56, Sig.=0.000

Table 2 Results of Multiple Regression Analysis

The findings revealed that the factors significantly influencing the efficiency of the large-scale longan farming system in Mae Tha District were marketing, production technology, and leadership. Among these, marketing was identified as the most critical factor, as access to stable markets and diverse distribution channels helps ensure farmers' income security. The second most influential factor was the adoption of appropriate production technologies, which reduce costs and enhance product quality. Leadership and management also played an essential role in

coordinating activities, fostering collaboration, and ensuring that the large-scale farming system operates effectively and sustainably in the long term.

Section 3: The overall efficiency of the system was found to be at a high level ($\bar{X}=3.79$). Among the three dimensions, the social dimension scored the highest ($\bar{X}=4.01$), reflecting the strength and collaboration of the community, followed by the sustainability dimension and the economic dimension, respectively (see Table 3). These results indicate that the large-scale longan farming system in this area is managed through a participative approach, which has concretely enhanced the efficiency and collective capacity of the community.

Efficiency Dimensions	Level of Assessment		
	$\bar{X}$	S.D.	Interpretation
1. Economic Dimension	3.57	0.58	High
2. Social Dimension	4.01	0.46	High
3. Sustainability Dimension	3.80	0.55	High
Overall	3.79	0.53	High

Table 3 Efficiency Levels of the Large-Scale Agricultural System

The results revealed that the efficiency of the large-scale longan farming system in Mae Tha District was at a high level, with the social dimension achieving the highest score ($\bar{X}=4.01$). This reflects the strength of farmer group collaboration, characterized by active participation, cooperation, and mutual trust between members and community leaders. Such practices not only enhance the effectiveness of large-scale farm management but also promote solidarity and stability within farmer networks, which constitute a fundamental foundation for advancing both the local economy and community sustainability in the long term.

Part 3: Factors Influencing the Efficiency of the Large-Scale Longan Farming System in Mae Tha District, Lamphun Province. From the in-depth interviews and focus group discussions with farm managers, farmer leaders, and government officials, the following key issues were identified:

1. **Management Model:** The large-scale longan farming system in Mae Tha District is characterized by participative management, whereby farmer members play an active role in every process from crop planning, determining production volume, and procuring inputs, to making decisions on pricing and monitoring group

performance. Providing opportunities for members to participate at all stages has enhanced transparency and fostered a sense of ownership among farmers, thereby strengthening the system as a whole.

2. Leadership: Farmer leaders and farm managers serve as the core coordinators of the management process. They play a crucial role in setting directions, linking cooperation with government agencies, the private sector, and buyers, as well as fostering trust and motivation among members to participate continuously. Strong leadership has therefore contributed to collective empowerment within farmer networks and enabled effective problem-solving.

3. Market Factors: Export markets, particularly China, are the primary determinants of income stability for farmers. By forming large-scale farming groups, farmers have improved their bargaining power and gained better access to buyers. However, there remains a need to develop additional marketing channels such as e-Marketing platforms and linkages with modern trade outlets, in order to reduce dependence on middlemen and increase the diversity of distribution channels.

4. Production Technology: Farmers have adopted modern production technologies, including drip irrigation systems, the use of bio-fertilizers, and smart farming practices, which help improve product quality and reduce production costs. Nevertheless, some farmers still face limitations in accessing knowledge and equipment due to budget constraints and inconsistent government support. As a result, the practical application of advanced technology is not yet widespread.

5. Challenges: Despite the benefits of the large-scale farming system in enhancing production and marketing capacity, several critical challenges remain. These include fluctuations in product prices driven by global market mechanisms, unequal access to financial resources, and discontinuities in group management caused by leadership changes or internal conflicts. Such challenges highlight the need for stronger policy-level support to ensure market stability, improve access to funding, and develop sustainable management mechanisms for large-scale farming systems.

Discussion

The study on Management Models and Factors Influencing the Efficiency of Large-Scale Agricultural Systems: A Case Study of Longan Large-Scale Farming in Mae Tha District, Lamphun Province provided several key points for discussion as follows:

1. Participative Management Model, The findings clearly indicated that the large-scale longan farming system in Mae Tha District operates under a participative management model, in which farmer members are actively engaged in all processes, including planning, production, marketing, and monitoring. Such participation enhances transparency in management and fosters a sense of shared ownership, which in turn strengthens group cohesion and collective action. This result is consistent with the Social Capital Theory highlighted by Kaewkaunkhri (2025) and Wachiravudho & Phinyarak (2025), who argued that networks, trust, and community participation are fundamental for sustainable social and economic development. In practice, participative management empowers farmers to address structural problems, such as cost reduction, resource allocation, and establishing product quality standards. Similarly, Pornsuttichaipong, Srichad, & Phutchu (2022) found that farmer networks producing and selling dried longans without middlemen in Lamphun achieved greater bargaining power and long-term economic security through participative group management. However, participative management requires a foundation of trust and transparency. Without adequate coordination and fairness, conflicts within groups may arise. Baedcharoen, Aksornatap, & Jatuprayoon (2023) also emphasized that the success of farmer group management in Thailand depends on leadership that promotes inclusivity and balances members' interests with collective goals.

2. Factors Influencing System Efficiency, Statistical analysis revealed that marketing, production technology, and leadership were the key factors influencing the efficiency of the large-scale farming system. 1) Marketing and distribution channels had the greatest influence ($\beta=0.350$, Sig.=0.000). Since longan is an export-oriented crop, particularly to China, access to stable markets and diverse marketing channels determines income security. This finding aligns with Prompanat (2021), who noted that the major challenge for longan farmers is overreliance on middlemen and limited market access. Therefore, developing new networks, such as e-Marketing and modern trade linkages, is essential. 2) Production technology ranked second ($\beta=0.310$, Sig.=0.000). The adoption of drip irrigation systems, bio-fertilizers, and smart farming practices reduces costs and improves product quality. Chakkaew & Sittisantikul (2023) stressed that sustainable use of technology requires continuous training and government support to ensure accessibility. 3) Leadership and management were also significant ($\beta=0.210$, Sig.=0.015). Leaders act as coordinators

with government agencies, private sectors, and buyers, while building trust and motivation among members. Naruepatr (2019) confirmed that trusted leadership with strong connections to government agencies enhances market access and strengthens the competitiveness of rural farming groups in Thailand. These findings affirm that the efficiency of large-scale agricultural systems does not merely stem from collective organization but is strongly shaped by structural management quality, particularly marketing, technology, and leadership, which must be effectively integrated.

3. Dimensions of Efficiency: Economic, Social, and Sustainability, The study also revealed that overall efficiency was rated at a high level, with the social dimension scoring the highest, followed by sustainability and economic dimensions. 1) The social dimension reflects cooperation, trust, and networking within the community, forming the foundation of social capital that drives effective group operations. Putnam (1993) and Thuvachote (2024) emphasized that strong networks and member participation are directly related to the success of farmer organizations in Thailand. 2) The sustainability dimension indicates efficient resource utilization and farmers' adaptability to environmental changes. Prayukvong et al. (2023), in their study of the Sufficiency Economy Philosophy, confirmed that balanced and moderate management fosters sustainability in agricultural communities. 3) The economic dimension, although rated high, received the lowest score compared to the other dimensions. This reflects issues of income instability and price fluctuations. Similarly, Dendup & Aditto (2020) found that Thai agricultural cooperatives face limitations in income distribution and heavy reliance on single markets. Thus, the prominence of the social dimension demonstrates that the value of farmer group collaboration extends beyond economic gains, creating social capital that strengthens communities and equips them to withstand challenges.

Overall Discussion Summary, The large-scale longan farming system in Mae Tha District demonstrates resilience through participative management and effective leadership that builds networks of cooperation. The most influential determinants of system efficiency are marketing, production technology, and leadership. Meanwhile, the social outcomes represent the strongest achievements of the system, as they foster collaboration, trust, and community stability. Nonetheless, challenges remain in terms of economic volatility and limited access to financial resources, which

require policy-level interventions to address structural gaps and ensure sustainable development.

New Knowledge

This research generated new knowledge in both theoretical and practical dimensions that systematically explain the success factors and limitations of the large-scale longan farming system. Such knowledge can be applied to guide policy formulation and agricultural management in other areas for sustainable development. The contributions are as follows:

1. **Knowledge on Management Models**, The study confirmed that effective management of large-scale farming systems should be based on participative management, which allows farmers to play roles in every process from planning, production, and marketing to monitoring and evaluation. This knowledge reinforces the theoretical perspective that transparency, participation, and a sense of shared ownership are key elements for the sustainability of farmer group management.

2. **Knowledge on Factors Influencing Efficiency**, Both quantitative and qualitative results indicated that marketing, production technology, and leadership are the three main factors determining system success. Among these, marketing was the most influential, highlighting that access to stable markets and diversified distribution channels is a critical structural variable for farmers' survival and income security.

3. **Knowledge on Efficiency Dimensions**, The research revealed that the social dimension achieved the highest level of efficiency. This reflects the strength of farmer group collaboration, the building of networks, trust, and community cooperation, all of which constitute social capital that sustains large-scale farming systems even under conditions of economic volatility and structural constraints.

4. **Theoretical Knowledge**, The findings reinforced and validated the Social Capital Theory and Participatory Management Theory, confirming their direct relationship with the efficiency of farmer organizations. At the same time, the study pointed out limitations of these theories in practice, particularly in financial and funding aspects, which though relevant are not decisive factors unless complemented by strong marketing systems and effective leadership.

5. **Practical Knowledge**, The study provided practical recommendations that can be directly applied at both policy and community levels, including:

5.1 Government should prioritize establishing permanent market structures and developing e-Marketing platforms to diversify distribution channels.

5.2 Continuous support programs for production technology should be developed, focusing on knowledge transfer and funding so that farmers can access and apply them effectively.

5.3 Development of network-oriented leadership should be emphasized to foster collaboration between farmers, government, and the private sector, thereby strengthening community resilience in the long term.

Summary of New Knowledge, This research highlights that the success of large-scale farming systems relies on participative management structures, strong leadership, stable markets, and appropriate production technology, underpinned by social capital as the essential foundation of sustainability. It also reaffirms that the success of large-scale farming is not measured solely by economic outcomes but also by the strength of social networks and community cohesion.

Conclusion and Suggestion

This study examined the management model and factors influencing the efficiency of the large-scale longan farming system in Mae Tha District, Lamphun Province. The findings revealed that the system is managed under a participative management approach, with farmers actively involved in all processes from planning to monitoring. The key factors significantly influencing efficiency were marketing, production technology, and leadership, while the social dimension demonstrated the highest level of efficiency, reflecting community strength and cooperation. However, financial support and funding remain limitations requiring further development. Overall, the study highlights that the success of large-scale farming depends not only on economic factors but also on social capital and effective management structures.

1. Policy Recommendations

1.1 Government should support the establishment of permanent market structures and promote online marketing (e-Marketing) to reduce reliance on middlemen.

1.2 Develop low-interest loan funds or financial schemes for farmers in large-scale farming systems to increase equitable access to capital.

1.3 Implement continuous policies to promote the transfer of production technologies that are suitable for local conditions.

2. Practical/Operational Recommendations

2.1 Farmer groups should develop joint marketing plans and use digital technology for promotion and market expansion. 2.2 Strengthen the leadership capacity of group leaders through training in management, economics, and negotiation skills. 2.3 Promote mutual learning among farmers by establishing model farms and organizing experience-sharing activities.

3. Future Research Recommendations

3.1 Conduct comparative studies of management systems between longan and other economic crops to identify shared and distinct factors. 3.2 Analyze the value chain of longan across all processes, from production and processing to marketing. 3.3 Study the environmental and sustainability impacts in greater depth to identify strategies for reducing risks related to resource use in the long term.

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