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THE MANAGEMENT OF LARGE-SCALE FARMING: A COOPERATIVE APPROACH FOR COST REDUCTION AND INCREASED RETURNS – A CASE STUDY IN SONGKHLA, THAILAND

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ABSTRACT

This study uses quantitative and qualitative research methods to examine the management model of large-scale rice farming and compares the costs and returns from rice farming between farmers who are members of large-scale farming groups and farmers who are not members of large-scale farming groups. Data were collected from sample farmers who are members of large-scale farming groups and farmers who are not members of large-scale farming groups using questionnaires and in-depth interviews. The statistics used for data analysis were mean, standard deviation, and independent t-test, and qualitative data were analysed using thematic analysis. The study findings revealed that the management of large-scale rice farming in Songkhla province emphasised group member participation, from the production process through to marketing, with driving mechanisms including committees and group rules and regulations. Cost management in rice farming is achieved through collective production of production factors and resource sharing, as well as collective marketing. Statistical testing found that farmers who are members of large-scale farming groups have significantly lower rice farming costs and higher returns than farmers who are not members of large-scale farming groups. Therefore, in scaling up the large-scale farming model to other areas, relevant agencies should consider farmers' readiness for collective organisation in terms of group management, cost management, and output management.

Introduction

Many rice farmers are burdened with debt and struggle to generate enough income to cover their expenses. The price of rice has fallen and farmers are growing rice that does not justify the cost (Hunnark, 2016). The price of rice remains on the Thai market is uncertain (Tiyatrakarnchai, 2022) due to internal factors such as rice variety, moisture content, and maturity, and external factors like government policies, political influences, and global market price mechanisms. In some years, the price of rice is very low, leading to minimal profits or even losses for farmers.

The second largest cost is labour wages. Currently, with fewer family members available for work, farmers are increasingly hiring external labour. Additionally, material costs contribute to the overall expenses (Sanpakdee & Onwimon, 2021). There are also issues with insufficient management and irrigation systems, deteriorated soil conditions, the need for research into rice variety development and ways to add value to rice products.

Enhancing the skills and capabilities of farmers, along with support from relevant government departments is also crucial. As

a result, the yield per unit area in Thailand is lower compared with India and Vietnam, and the quality of the rice does not meet standard expectations, leading to price reductions by middlemen. The average rice yield in Thailand is 450 kg/rai (Krungsri Research, 2022). Rice-cultivating households make up 60.5% of all farm households. Addressing the issues faced by rice farmers is, therefore, a critical concern, with ongoing government support and assistance since 1965. To help farmers, the government provides support such as price subsidies and insurance, rice pledging and funding for comprehensive farming operations (Hunnark, 2016).

In 2015, the Ministry of Agriculture and Cooperatives encouraged small farmers to consolidate their production areas into large-scale farms. This approach aimed to enhance production efficiency by enabling small farmers to manage production and marketing as effectively as large farms. Moreover, the policy sought to improve agricultural extension services by appointing specialists as area managers to integrate various sectors in alignment with local conditions and address the needs of farmers (Department of Agricultural Extension, 2023). The consolidation of small farms enhanced farmers' self-reliance and fostered entrepreneurial skills. This approach is crucial for promoting transparent, sustainable policy implementation and strengthening decentralisation at the grassroots level. It also boosts the self-reliance of local communities by involving them in all stages of the process, from production and maintenance to harvesting and finding marketing channels.

Between 2016 and 2024, there were 10,175 large-scale farming operations involving 571,951 farmers, covering 7,294,497.19 rai. This includes 4,121 large rice plots, which make up 40.50% of all large plots. Of these, 281,210 farmers were involved in rice cultivation on 3,902,052.92 rai (Department of Agricultural Extension, 2023). Joining farms into larger fields serves as a bargaining mechanism that can reduce production costs and increase income for farmers, operating under the "Large-scale Farming Model" as illustrated in the Figure 1.

Researchers have studied farmer cooperatives and large-scale agricultural organisations in Thailand and elsewhere. Qualitative case studies of management

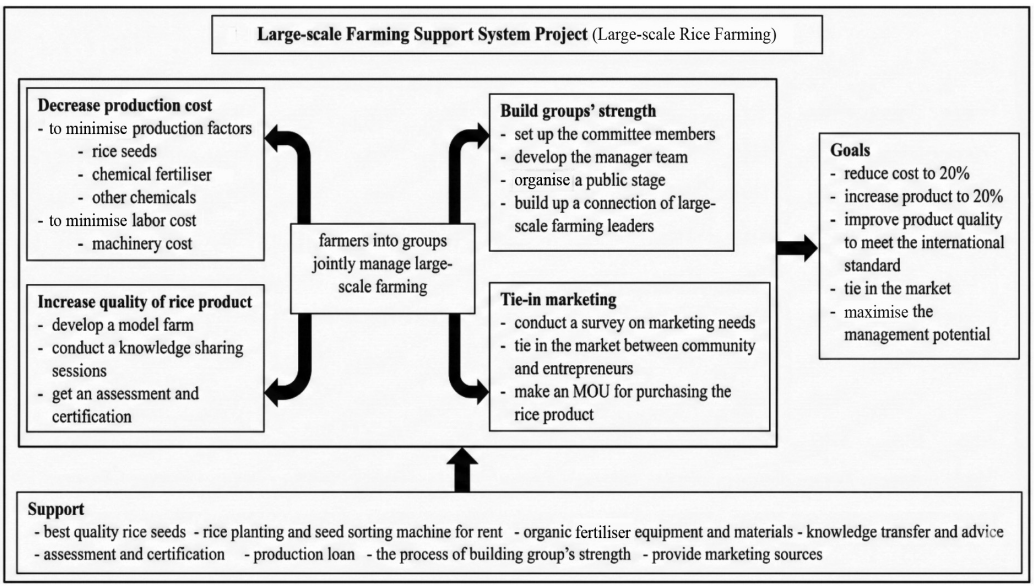

Figure 1: The management model for large-scale rice farming
Source: Department of Agricultural Extension (2023)

strategies and processes in distinct locations have dominated research on large-scale rice farming organisations in Thailand. Rice production benefits from farmer cooperatives, according to an international study. Cooperative participation boosts yield via automation, high-quality inputs and farmer education (Lin *et al.*, 2022). Smallholder groupings boost competitiveness, negotiating strength, farmer capacities and involvement, strong leadership, trust, and shared objective motivation (Ahmad *et al*., 2024).

Similar results have been found in international studies comparing cooperative versus non-member production costs and returns. Data Envelopment Analysis (DEA) showed that members of large-scale rice farm groups in Chiang Rai and Phayao provinces had somewhat greater production efficiency. Vietnam's agricultural cooperatives helped farmers grow rice cheaper and earn more (Tran *et al.*, 2022). Few Thai studies have evaluated group management methods and rice farmers' economic outcomes, but they have analysed farmer group formation, success drivers, development strategies and cost-return analysis. Comparisons of production costs and returns between large-scale farming group members and non-members are limited, especially in the context of understanding how participation helps both groups economically. Thai research on large-scale rice growing has been focused on the North, Northeast and Central regions, with little on the South.

Despite its importance to local food security and livelihoods, Songkhla produces less than 2% of Thailand's rice. In 2023, the Office of Agricultural Economics reported that Songkhla had 456,187 rai of rice cultivation. The province has 96,611 farm families and is a good example of large-scale rice farming groups with competitive advantages like advanced processing and strong brands like "Chang Khrae", "Song Le", and "Sabay Saen" distributing products through websites, supermarkets and department stores. Songkhla is a good place to study how large-scale farming might increase rice production in non-traditional, smaller rural areas in southern Thailand and other areas that do not grow a lot of rice.

This study examines large-scale rice farming organisations' management model and compares production costs and returns between members and non-members in Songkhla province to fill these gaps. Results will benefit lower Southern rice producers and inform agricultural cooperative policies.

Materials and Methods

Conceptual Framework

This study employs a management model framework for comparative analysis, examining four key dimensions: Group management, cost management, productivity management, and marketing management. This framework guides both the comparative cost-return analysis and the qualitative assessment of organisational management differences between large-scale farming group members and non-members.

Data Collection

The study method consists of two parts: Collecting secondary data and primary data, with details as follows.

Secondary data encompasses data from websites such as the Rice Research Center, Pattani Rice Seed Center, Office of Agricultural Economics, Department of Internal Trade, Department of Agricultural Extension, and other relevant sites related to rice production.

Primary data is obtained through interviews with officials involved in large-scale rice farming and individual farmers. This includes farmers who are members of large-scale farming groups and those who are not, in the Rattaphum, Singhanakhon, Sathing Phra, and Ranot districts of Songkhla province. The data will be used for analysis according to the study objectives. The details are as follows.

The study area selection was based on data from participation in the Large-scale Farming Project of the Ministry of Agriculture and

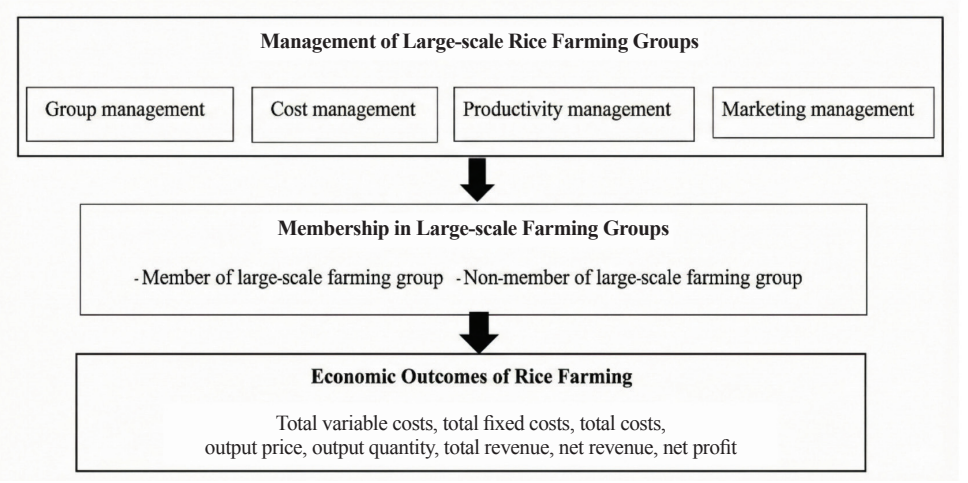

Figure 2: Research conceptual framework

Cooperatives. A multistage sampling method was employed. The selection was made from various districts in Songkhla province that had established large rice-farming groups. Stage 1: District selection identified four districts (Rattaphum, Singhanakhon, Sathing Phra, and Ranot) that have operated large-scale farming since 2017. Stage 2: Sub-districts within each district with active large-scale farming groups were selected. The areas selected are as follows: Rattaphum district: Khuan Ru and Khuha Tai sub-districts; Sathing Phra district: Tha Hin sub-district; Singhanakhon district: Bang Khiat sub-district; and Ranot district: Ban Khao sub-district. Population and sample: The study population is divided into two groups: Key informants were one project coordinator, four plot managers from the Rattaphum, Singhanakhon, Sathing Phra and Ranot District Agriculture Offices, and 10 people comprising the chairman and committee members of large-scale farming group, for a total of 15 key informants. In the five selected sub-districts are 2,577 rice farmers: 576 farmers who are members of large-scale farming groups and 2,001 farmers who are not members of large-scale farming groups (Department of Agricultural Extension, 2023). This study population has production data from 2017 to 2018 and 2022 to 2023 (Office of Agricultural Economics, 2017).

Sample unit selection plan and sample size determination: The sample size was determined using Yamane's formula at a 95% confidence level (Yamane, 1973). The total sample size was 237 farmers who were members of large-scale farming and 334 farmers who were not members of large-scale farming with the sample proportionally distributed based on the number of farmers participating in large-scale farming in each sub-district. Proportional stratified random sampling was applied, with sub-districts serving as strata and simple random selection from the membership list in each sub-district based on the population proportion. The sample sizes for each sub-district are presented in Table 1.

Qualitative research method: Data was gathered through semi-structured in-depth interviews with key informants, including officials from the Rattaphum, Singhanakhon, Sathing Phra, and Ranot District Agriculture Offices, as well as the chairman and committee members of the large-scale farming groups. After completing the interviews, the interview transcripts were transcribed and field notes were recorded as text.

Quantitative research method: Data collection was conducted on the rice farming of farmers who are members of large-scale farming groups and farmers who are not members of large-scale farming groups in the production

Table 1: Population and sample of farmers who are members of large-scale farming groups and farmers who are not members of large-scale farming groups

	Rice Farmers (Persons)	Farmers Who are Members of Large-scale Farming Groups (Persons)		Farmers Who are Not Members of Large-scale Farming Groups (Persons)	
		Population	Sample	Population	Sample
Khuha Tai	481	174	72	307	51
Khuan Ru	406	147	60	259	43
Bang Khiat	534	94	39	440	73
Tha Hin	549	57	23	492	82
Ban Khao	607	104	43	503	84
Total	**2,577**	**576**	**237**	**2,001**	**334**

Source: Department of Agricultural Extension (2023)

years 2017 to 2018 and 2022 to 2023 using a structured questionnaire. The questions were developed based on operational definitions and adapted from existing academic sources. The questionnaire was validated by five experts for content validity, resulting in Item-objective Congruence (IOC) values ranging from 0.60 to 1.00. A pilot test was conducted, with 45 non-sample participants and internal consistency was measured using Cronbach's alpha coefficient, which yielded a value of 0.74 to 0.85. The questionnaire included both open-ended and closed-ended questions, covering the following topics: General social and economic information of farmers, general conditions of rice cultivation, costs and returns of rice cultivation, and problems and obstacles in rice farming.

Data Analysis

In this study, the researcher analysed the data using Statistical Package for the Social Sciences (SPSS) for Windows software to address the research objectives, employing two methods: Descriptive and quantitative analysis.

Descriptive analysis involved using descriptive statistics, including frequency distribution, mean, Standard Deviation (SD), and percentage to examine social and economic data of farmers. This analysis covered the general conditions of rice cultivation, costs and returns, as well as the problems and obstacles in rice farming.

Qualitative data from 15 key informants were analysed using manual thematic analysis. The analysis employed both deductive coding based on the conceptual framework (group management, cost management and return of rice production) and inductive coding from interview transcripts. Triangulation was applied across informant groups, and findings were integrated with quantitative cost-return data to enhance analytical reliability. An audit trail was maintained for retrospective verification.

Cost-return Analysis

Production cost analysis: Production costs in this study consist of variable costs and fixed costs (Chalisa & Kanoknate, 2016). Total cost is calculated as TC = TFC + TVC, with separation of cash and non-cash costs. The details are as follows:

Total Variable Cost (TVC) refers to production costs that change with the volume of production. If farmers produce more, they incur higher variable costs. Conversely, if production is lower, these costs decrease. Variable costs can be adjusted by farmers during the production period.

The variable costs used in the analysis include:

Expenses in production (Pongklang, 2017), such as seed costs (estimated from the price of paddy that each farmer sells), fertiliser costs (such as chemical fertilisers, organic fertilisers, biological fertilisers and compost), pesticide and herbicide costs, as well as fuel (Attharungsun, 2015) and electricity. Cash variable costs include expenses for labour, seeds, chemical fertilisers, pesticides, herbicides, fuel, electricity, equipment repair and other materials. Non-cash variable costs encompass household labour, the cost of seeds that farmers save for their own use, and the opportunity cost of short-term investments.

Total Fixed Costs (TFC) refer to production costs that do not vary with the quantity of output (Kongithi & Petcharat, 2016), regardless of whether the output is large or small. Fixed costs include land use costs including rental and the use of owned land (Jaima *et al.*, 2018).

Depreciation of agricultural assets and equipment includes tractors, tillers, water pumps, water pipes, spraying equipment for chemicals, lawnmowers, and barns. Depreciation can be calculated as follows:

Depreciation = (buying value – scrap value) / (useful life (year)) × utilisation percentage × 4/12 months

The fixed costs are also divided into cash and non-cash fixed costs. Cash fixed costs are those that the producer has paid out in cash, including land use costs. Non-cash fixed costs refer to expenses that the producer does not actually pay in cash but are assessed for the use of various factors owned by the producer, such as land use costs and depreciation of agricultural assets and equipment.

Return analysis: The analysis of returns is detailed as follows:

Total Revenue (TR) is the amount of money that farmers receive from selling rice, or the value of rice stored for consumption, or the value of rice used to pay debts, or the value of rice stored for sale, calculated as the price per unit (P) multiplied by the quantity of produce (Q).

$$TR = P \times Q$$

Net Return (NR) is the difference between Total Revenue (TR) and Total Variable Cost (TVC).

$$NR = TR - TVC$$

Net Profit (NP) is the difference between Total Revenue (TR) and Total Cost (TC). It represents the actual return from production and is used as a measure of profitability.

$$NP = TR - TC$$

Research Hypotheses and Statistical Testing

The main research hypothesis is that the economic outcomes from rice farming of large-scale farming group members differ from farmers who are not members of large-scale farming groups. Independent samples t-test was employed at a significance level of 0.05 to compare the means of two independent samples. The testing process involved two steps: Step 1—testing the variance between the two populations, and Step 2—testing the mean difference between the two populations.

The variables tested include: Total variable costs, fixed costs, total costs, output quantity, rice price, total revenue, net return, and net profit.

The sub-hypotheses are as follows:

H_1: The mean total variable costs, fixed costs, and total costs from rice farming of farmers who are members of large-scale farming groups are lower than the mean total variable costs from rice farming of farmers who are not members of large-scale farming groups.

H_2: The mean rice output quantity, rice price, total revenue, and net profit of farmers who are members of large-scale farming groups are greater than the mean rice output quantity of farmers who are not members of large-scale farming groups.

Results and Discussion

Large-scale Rice Farming Management

The management of large-scale rice farming in Songkhla province has mechanisms for driving the group, including a management committee. There is a process for creating participation among farmers who are members of large-scale farming groups to manage costs and returns from rice farming, as in Figure 3.

Group management includes establishing rules such as mandatory participation in all group activities, monthly meetings, investment in shares and distribution of returns to members. This is because the management of the group, as shown by this study, reflects a structured model with strong participation following the collective farming approach. Representatives of farmers are selected to serve on the executive committee, which includes a chairman, vice-chairman, financial officer, public relations officer, and secretary. This structured management enhances the group's operational efficiency. The creation of specialised subcommittees, each focusing on specific areas such as quality rice production, pest management, organic fertiliser production, biological fertiliser production, and the use of agricultural machinery, strengthens the group's capabilities. Each subcommittee acts as a leader in spreading knowledge within their respective areas to other members, which not only improves individual agricultural skills but also helps extend the group's success to other farmers. Regular participation in group activities, monthly meetings, investment in group shares, and the distribution of returns to members establish a shared responsibility, where members are accountable for both responsibilities and benefits. The distribution of returns based on investment and participation also motivates members to contribute more actively, promoting fairness and commitment within the group. This approach increases the group's efficiency while promoting participation and collaboration (Kongtanajaruanun & Cheamuangphan, 2021).

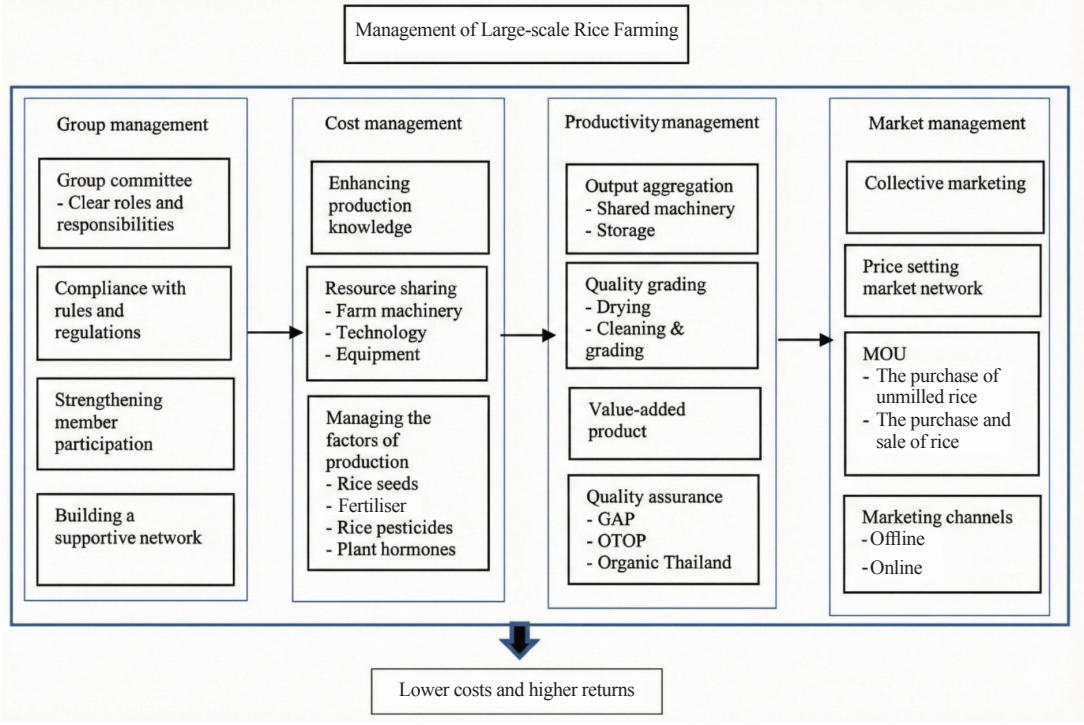

Figure 3: Management of large-scale rice farming in Songkhla province

This structured model helps the group achieve broader agricultural goals by pooling resources and sharing knowledge (Heizer *et al.*, 2020).

The group's production cost management focuses on managing the costs of rice cultivation through several coordinated practices. These include providing knowledge on soil analysis and soil improvement prior to planting based on the analysis results; land preparation through plowing and harrowing; using an appropriate seed rate of 8 to10 kg/rai; applying water in suitable amounts; producing chemical fertilisers based on soil analysis results; producing organic fertilisers; maintaining and nourishing rice plants by applying fertilisers at appropriate rates; preparing rice pest repellents; producing growth hormones for rice; utilising tools and machinery; and, jointly producing rice seeds, fertilisers, and rice pest repellents.

Regarding rice seeds, the large-scale farming group produces high-quality rice seeds for its own use and allows members to borrow seeds for planting, with repayment made in the form of rice seeds after the harvest season. The group also sells rice seeds to its members and to farmers in the local community. Knowledge support is provided by the Pattani Rice Seed Center, Department of Rice, particularly in relation to rice varieties suitable for local soil and climatic conditions, rice seed production techniques, and the proper use of seed rates. Farmers in the group that produce rice seeds serve as pilot plots for seed production. Their rice seeds are submitted to the Pattani Rice Seed Center for quality certification and the centre also purchases rice seeds from these farmers. The use of high-quality seeds suitable for local conditions increases yields while the use of an appropriate seed rate reduces production costs (Li *et al.*, 2020; Matusso & Mucheru-Muna, 2020). In addition, the shared use of resources helps reduce machinery rental and labour costs. The large-scale farming group is managed by the Agricultural Machinery Committee, which serves as the core body responsible for the use, maintenance and repair of machinery provided through government support. These include rice seed drilling machines, rice milling machines, colour sorting machines, and rice packaging machines. The group charges service fees lower than the general market rate (Finger & Lehmann, 2014; Srisompun & Boontang, 2019; Khatiwada *et al.*, 2021).

In terms of output management, the group manages production by purchasing paddy rice and rice seeds from its members and then sells them to customers both within the province and in other provinces, enabling the group to set product prices independently. In addition, the group processes paddy into milled rice and other products to add value, thereby increasing members' income. Allocating resources cooperatively among participants, joint maintenance and use, improved cooperation and unity within the group reduce financial strain on small-scale farming. By using government assistance to provide economical and effective agricultural solutions, this systematic approach to technology management ensures long-term sustainability (Finger & Lehmann, 2014; Srisompun & Boontang, 2019; Khatiwada *et al.*, 2021).

The management of marketing and distribution in large-scale rice farming groups is a key factor that helps enhance marketing potential and increase income for farmers. The group's knowledge in business planning, building partnerships and finding new marketing channels has enabled them to efficiently purchase paddy and rice seeds from members, and sell them to customers both within and outside the province. One of the important outcomes is that the large-scale rice farming group can set their own prices due to their production methods that reduce chemical usage and emphasise meticulous farming. This enhances the value and marketability of their products. The group's GAP, Organic Thailand, and OTOP-certified products enhance consumer confidence in their quality, enabling them to be sold at premium prices compared to conventional rice. The group's focus on sustainable farming also helps build a positive image for their products, which is important in markets that demand safe and

environmentally friendly agricultural products. Furthermore, the group's collective approach to selling products and building partnerships helps reduce the risks that small-scale farmers face in highly competitive markets. Working together not only gives farmers access to a wider market but also strengthens their economic stability and improves their bargaining power with buyers. Effective marketing and distribution management in large-scale rice farming groups is, therefore, a crucial tool for increasing income and ensuring sustainability for farmers, both in terms of risk reduction and adding value through certification and strong marketing networks (Hellin *et al.*, 2009; Aku *et al.*, 2018; Dumitrescu *et al.*, 2022).

Costs and Returns of Members and Non-members of Large-scale Rice Farming Groups

The cost of farming is calculated from fixed costs, such as rent or taxes on the fields and depreciation, as well as variable costs, including labour and production factors, which includes cash and non-cash costs. Returns from farming are determined by total income, net income and net profit. The cost of large-scale farming is 2,622.91 baht/rai, consisting of fixed costs of 314.12 baht/rai and variable costs of 2,308.83 baht/rai. The quantity of rice produced is 440.69 kg/rai, with a selling price of 8.16 baht/kg. The net profit is 973.12 baht/rai. The cost of small-scale farming is 2,798.85 baht/rai, comprising fixed costs of 289.46 baht/rai and variable costs of 2,509.60 baht/rai. The amount of rice produced is 438.15 kg/rai, with a selling price of 7.38 baht/kg. The net profit is 434.70 baht/rai, as in Table 2.

Comparison of Production Costs and Returns between Members and Non-members of Large-scale Rice Farming Groups

Farming on large plots is less expensive than small-scale farming. Farmers in large plot groups receive knowledge and support to encourage them to combine purchasing and production. They also benefit from support for agricultural machinery and technology, which reduces farming costs. The mutual agreement on farming methods and certified product standards enables them to set prices. As a result, the large rice-farming group is more productive, and the income and profits are higher compared with farmers who did not join the group.

From the statistical analysis comparing farmers who are members of the large-scale farming group with those who are not, significant differences were found, particularly in terms of production costs and returns, which can be explained as follows:

Table 2: Costs and returns of members and non-members of large-scale rice farming groups

	Member			Non-member		
	Cash	**Non-cash**	**Total**	**Cash**	**Non-cash**	**Total**
Fixed costs (baht/rai)	227.48	86.64	314.12	222.64	66.82	289.46
Variable costs (baht/rai)	1995.48	313.31	2,308.83	2,232.59	276.80	2,509.60
Total costs (baht/rai)	2,222.96	399.95	2,622.91	2,455.23	343.62	2,798.85
Productivity (kg/rai)	440.69		440.69	438.15		438.15
Product price (baht/kg)	8.16		8.16	7.38		7.38
Total income (baht/rai)	3,596.03		3,596.03	3,233.55		3,233.55
Net income (baht/rai)	1,287.24		1,287.24	724.16		724.16
Net profit (baht/rai)	973.12		973.12	434.70		434.70

Note: Opportunity costs represent forgone interest from short-term investments; Net income = Total income – Total costs (including opportunity costs); Net profit = Total income – Total costs (excluding opportunity costs).
Source: Data processed from primary survey of 237 members and 334 non-members

Table 3: Statistical comparison of costs and returns between members and non-members

	Members	Non-members	t-test	*p*-value
Total fixed costs (baht/rai)	314.12	289.46	-7.206	0.000*
Total variable costs (baht/rai)	2,308.83	2,509.60	0.954	0.340^{NS}
Total cost (baht/rai)	2,622.91	2,798.85	-5.041	0.000*
Productivity (kg/rai)	440.69	438.15	5.615	0.000*
Product price (baht/kg)	8.16	7.38	0.288	0.774^{NS}
Total income (baht/rai)	3,596.03	3,233.55	4.168	0.000*
Net income (baht/rai)	1,287.24	724.16	4.558	0.000*
Net profit (baht/rai)	973.12	434.70	6.083	0.000*

Note: *$p < 0.05$; ^NS = Not Significant Productivity calculated as total rice yield (kg) divided by total farming area (rai); Independent samples t-test, two-tailed; N = 237 members, 334 non-members

Regarding production costs, it was observed that the members of the large-scale farming group had significantly lower production costs compared with non-members. This was due to lower labour and input costs, as the group members could purchase raw materials in bulk, reducing the cost per unit. This aligns with the principle of Economies of Scale, where group members can share agricultural machinery and technology, leading to reduced labour and machinery costs.

As for returns, members of the large-scale farming group experienced significantly higher returns from rice production than non-members. The main factors contributing to higher returns include the use of high-quality seeds and appropriate fertilisers, which increased yield per area. Additionally, group members engaged in collective marketing, allowing them to set higher selling prices compared with selling through middlemen, and they could sell directly to customers in higher-quality markets.

Thus, being a member of the large-scale farming group has a significant impact on reducing production costs and increasing returns. This is achieved through shared resources and technology, more efficient management with structured and clear role assignments—such as in production management, technology use and better marketing strategies—allowing the group to allocate resources more effectively. Non-member farmers may not have the same access to these resources. Furthermore, group members benefit from greater access to government support, such as agricultural technology assistance, production training and financial aid, which enhances the group's competitiveness and results in better returns for members (Suh, 2015; Tolno *et al.*, 2015; Michalek *et al.*, 2018).

Conclusions

Large-scale rice growing in Songkhla province shows that resource sharing, technology adoption and coordinated marketing cut costs and boost returns. Machinery, technology, training and market access from the government boost competitiveness and agricultural security. Policy recommendations: The consolidation of rice farms with effective management has resulted in farmers with greater knowledge and capacity to produce rice at lower costs compared with farmers who are not members of such groups. Therefore, large-scale rice farming should be promoted among farmers in other areas through the following measures: Supporting budgets and capacity-building activities for farmers in managing large-scale rice farming, from production to distribution; providing machinery and technology support to help farmers reduce hiring costs; supporting the elevation of farmer groups to become capable entrepreneurs; and developing networks of relevant agencies to work in an integrated and participatory manner.

Practical recommendations: In managing large-scale rice fields, the management committee plays a crucial role in ensuring that group members follow the guidelines for large-scale rice farming practices. Therefore, the committee should develop clear operational plans, rules and group agreements that involve member participation in the implementation process, and it should also communicate and disseminate these plans and operational results to enable group members to engage in discussions. Cost management and output management are critical factors in reducing costs and increasing returns from rice farming. As a result, large-scale rice cultivation should set specific rules for cost and production control.

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Author Contributions Statement

Wandee Nuansoi conceptualised the central research idea, designed the study and supervised its progression. Wanpracha Nuansoi conducted the research and was responsible for writing and revising the manuscript. Krisanapong Sangkhavasi oversaw the review process, made revisions and approved the final submission of the article.

Conflict of Interest Statement

The authors agree that this research was conducted in the absence of any self-benefits, commercial, or financial conflicts and declare no conflicting interests with the funders.

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