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Organic Rice Supply Chain Structure and Marketing Strategies in a Basin-based Agroecosystem: A Case Study from Sathing Phra Peninsula, Southern Thailand

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ABSTRACT

Background: The transformation from traditional to sustainable organic farming systems presents significant challenges with varying development patterns across geographical contexts. Sathing Phra Peninsula in Southern Thailand represents a unique case where organic agriculture covers only 0.31 per cent of rice cultivation area yet demonstrates distinctive adaptations. Despite growing organic agriculture literature, research on coastal peninsular organic rice systems remains limited, creating knowledge gaps for location-specific development strategies.

Methods: This mixed-methods study was conducted in Sathing Phra Peninsula, covering four Songkhla Province districts. Data collection involved two phases: Examining organic rice supply chain structure using snowball sampling with 52 informants analyzing marketing patterns from 47 certified organic rice farmers through in-depth interviews and observation. Analysis utilized descriptive statistics, cluster analysis, content analysis SWOT analysis. Data validity was ensured through triangulation, member checking expert review.

Result: The study revealed a centralized supply chain where farmers and small-scale operators conduct all stages from production to distribution, with no specialized processors found. Three farmer groups emerged: Traditional Marketers (51.06 per cent) selling paddy rice through conventional channels, New Marketers (31.91 per cent) adapting to diversified systems and professional entrepreneurs (17.02 per cent) with superior marketing capabilities. Despite 95.74 per cent producing to organic standards, vulnerabilities include low bargaining power (72.34 per cent depend on intermediaries), lack of branding (74.47 per cent have no product names) and limited online adoption (19.15 per cent). SWOT analysis identified four strategic approaches encompassing value addition, capacity development, strength-based defense and integrated weakness-threat reduction for sustainable organic rice marketing development.

Key words: Basin-based agroecosystem, Farmer typology, Marketing strategies, Organic rice, Supply chain.

INTRODUCTION

Organic agriculture has gained worldwide recognition over the past decade due to growing awareness of health and environmental impacts from agricultural chemicals and increasing global demand for organic products (Willer *et al.*, 2022). This approach represents a suitable sustainable farming solution (Manickam *et al.*, 2024; Ghanem *et al.,* 2024). Thailand, as a major rice exporter, has prioritized organic rice production development to meet this demand, though expansion remains gradual but crucial across all sectors (Baoguo, 2022). Organic agriculture development patterns vary significantly across geographical regions. The Sathing Phra Peninsula in Southern Thailand serves as a particularly interesting case study. Despite organic agriculture covering only 0.31 per cent of total rice cultivation area (Bunsong *et al.*, 2024), unique agricultural adaptations have emerged through complex interactions among local traditional knowledge, suitable ecological environments institutional support systems. This has created distinctive development patterns that differentiate the area from other regions and demonstrate potential as a development model for similar contexts.

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The Sathing Phra Peninsula, located between the Gulf of Thailand and Songkhla Lake, encompasses four Songkhla Province districts with 49,239.52 ha suitable for rice cultivation, representing 83.17 per cent of total agricultural area (Songkhla Province Agriculture and

Cooperatives Office, 2023). Its unique geographical characteristics, favorable environment and excellent irrigation system enable year-round rice cultivation (Prapruit *et al.*, 2023; Thongkaew *et al.,* 2022). These features distinguish it from Thailand's major rice-producing regions, particularly the Northeast, where organic farming flourished through contract farming and NGO support (Chitchop *et al.*, 2014; Puapongsakorn *et al.,* 2010), Conversely, the southern region developed primarily through government initiatives and local farmer groups.

Understanding organic rice supply chain structure is crucial, as supply chain characteristics significantly influence farmer participation and economic outcomes (Panpluem and Yin, 2021). This becomes particularly important as Thailand diversifies organic rice production beyond traditional bases, making regional variation understanding essential (Rattanasuteerakul and Thapa, 2012). The Sathing Phra Peninsula holds special significance as Southern Thailand's only area participating in government organic rice promotion projects with commercial production capabilities. Despite growing literature on organic agriculture and supply chain management, research on coastal peninsular organic rice systems remains limited. This study addresses this gap through cluster analysis examining organic rice production system diversity and SWOT analysis developing context-specific marketing strategies. Findings will support locally appropriate policy development for Southern Thailand's unique coastal context while providing insights into basin-based agroecosystem development, ultimately contributing to sustainable agricultural development in similar regional contexts.

MATERIALS AND METHODS

The research was conducted in Sathing Phra Peninsula, southern Thailand, covering four Songkhla Province districts: Ranot, Sathing Phra, Krasae Sin and Singhanakhon. This peninsula possesses unique characteristics in organic rice production, making it particularly suitable for studying supply chain structure and marketing strategies in coastal contexts. The study adopted a mixed-methods approach to comprehensively analyze organic rice production and marketing conditions. Data collection comprised two main phases aligned with research objectives and was conducted from December 2023 to October 2024, with data analysis performed in 2025. The first phase studied organic rice supply chain structure using snowball sampling until data saturation, involving 52 informants covering all stakeholders from production and processing to distribution. The second phase examined organic rice marketing, collecting data from 47 organic rice farmers who cultivate rice commercially, possess at least one organic agriculture certification standard and produce organic rice consistently. Participation was based on voluntary informed consent. The primary data collection instrument was interview schedules covering general farmer information, distribution characteristics, brand usage, marketing channels, selling prices and organic rice sales volumes. Data collection employed in-depth interview techniques combined with participant and non-participant observation, continuing until information saturation was achieved.

Data analysis utilized appropriate statistical methods according to data nature. Quantitative data employed descriptive statistics including frequency and percentage to describe sample characteristics. Cluster analysis classified farmer groups according to production and marketing characteristics. Qualitative data utilized content analysis for interview data and thematic analysis to identify emerging themes. SWOT analysis examined strengths, weaknesses, opportunities and threats, subsequently developing four strategic approaches: SO, WO, ST and WT strategies. Data validity and reliability were verified through triangulation, member checking and expert review by agriculture and marketing specialists. The research adhered to ethical principles and received formal approval from the Human Research Ethics Committee.

RESULTS AND DISCUSSION

Organic rice supply chain structue in sathing phra peninsula

The organic rice supply chain structure in Sathing Phra Peninsula reveals a distinctive pattern where farmers serve as primary producers, comprising 63.46 per cent of stakeholders, followed by groups operating both production and distribution functions at 23.08 per cent. Groups involved in processing and distribution represent only 9.62 per cent, while those covering the complete value chain constitute merely 3.85 per cent. Notably, no enterprises operate exclusively as processors or distributors, reflecting local farmers' self-reliance characteristics (Table 1). The upstream segment demonstrates the highest participant concentration, with exclusive producers accounting for 70.21 per cent, predominantly in Singhanakhon and Krasae Sin districts. Groups engaged in production and direct sales represent 25.53 per cent, while complete value chain operators

Table 1: Stakeholders in the organic rice supply chain in sathing phra peninsula (n=52).

Stakeholders	Number	Percentage
A	33	63.46
ABC	2	3.85
AC	12	23.08
BC	5	9.62
Total	52	100.00

Note: A represents players who are producers only, ABC represents players who are producers, processors and distributors of organic rice, AC represents players who are both producers and distributors of products and BC represents players who are both processors and distributors.

comprise only 4.26 per cent, all located in Ranot District. The midstream segment involves only 13.46 per cent of participants, with most operating combined processing and distribution functions at 71.73 per cent, primarily in Singhanakhon District. Complete value chain operators constitute 28.57 per cent, all in Ranot District, indicating limited processing activities and absence of clearly differentiated processing businesses. The downstream segment encompasses 63.16 per cent of participants, divided into production and direct sales groups (25.53 per cent), processing and distribution groups (26.32 per cent) and complete value chain operators (10.53 per cent). Significantly, no exclusive distributors were identified, demonstrating integration of production and distribution roles within the same farmers or enterprises (Table 2).

This structure exhibits unique characteristics where farmers and small-scale enterprises maintain roles across all supply chain stages, lacking clear role differentiation in large-scale operations or specialized processing industries. While demonstrating strength in self-reliance and flexibility, it reveals limitations in value addition and market expansion capabilities. These findings align with Panpluem and Yin, (2021), who found organic rice supply chains are shorter than conventional chains, with fewer intermediaries. However, while their Yasothon Province study showed shorter chains enabled better farmer returns, Sathing Phra Peninsula farmers continue experiencing low bargaining power and inability to determine prices independently. This connects to Kerdsriseam and Suwanmaneepong, (2015), who emphasized strong intermediaries' importance between farmers and collectors/exporters, contrasting sharply with Sathing Phra Peninsula's lack of specialized processing or distribution enterprises. Furthermore, Pakdeenarong and Hengsadeekul, (2020) identified critical risk factors including equipment shortages, lack of organic rice mills and labor shortages, reflected in this study's observation that processing activities remain limited with only 13.46 per cent participant involvement. The comparative analysis reveals that while exhibiting typically shorter characteristics, the supply chain lacks crucial supporting factors, particularly strong intermediaries and specialized expertise at each stage, representing a fundamental reason why farmers fail to fully benefit from organic farming practices.

Current situation of organic rice distribution in sathing phra peninsula

This study on organic rice distribution in Sathing Phra Peninsula reveals significant market structure constraints despite 95.74 per cent of farmers producing under comprehensive organic agricultural standards. The distribution system shows paddy rice sales dominating at 51.06 per cent, while higher-value milled rice represents only 8.51 per cent, resulting from limited processing technology, insufficient marketing knowledge inadequate group management systems. Most farmers (72.34 per cent) sell to groups, mills, or intermediaries, preventing independent price determination and forcing them to sell organic rice at conventional rice prices despite greater labor investment. Additionally, 74.47 per cent of farmers lack product names or brands, preventing market differentiation, while distribution channels remain predominantly offline

Table 2: Organic rice supply chain structure in sathing phra peninsula by District (n = 52).

Structure	Components	Number (Percentage)	Districts	Number (Percentage)
Upstream	A	33 (70.21)	Singhanakhon	21 (63.64)
47 (100.00) *			Krasae Sin	12 (36.36)
	ABC	2 (4.21)	Ranot	2 (100.00)
	AC	12 (25.53)	Singhanakhon	9 (75.00)
			Krasae Sin	1 (8.33)
			Ranot	2 (16.67)
Midstream	ABC	2 (28.57)	Ranot	2 (100.00)
7 (100.00) *	BC	5 (71.43)	Singhanakhon	3 (60.00)
			Krasae Sin	1 (20.00)
			Ranot	1 (20.00)
Downstream	ABC	2 (10.53)	Ranot	2 (100.00)
19 (100.00) *	AC	12 (63.16)	Singhanakhon	9 (75.00)
			Krasae Sin	1 (8.33)
			Ranot	2 (16.67)
	BC	5 (26.32)	Singhanakhon	3 (60.00)
			Krasae Sin	1 (20.00)
			Ranot	1 (20.00)

Note: *Indicates respondents with multiple answers, A represents players who are producers only, ABC represents players who are producers, processors and distributors of organic rice, AC represents players who are both producers and distributors of products, BC represents players who are both processors and distributors.

(65.96 per cent) with online sales at only 19.15 per cent (Table 3). Analysis of farmer groups reveals three distinct categories based on marketing behavior: Traditional Marketers (51.06 per cent) selling only paddy rice through conventional channels without value-added processing or brand identity; New marketers group (31.91 per cent) beginning market adaptation by selling both paddy and milled rice but continuing to rely primarily on intermediaries; and Professional Entrepreneurs Group (17.02 per cent) demonstrating highest marketing capabilities with diverse distribution formats, premium pricing above conventional rice levels, branding utilization and employment of various distribution channels both offline and online (Table 4).

These findings demonstrate farmers' vulnerability in the marketing chain and align with existing research on smallholder farmer challenges. The limited bargaining power supports Moustier *et al.* (2010), who found farmers using traditional marketing systems without group formation typically receive lower profit shares due to limited bargaining power and market information access. The substantial percentage (74.47 per cent) lacking product branding represents significant missed opportunities, as Meas *et al.* (2015) found attractive brands and packaging can increase organic rice prices by up to 30.00 per cent, while Ngokkuen and Grote, (2012) demonstrated how geographical indications significantly increased Thai jasmine rice export prices. The limited online channel usage (19.15 per cent) indicates adaptation lag compared to Cao and Li, (2015); Verhoef *et al.* (2015), who found omni-channel strategies positively impact sales growth and pricing. However, the professional entrepreneurs group's ability to set premium prices aligns with Umberger *et al.* (2009), confirming consumer willingness to pay higher prices for certified organic rice with trustworthy brands. The necessity for farmer group development supports research by Sorrentino *et al.* (2018); Jadav *et al.* (2011), who found producer organizations increase bargaining power for better price negotiations, while studies by Methamontri *et al.* (2022); Courtois and Subervie, (2015) confirm collective marketing and information systems enhance bargaining power and market participation, leading to improved prices and stable income, demonstrating the critical need for developing information systems and group formation to address market information gaps and smallholder farmer vulnerability.

SWOT analysis of organic rice distribution systems in sathing phra peninsula

The study reveals complexity in market development factors affecting the area. Strengths include a robust production base with 95.74 per cent of farmers producing under comprehensive organic standards and diverse distribution formats for paddy and milled rice. The self-reliance system shows most farmers (63.46 per cent) as exclusive producers, with groups operating production-distribution functions (23.08 per cent) maintaining role flexibility. Professional entrepreneur groups (17.02 per cent) demonstrate outstanding marketing capabilities, diverse distribution channels and ability to set prices 25.53 per cent higher than conventional rice.

Weaknesses primarily involve lack of value addition, with paddy rice distribution dominating (51.06 per cent)

Table 3: Organic rice production system of farmers in the sathing phra peninsula (n = 47).

Item	Number	Percentage
Sales standard		
Organic rice standard only	45	95.74
Safe/Chemical-free rice	2	4.26
Product form for Sale		
Paddy only	24	51.06
Milled rice only	4	8.51
Both paddy and milled rice	19	40.43
Sales channels		
Group/Mill/Middleman	34	72.34
Direct retail by farmers11	23.40	
Both channels	2	4.26
Pricing		
Higher than conventional rice	12	25.53
Same as conventional rice	35	74.47
Use of brand name or trademark		
No brand name or trademark	35	74.47
Has brand name or trademark	12	25.53
Distribution channels		
Offline market only through group/mill/middleman	31	65.96
Offline market only by farmers	7	14.89
Both online and offline by farmers	9	19.15

Table 4: Classification of organic rice distribution farmers in the area based on similar production characteristics (n = 47).

Characteristics	Group 1: Traditional marketers	Group 2: New marketers	Group 3: Professional entrepreneurs
Proportion	24 farmers (51.06) Singhanakhon District (54.17) Krasae Sin District (41.67) Ranot District (4.17)	15 farmers (31.91) Singhanakhon District (80.00) Krasae Sin District (13.33) Ranot District (6.67)	8 farmers (17.02) Singhanakhon District (62.50) Krasae Sin District (12.50) Ranot District (25.00)
Distribution standards	Organic rice (100.00)	Organic rice (93.33) Safe rice (6.67)	Organic rice (87.50) Safe rice (12.50)
Production characteristics	Paddy rice only (100.00)	Both paddy rice and milled rice (100.00)	Milled rice only (50.00) Both paddy rice and milled rice (50.00)
Product distribution outlets	Groups/mills/intermediaries (66.67) Direct retail customers by farmers themselves (33.33)	Groups/mills/intermediaries (100.00)	Groups/mills/intermediaries (37.50) Direct retail customers by farmers themselves (37.50) Both sources (25.00)
Distribution pricing	Higher than conventional rice (29.17) Equal to conventional rice (70.83)	Higher than conventional rice (20.00) Equal to conventional rice (80.00)	Higher than conventional rice (25.00) Equal to conventional rice (75.00)
Use of brand names or Trademarks in distribution	None (75.00) Have (25.00)	None (80.00) Have (20.00)	None (62.50) Have (37.50)
Distribution channels	Offline only through groups/mills/ intermediaries (66.67) Offline only with farmers as distributors (33.33)	Offline only through groups/mills/ intermediaries (100.00)	Offline only through groups/mills/ intermediaries (37.50) Offline only with farmers as distributors (37.50) Both online and offline by farmers (25.00)

Parentheisis indicates per centage to total.

and operators lacking processing technology and marketing knowledge. Low market bargaining power affects most farmers (72.34 per cent) who sell to intermediaries at conventional rice prices (74.47 per cent). Product identity creation remains problematic, with 74.47 per cent lacking product names or brands, preventing market differentiation. Supply chain structure remains incomplete without specialized processing or distribution operators.

Opportunities include growing online markets, with only 19.15 per cent using online channels, indicating expansion potential amid changing consumer behavior. Professional entrepreneur groups can serve as development models for upgrading traditional groups, while new marketer groups (31.91 per cent) show transition trends. Increasing organic rice demand from health consciousness provides important market driving force.

Threats comprise price competition forcing organic rice sales at conventional prices, impacting production incentives high intermediary dependence preventing independent pricing. Structural constraints include lack of processing equipment, packaging systems new market access capabilities. Farmer vulnerability persists with high traditional channel dependence (65.96 per cent) and inability to transform production potential into value addition. Inadequate supportive marketing systems prevent farmers from accessing fair returns and adapting to rapidly changing consumer behavior.

Strategic framework for organic rice distribution in sathing phra peninsula

Based on SWOT analysis results, four main strategies for organic rice distribution development can be formulated:

Strategy 1: Value addition and brand development (SO Strategy) leverages the robust production base (95.74 per cent producing according to standards) combined with professional entrepreneur group expertise to develop high-quality milled rice products. This strategy utilizes professional entrepreneur groups (17.02 per cent) to expand online distribution channels from the current 19.15 per cent and employs local operator flexibility in role adjustment to respond to increasing organic rice demand.

Strategy 2: Capacity development and weakness reduction (WO Strategy) uses professional entrepreneur groups as models for teaching paddy rice processing (51.06 per cent) transformation into higher-value milled rice. It utilizes online channels to create brands and identity for 74.47 per cent of farmers currently lacking product names or brands and leverages increasing organic rice demand to create direct consumer markets, reducing intermediary dependence (72.34 per cent).

Strategy 3: Defense and leveraging strengths against threats (ST Strategy) focuses on utilizing professional entrepreneur group expertise in setting prices higher than conventional rice (25.53 per cent) to address price competition problems. It employs standardized production quality (95.74 per cent) to create supportive marketing systems through quality certification and uses local operator flexibility to reduce farmer vulnerability in marketing chains.

Strategy 4: Weakness reduction and threat avoidance (WT Strategy) develops complete supply chain structure by creating operator cooperation with clearly separated roles and responsibilities to reduce structural constraints. It establishes operator groups to increase market bargaining power and reduce price competition, addressing the problem of 72.34 per cent of farmers selling to intermediaries, while developing value addition through processing to create supportive marketing systems.

These strategies align with existing research findings. The complexity of farmer problems supports Malak-Rawlikowska *et al.* (2019), who found farmers with high bargaining power typically have large cultivation areas and can negotiate prices, while most study area farmers lack bargaining power and rely on intermediaries. The WT strategy's emphasis on group formation is supported by Rahmadi *et al.* (2025), who found farmer groups help stabilize prices and increase profitability through resource pooling and marketing coordination. Value addition and brand development strategy aligns with Park and Suzuki, (2021), who emphasized product identity creation's importance for successful new product development. The complete supply chain structure emphasis reflects Prasertwattanakul and Ongkunaruk, (2018) findings that organic rice companies with direct farmer group contact better control quality and quantity, consistent with FAO, (2013) research stating farmer groups play important roles in delivering organic rice to exporters and markets. This comparative analysis demonstrates the necessity for holistic development encompassing farmer capacity building, supply chain structure development fair marketing system creation, enabling sustainable transformation of production potential into economic value addition.

CONCLUSION

This study reveals distinctive characteristics of organic rice supply chain structure and distribution in Sathing Phra Peninsula differing from other areas. The supply chain exhibits a centralized pattern where farmers and small-scale operators conduct operations covering all stages from production, processing, to distribution, with no specialized operators in specific areas. While demonstrating self-reliance strength, this structure represents significant limitations in value addition and market expansion. Organic rice distribution reveals farmer vulnerability in marketing chains. Despite standard production capabilities, farmers lack market bargaining power, depend on intermediaries, lack brand identity and have not adapted to online markets, preventing transformation of production potential into economic value addition. The classification into three farmer groups *viz*; Traditional

Marketers, New Marketers-and Professional Entrepreneurs - demonstrates different development levels and further development potential, particularly learning opportunities from professional entrepreneurs who succeed in price determination and diverse marketing channel utilization. Study findings indicate organic rice development requires a holistic approach encompassing farmer capacity building, supply chain structure development and fair marketing system creation. This enables farmers to maintain production incentives and access fair returns, leading to long-term sustainability of the organic agricultural system in Sathing Phra Peninsula.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Conflict of interest

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