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Enhancement of Supply Chain Management Efficiency of Lemongrass to Increase the Value of Community Products.

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Abstract.

This research aims to enhance the efficiency of lemongrass supply chain management in order to increase the value of community products. Lemongrass is a plant native to Sri Lanka and India. Its leaves possess a distinctive aromatic fragrance and are widely cultivated for use as an ingredient in cooking, particularly in Thai cuisine such as Tom Yum. In addition, lemongrass is utilized as a raw material in the cosmetic industry, including soap and shampoo production. According to traditional medicinal knowledge, lemongrass has medicinal properties such as relieving flatulence, stimulating appetite, improving digestive function, treating urinary tract disorders, reducing food odors, and alleviating loss of appetite (Ramanya Narisopa et al., 2022).

This study was conducted to identify the potential and existing problems that lead to the development of community-based lemongrass products. The research emphasizes product development models, efficiency enhancement processes, upgrading production and supply chain management, and increasing household income for lemongrass farmers. The objectives include developing existing occupations, promoting new occupations, and enhancing knowledge related to lemongrass processing in order to generate income for farmers and support the growth and circulation of the local grassroots economy. The research findings indicate that the implementation of the project resulted in the emergence of new learning processes within the farming community. Effective approaches for enhancing production management efficiency and increasing household income among lemongrass farmers were developed. A value-added agricultural product model, namely Chinese herbal formula citronella balm oil, was created to address the issue of insufficient income. This model can be applied as a prototype for enhancing the potential of other agricultural products. Moreover, new systematic and high-quality knowledge in supply chain management and income enhancement was generated, serving as a good practice model for community enterprises in Nakhon Pathom Province and contributing to the strengthening of community economic sustainability. Recommendations The findings of this study can serve as important information for community leaders, community enterprise presidents, and farmer groups to raise awareness of the significance of product processing in establishing an effective value-added operation system. Farmer groups should adapt to changing conditions and develop a clear vision to actively participate as key contributors in product development processes. Furthermore, the results provide administrators and relevant personnel with a clear understanding of farmers'

operational outcomes and defined objectives to be achieved. Opportunities should be created for farmer groups to participate in enhancing business competitiveness, which requires continuous adaptation to ensure sustainable survival. This includes setting clear performance outcomes, emphasizing achieved results, and motivating group members to collectively work toward success.

Keywords: Local Products, Agricultural Products, Management, Lemongrass

1. Introduction

The five-year Nakhon Pathom Provincial Development Plan (2023–2027) aims to establish the province as a center of agricultural and food technology and innovation, high-value processed agriculture, and human resource development across all age groups, with an emphasis on sustainable and environmentally friendly growth. The plan focuses on increasing gross provincial product (GPP) per capita, developing the service sector, and enhancing human capital in response to economic recovery following the COVID-19 pandemic, technological advancements, and changing socio-economic conditions.

Recognizing these developments, this study emphasizes the importance of enhancing knowledge and understanding of efficient agricultural product management, particularly for lemongrass, to respond to market demand and strengthen competitiveness. The research focuses on value-added development and supply chain management of local lemongrass products in the Lantakfa Community, Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province, with the objective of increasing income for small- and medium-scale farmers and strengthening local management networks.

This qualitative study examines the potential and development approaches for upgrading local lemongrass products in alignment with the revised five-year provincial development plan (2023–2027). Lemongrass, an economic crop promoted by relevant agencies such as the Nakhon Pathom Provincial Agricultural Office, is native to Sri Lanka and India and is widely used in Thai cuisine, cosmetic production, and traditional medicine. This research integrates local herbal resources with supply chain management enhancement to create marketable products and address income insufficiency among community farmers in a sustainable manner.

2. Research Objective

1. To study the problems and potential of lemongrass agricultural products in Phutthamonthon District, Nakhon Pathom Province.
2. To identify appropriate approaches and development models for agricultural product development among lemongrass farmers.

3. Scope of the Research

3.1 Population and Sample

The population of this study consists of lemongrass farmers in the Lantakfa Community, Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province. The unit of analysis of this research is the individual farmer.

3.2 Study Area

This research focuses exclusively on lemongrass farmers operating in Phutthamonthon District, Nakhon Pathom Province.

3.3 Time Frame

The research project was conducted from October 1, 2023, to September 30, 2024. Data collection was carried out between May 2024 and June 2025.

3.4 Content Scope

The study focuses on product development models for lemongrass agricultural products in Phutthamonthon District, Nakhon Pathom Province.

This includes encouraging farmer groups to conduct self-analysis to identify their potential and existing problems leading to product development, with an emphasis on product design and development capacity of lemongrass agricultural products.

4. Research Delimitation

This study was conducted exclusively within the Lantakfa Community, Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province.

5. Expected Benefits

5.1 Policy Contributions

The findings provide insights into competitive potential, value-added creation, and the capacity of local communities to enhance competitiveness, enabling the sustainable development of lemongrass agricultural products.

5.2 Management Contributions

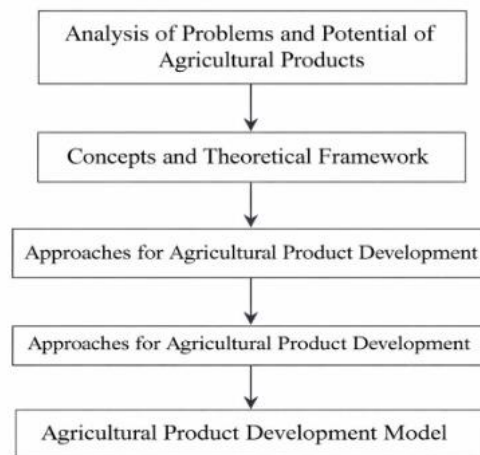
This qualitative research investigates the development and upgrading of local lemongrass agricultural products in the Lantakfa Community, Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province. The study explores characteristics and potential for product development to enhance the competitiveness of lemongrass products in Phutthamonthon District, Nakhon Pathom Province.

5.3 Theoretical Contributions

This study employs documentary research and qualitative research techniques related to theories of competitiveness, value-added creation, and innovation management capacity. The research is conducted using a phenomenological approach to gain in-depth understanding of local agricultural product development.

6. Conceptual Framework

Figure 1: Conceptual Framework To illustrate the relationships among the development approaches for upgrading local lemongrass agricultural products



7. Definition of Terms

1) Product A product refers to anything offered to the market to satisfy consumer needs or wants and achieve customer satisfaction. Products may be tangible goods or intangible services. Tangible products include general goods that can be seen and physically touched, allowing consumers to examine them prior to purchase, such as food, jewelry, clothing, footwear, computers, and cosmetics. Intangible products refer to services that cannot be physically seen or touched and are experienced through service usage (Tarika Sarathongkham et al., 2022).

2) New Product Development McCarthy and Perreault Jr. (1991) defined product development as products created for business purposes, including goods or services that involve new concepts or modifications of existing products. Such development aims to enhance consumer satisfaction beyond that of existing products, or to introduce existing products into new markets.

3) Management According to Napaporn Sorpipat (2022), management is the application of scientific knowledge and practical skills in utilizing organizational resources—namely human resources, budget, materials, equipment, and management systems—in a systematic and structured process to achieve organizational goals efficiently and effectively.

4) Lemongrass Lemongrass is an aromatic herbal plant widely recognized by both Thai and international communities. It is a highly beneficial plant whose parts—from stems to leaves—can be fully utilized for both consumption and non-consumption purposes. Due to its diverse properties and extensive applications, lemongrass is considered a high-value economic crop. In Thailand, lemongrass is well known and commonly used as an essential ingredient in daily life (Suchada Somrat, 2016).

8. Research Methodology

This research, entitled Enhancing the Efficiency of Lemongrass Supply Chain Management for Value Addition of Community Products, aims to: (1) examine the problems and potential of lemongrass agricultural products in the Lantakfa Community, Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province; and (2) identify approaches and models for the development of agricultural products produced by lemongrass farmers.

The study employed a Research and Development (R&D) approach.

Step 1: Problem Exploration and Document Review

This step was conducted to develop a conceptual framework for enhancing the efficiency of lemongrass supply chain management to increase the value of community products in the Lantakfa Community, Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province. The problem exploration and document review aimed to examine the basic background information of farmers in order to identify existing problems, gain a deeper understanding of research issues, determine development needs, and understand the farmers' context. This process supported the development of the research conceptual framework. The research followed a Research and Development (R&D) process consisting of the following stages: RA = Research Activity; RO = Research Outcome; DA = Development Activity; DO = Development Outcome, as detailed below.

R1 A: Research Activity

Primary data were collected through field surveys conducted by the researchers to study the agricultural context of farmers in the Lantakfa Community, Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province. Data collection was carried out from 1–20 November 2024.

R1 O: Research Outcome

The researchers synthesized data obtained from field surveys, document reviews, informal interviews, and related previous studies. The data were analyzed using content analysis, based on the preliminary conceptual framework, to summarize and finalize the research framework aimed at addressing farmers' problems.

D1 A: Development Activity

The researchers clarified the identified problems by organizing participatory forums with lemongrass producers and sellers, as well as community leaders. This activity commenced on 1 December 2024.

D1 O: Development Outcome

The outcomes included clearer identification of problems and development approaches derived from farmer participation. These focused on enhancing capacity in lemongrass supply chain management to increase the value of community products, such as increasing lemongrass production volume, promoting processing activities, and developing product packaging.

Figure 2 Study Area for Examining the Agricultural Context in Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province .



Step 2: Research and Development for Strategy Formulation and Hypothesis Development

R2A: Research Methodology

This research and development phase aimed to formulate strategies for problem-solving by employing a qualitative research approach. The methods included participant observation, non-participant observation, field note recording, and periodization to gain an in-depth understanding of social phenomena in the Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province.

R2O: Research Outcome

A systematic research procedure was developed to obtain factual information regarding lemongrass production conditions. The knowledge gained from this process served as a foundation for identifying approaches and models to enhance the efficiency of lemongrass supply chain management in order to increase the value of community products in Phutthamonthon District, Nakhon Pathom Province.

D2A: Development Activity

The researchers employed focus group discussions to identify approaches for strengthening the competitive potential of local products and increasing value through improved lemongrass supply chain management. Participants included community leaders, local scholars, one subdistrict agricultural officer, occupational group leaders, producers, and distributors in Phutthamonthon District, Nakhon Pathom Province. The development process focused on creating a value-added product through processing lemongrass into a citronella balm oil based on a Chinese herbal formula.

D2O: Development Outcome

A hypothetical development model for upgrading local lemongrass agricultural products in Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province was established. The findings indicated that production capacity plays a significant role in the development of lemongrass agricultural products.

Regarding input factors, farmers selected high-quality lemongrass and possessed the knowledge and skills required to use processing equipment; however, the proportion of sales was lower compared to the previous year. In terms of government policy support, public sector agencies—such as the Provincial Agricultural Office and universities—provided support and development in various areas, including production, processing, and the application of digital technologies to develop diverse marketing channels. These initiatives aimed to enhance product capabilities in areas such as product design, processing, distribution venues, and product promotion to achieve wider market acceptance. The product processing focused on the development of a value-added product in the form of citronella balm oil based on a Chinese herbal formula

Figure 3. Lemongrass Essential Oil Distillation Process Using Local Wisdom-Based Production Innovation



Step 3: Data Collection and Model Implementation

R3 A (Research Activity)

The researchers collected and verified field data to prepare for the processing and development of lemongrass products.

R3 O (Research Outcome)

An applicable model for enhancing the efficiency of lemongrass supply chain management to increase the value of community products in Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province was obtained. The model was evaluated to identify strengths and weaknesses and was reviewed by farmers, community members, relevant government officials, distributors, and consumers. The model was subsequently revised based on stakeholder feedback.

Upgrading Lemongrass Supply Chain Management

The findings indicate that enhancing the efficiency of lemongrass supply chain management significantly influences farmers' performance. Effective supply chain management contributes to product quality improvement through strengthened planning, production, procurement, and transportation processes. In addition, product development, innovative marketing channels, and service enhancement play a crucial role in increasing product value. The upgraded supply chain management can be summarized into four key dimensions: Planning, Production, Procurement, and Transportation.

This process also emphasizes knowledge sharing and collaboration among farmer groups, including shared use of agricultural equipment and the transfer of practical knowledge within the community.

9. Conclusion

The upgrading of lemongrass supply chain management resulted in improved agricultural product performance and contributed to the development of value-added local lemongrass products in Lantakfa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province. Farmers benefited from enhanced production processes and increased product value.

Farmers' Performance Outcomes

The enhanced supply chain management model supported the processing of lemongrass into value-added products, specifically Chinese herbal formula citronella balm oil, which improved farmers' income opportunities.

Data Analysis and Model Development

Qualitative data were systematically analyzed to elucidate the prevailing conditions of lemongrass production for the purposes of model development and validation, as well as to identify facilitating and constraining factors. Decisions regarding the procurement of actual packaging materials were undertaken concurrently with the consideration of other relevant determinants (Karsira et al., 2024). Subsequently, the findings were synthesized to develop a structured model aimed at enhancing the competitiveness of local products through value

addition and integrated supply chain management of lemongrass-based agricultural products. The proposed model provides a strategic framework for strengthening the competitive capacity of local agricultural products by increasing value added.

Figure 4 Model for Enhancing Lemongrass Supply Chain Management to Increase the Value of Community Products through Processing into Chinese Herbal Formula Citronella Balm Oil



10. Results

Based on the research findings, the study concludes that the outcomes of the research were developed into a tangible product through the processing stage of lemongrass production based on local wisdom. The agricultural lemongrass product was further developed into lemongrass aromatic balm (Chinese herbal formula).

11. Conclusions and Recommendations

Conclusions

The study found that the problems faced by lemongrass farmers could be addressed through activities aimed at developing a production model for lemongrass aromatic balm (Chinese herbal formula) to enhance the value of agricultural lemongrass products. The conclusions are summarized as follows:

Production Potential

Production factors can be categorized into four key dimensions. 1) Input factors 2) Demand factors 3) Competition and strategy And 4) Government policy. The findings indicate that competitiveness is influenced by input factors such as farmers' ability to select high-quality lemongrass and their skills in using processing equipment. Demand factors show that although farmers possess sufficient reserve capital, sales volumes declined compared to the previous year. leading to increased interest in processed lemongrass products. Government agencies, including provincial agricultural offices and universities, play a significant role by providing

support and knowledge in production and processing. Qualitative research results reveal that farmers in Lan Tak Fa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province emphasize the adoption of new equipment and innovation management based on local wisdom. Farmers demonstrated adaptability to change, creativity in product processing, and strong collaboration, contributing positively to their operational performance.

Outcomes of Enhancing Agricultural Product Processing

The qualitative findings show that upgrading local lemongrass products in Phutthamonthon District, Nakhon Pathom Province positively affected farmers' performance. The benefits gained encouraged creativity derived from local wisdom. The outcomes can be summarized as follows:

Farmers' Performance

Farmers emphasized performance outcomes through the processing of lemongrass into aromatic balm (Chinese herbal formula) to enhance local agricultural products. Performance can be classified into two aspects 1) Financial performance 2) Non-financial performance Financial performance reflects increased profitability resulting from growing market share. Non-financial performance includes the continuous expansion of new customer bases. Overall, the qualitative research confirms that enhancing lemongrass supply chain management efficiency for value-added community products in Lan Tak Fa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province encourages farmers to adopt new equipment, manage innovation based on local wisdom, and adapt to changing conditions. This approach supports sustainable product development and strengthens farmers' competitiveness.

Policy Recommendations

1) The government should accelerate policies that promote and support lemongrass supply chain management based on local wisdom by integrating collaboration with the private sector and providing appropriate incentives. This approach will ensure development aligns with farmers' actual needs and enhances supply chain capabilities nationwide.

2) Relevant agencies should utilize the findings as guidelines for educating community leaders and heads of community enterprises on innovative supply chain management practices. Support from community leaders and enterprise heads is a critical success factor for effective lemongrass supply chain management.

Managerial Recommendations

1) Community leaders, heads of community enterprises, and farmer groups should recognize the importance of product processing, product design, distribution channels, and product promotion to establish an efficient value-added operational system. Farmers must adapt proactively and develop a shared vision to compete at an international level.

2) The findings provide valuable insights for administrators and stakeholders to clearly understand farmers' performance outcomes, encourage farmer participation in enhancing business competitiveness, and support sustainable adaptation. Emphasis should be placed on

outcome-oriented management, performance motivation, and collective collaboration to achieve a practical and sustainable lemongrass supply chain management model for Lan Tak Fa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province. To enhance competitiveness, value addition, and innovation management capability of agricultural products. Pimolrattanakan, S. (2020).

Figure 5 Collaboration in Developing Lemongrass Agricultural Products in Lan Tak Fa Subdistrict, Nakhon Chai Si District, Nakhon Pathom Province



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