

Capability Development on Supply Chain Management of Processed Agriculture Products Based on Local Identity of Young Smart Farmers

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Abstract

The objectives of this research were to (1) study the activities at the upstream, midstream, and downstream of the agricultural product supply chain based on the local identity of young smart farmers, and (2) to develop the supply chain management capabilities of processed agricultural products based on the local identity of young smart farmers. The study was qualitative research. Key informants comprised 32 Ban Pwoagsoong organic asparagus community enterprise members and government officers. The data were collected through focus group discussions and in-depth interviews. Additionally, the content analysis was conducted on the data. Research findings indicated that the supply chain management capabilities of locally distinctive agricultural processed products for the Ban Pwoagsoong organic asparagus community enterprise could be seen in (1) transforming fresh asparagus into asparagus powder, ready for consumption, and (2) designing logistics packaging that considered factors related to product damage, transportation and distribution cost savings, product manufacturing, consumer convenience, and communication with stakeholders in the transportation system.

Keywords: Young Smart Farmers, Capability Development on Supply Chain Management, Processed Agriculture Products

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Introduction

The “Young Smart Farmer” or “YSF” project was initiated by the Department of Agricultural Promotion and the Ministry of Agriculture and Cooperatives. It aims to develop a new generation of individuals who have a passion for agriculture, are knowledgeable about agricultural management with innovation and modern technology, possess creative thinking, and have the ability to become self- sufficient entrepreneurs and agricultural leaders in their communities (Internal Security Operations Command, 2019). To become the owner of a new-generation farmer incubation center under the “Young Smart Farmer” program, candidates must meet various qualifications. They are expected to serve as connectors, facilitating the exchange of knowledge and learning among new-generation farmers (Young Smart Farmers or YSF) nationwide. These incubation centers act as hubs and serve as knowledge transfer centers in various agricultural sectors (Duangjan et al., 2022). They enable the exchange of knowledge about modern technology, innovation, agricultural business principles, production, processing, marketing, and supply chain management. Ultimately, they help strengthen the agricultural supply chain (The Standard Team, 2019).

Based on in-depth interviews with experienced agricultural promotion specialists from the Lop Buri Provincial Agricultural Office, the project organizers of the Smart Farmer and Young Smart Farmer development programs in Lop Buri province, and representatives of the new-generation farmers, regarding the challenges in developing the potential of Young Smart Farmers, the following issues were identified: There was a significant lack of academic knowledge needed to enhance and add value to agricultural products for both basic and advanced-level Young Smart Farmers.

The research team conducted interviews with members of the Ban Pwoagsoong Organic Asparagus Community Enterprise and discovered that the enterprise is located in Tha Din Dam sub-district, Chai Badan district, Lop Buri province, was established in the year 2016 and registered as a Young Smart Farmer of Lop Buri Province in the year 2020. Currently, the group comprises a total of 35 members with a collective land area of 50.20 Rai. They primarily produce organic asparagus and organic vegetables, which have been certified under the Good Agricultural Practices (GAP) standards. They are the first and largest group in Lop Buri province to produce organic asparagus. Presently, Ban Pwoagsoong Organic Asparagus Community Enterprise has received support in the form of machinery for asparagus powder processing from the government. However, due to the COVID-19 pandemic and severe flooding in the Tha Din Dam agricultural area in October 2021, the group had to halt the production of asparagus powder temporarily. After overcoming this crisis, the group has expressed the need to resume asparagus powder production to generate income for its members and the community. They are seeking academic support to enhance the value of their asparagus powder products, such as creating product branding and packaging that reflects their local identity.

The research team was therefore interested in undertaking a research project on enhancing the supply chain management capabilities of processed agricultural products based on the local identity of new-generation agricultural entrepreneurs. The selected case study would focus on the Ban Pwoagsoong Organic Asparagus Community Enterprise, for developing distinctive community products that could effectively communicate the local identity. Furthermore, it could establish sustainable income generation and preserve indigenous knowledge within the community.

Research Objective

1. To study the activities at the upstream, midstream, and downstream of the agricultural product supply chain based on the local identity of young smart farmers.
2. To develop the supply chain management capabilities of processed agricultural products based on the local identity of young smart farmers.

Literature Review

1. Young Smart Farmer

New Generation Agricultural Entrepreneurs, or Young Smart Farmers, refer to young farmers who manage agriculture using modern technology, possess creative and innovative thinking, establish connections within networks, and play a leadership role in local agriculture. They must also meet the criteria of having a minimum household income of 180,000 Baht per year and an age range between 17 and 45 years old (Ministry of Agriculture and Cooperatives, 2017; Manassong, Suakaew, Luewumnouichok, and Uraivarojanakorn, 2022).

2. The Process of Developing New Generation Farmers into Young Smart Farmers

The development of new-generation farmers into Young Smart Farmers consists of four key processes, as follows (Ministry of Agriculture and Cooperatives, 2017; Torsee, 2018).

2.1 Developing a life plan involves adjusting the perspective of new-generation farmers and instilling motivation in them to engage in agriculture. In this process, an “activity plan” is used as a tool, based on a model from the network of new-generation farmers in the western region, to analyze oneself, identify academic and technological needs, and establish links within the production/marketing network with fellow farmers.

2.2 Knowledge exchange involves facilitating a blended learning process between new-generation farmers and mentors, which encompasses face-to-face or experiential learning from the wisdom of local experts or role models. It also includes learning through field visits, hands-on practice, and utilizing information and online media for learning.

2.3 Networking emphasizes active participation in knowledge exchange processes and building interconnected networks of knowledge, technology, and agricultural activities from production to marketing. This is aimed at consolidating groups of new-generation farmers who are dedicated to their self-development as Young Smart Farmers, leading them towards becoming future agricultural leaders. Additionally, it strengthens the groups and learning networks between new-generation farmers and relevant stakeholders.

2.4 An assessment would determine new-generation farmers' qualifications as Young Smart Farmers. This assessment includes having knowledge in their field, possessing decision-making supporting information, effectively managing production and marketing, being aware of product quality and consumer safety, taking responsibility for the environment and society, and having a sense of pride in being a farmer. Additionally, it involves summarizing the results of learning exchanges, assessing the outcomes of learning, and planning for future development.

3. Agricultural Supply Chain and Logistics

The Ministry of Agriculture and Cooperatives Economic Office (2018) reports that the agricultural logistics and supply chain process in the agricultural product supply chain system consists of three levels: upstream, midstream, and downstream.

At the upstream level, farmers are responsible for the utilization of local raw materials for production and services, as well as the engagement of community labor (Hiranphaet et al., 2022). The logistics activities begin with the procurement and use of agricultural production factors, the management of product quality on the farm, and continue until the products are ready for sale at the next level (The Ministry of Agriculture and Cooperatives Economic Office, 2018).

The midstream level consists of product collectors/traders, wholesalers, and processing factories, with product collectors playing a significant role in the movement of products from farmers to the market (Sinthukhammoon, Hiranphaet, Aunyawong, and Chaladtanyakit, 2021). Logistics activities at this level include infrastructure management for collection and storage, sorting, quality inspection, and the use of post-harvest technologies in both quantity and quality management. Collected agricultural products are then distributed into two main channels: 1) collected for direct sale to consumers as fresh produce (e.g., fruits, vegetables, eggs), which are further sent to the downstream market, and 2) collected for processing into various products such as canned pineapples, canned fish, sugar, sausages, etc., with key logistics activities being product innovation and development, followed by the sale to wholesalers, retailers, export agents, or consumers (The Ministry of Agriculture and Cooperatives Economic Office, 2018).

The downstream level involves the movement of agricultural products, both fresh produce and processed products, to the market. These products are sold to wholesalers/retailers/export agents who distribute them to end consumers. Logistics activities at this level include business

management, customer acquisition, decision-making regarding products/ services necessary to establish and support the customer base, as well as quality management of standardized products to meet customer needs and achieve customer satisfaction (The Ministry of Agriculture and Cooperatives Economic Office, 2018). The pricing, risk, and transaction costs are influenced by market conditions. Essential factors contributing to this include the size and closeness of urban markets, the standards and quantity of roads connecting farmers to markets, as well as the accessibility and behavior of midstream (wholesalers, logistics firms, and processors) and downstream (retailers) entities in their dealings with small farmers (Diao et al., 2023).

Research Framework

This research was conducted as a Community-based Research (CBR) utilizing Participatory Action Research (PAR) approaches. The conceptual framework of this research was presented in Figure 1.

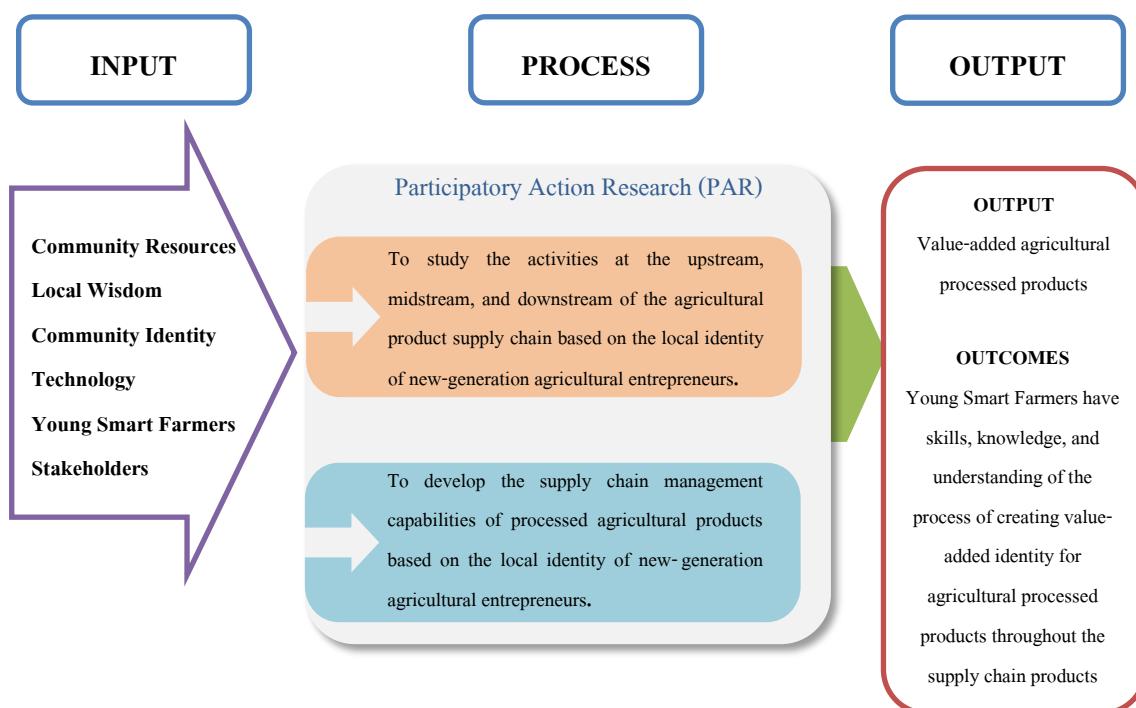


Figure 1 Research Framework

Research Methodology

Research Design

This research was conducted as a Community-based Research (CBR) utilizing Participatory Action Research (PAR) approaches.

Population and sample

The research team conducted a qualitative survey, with a focus on surveying processes and active participation in observations with 32 key informants. These informants included a leader, 24 members of the Ban Pwoagsoong organic asparagus community enterprise, and 8 relevant government officials in order to study the activities at the upstream, midstream, and downstream of the agricultural product supply chain based on the local identity of new-generation agricultural entrepreneurs.

Research instrument

1. The research team conducted a qualitative survey. Also, In-depth interviews and focus group discussion forms were used as research instruments. The interview protocol consisted of the activities at the upstream, midstream, and downstream of the agricultural product supply chain.

2. The research team organized a practical training session to educate group members, stakeholders, and other interested individuals on designing logistics packaging for a project to develop the supply chain management capabilities of processed agricultural products based on the local identity of new-generation agricultural entrepreneurs. The training included both theory and practice. During the practical session, a leader and members of the Ban Pwoagsoong organic asparagus community enterprise, totaling 20 people, participated in brainstorming and developing packaging. In addition, representatives from relevant government agencies, including agricultural officials from Chai Badan district, Lop Buri province, with a total of 3 people, were involved. The Department of Food Science and Technology, Faculty of Science and Technology, Thepsatri Rajabhat University provided the lecturers who facilitated the training.

Data collection

The research team conducted in-depth interviews and facilitated focus group discussions, emphasizing participatory thinking and development of packaging with a leader, 23 members of the Ban Pwoagsoong organic asparagus community enterprise, and 8 relevant government officials to gather information on the need for the development of processed products and packaging formats based on local identity.

Data analysis

The qualitative data was analyzed using content analysis, specifically using the SCOR Model. In addition, the research team utilized the data obtained from the investigation in objective 1 to analyze and synthesize it. This helped them to design and develop processed asparagus powder products. In addition to this, the team created packaging prototypes, product branding, and labels for the asparagus powder product.

Findings

1. To study the activities at the upstream, midstream, and downstream of the agricultural product supply chain based on the local identity of new-generation agricultural entrepreneurs. Table 1 displays actions in agricultural supply chain stages: upstream, midstream, and downstream. The focus is on the unique local identity of emerging agricultural entrepreneurs.

Table 1 The activities at the upstream, midstream, and downstream of the agricultural product supply chain

Upstream	Midstream	Downstream
<ul style="list-style-type: none"> - Farmer groups planned and procured asparagus seedlings from producers or suppliers, along with preparing labor, fertilizers, equipment, and group management. - The Young Smart Farmer (YSF) network project supported these farmers and imparted knowledge to reduce chemical usage, making them role models for transitioning to single-crop cultivation. 	<ul style="list-style-type: none"> - Farmers had begun cultivating asparagus in an organic farming system, and there was collaboration between farmers and officials to access knowledge and information, enabling them to plan and develop their agricultural practices for the future. - The use of chemicals in asparagus cultivation was discontinued, and they shifted to organic farming practices as per the guidance of the Chai Badan District Agricultural Office. - This resulted in reduced costs, safe production, and increased income for the farmers. - This also involved seeking certification for Good Agricultural Practices (GAP) standards to gain market acceptance from both domestic and international consumers. 	<p>The Ban Pwoagsoong organic asparagus community enterprise successfully developed the independent distribution of their agricultural products, bypassing middlemen. They engaged in negotiations with direct buyers, including:</p> <ol style="list-style-type: none"> 1) Asparagus, which was sent for sale in Singapore and Australia, to Natural & Premium Food Co., Ltd., a foreign company. 2) Queen Eggplant, sold by farmers through online channels like FACEBOOK and LINE application. 3) Lettuce, marketed by farmers through online channels like FACEBOOK and LINE application. 4) The products of the group that have received organic certification (Organic Thailand) will be distributed through the website RedMart.com (WWW.REDMART.COM)

Based on the data analysis, both quantitative and qualitative, obtained from the research study in this instance, the research team had formulated a practical operational model of the asparagus supply chain (SCOR Model) for the Ban Pwoagsoong organic asparagus community enterprise. The details were as follows:

In the plan aspect, it was discovered that the Ban Pwoagsoong organic asparagus community enterprise, set production goals of more than 1.2 tons per week. They collaborated with various network organizations, particularly educational institutions, to develop agricultural products through processing to address the challenges posed by COVID-19. They established COD (Cash on Delivery) services with transportation companies to introduce their products into the online market platforms such as SHOPEE and LAZADA. They improved product standards to meet USDA (United States Department of Agriculture) standards and expanded their product reach to the North American market, including Canada and the United States. Additionally, they devised a crop insurance pricing plan to increase profits by 30-35%. They initiated the use of alternative or clean energy sources to reduce expenses. They incorporated technology and AI systems to analyze production plans and manage agricultural data. They also created online streaming channels to facilitate consumer access to farmers. Finally, they expanded and nurtured a new generation of farmers, increasing their numbers by 40% compared to the past.

In the source aspect, it was found that the Ban Pwoagsoong organic asparagus community enterprise focused on organic agriculture and expanded its cultivation area from 50 to 100 rai. This expansion would be achieved through contributions from within the group's members and collaborative partners. Emphasis was placed on sourcing materials and raw ingredients in line with organic agricultural standards. Member farmers were required to have organic agriculture standard certification. Moreover, in the production of biofertilizers and insect repellents, the group manages the production of these products to help members reduce production costs. The expenses would be covered by the group's profits generated through the sale of agricultural products.

In the make aspect, it was observed that the Ban Pwoagsoong organic asparagus community enterprise actively collected and stored individual income data for each member. They formulated individualized production development plans (IFPP) and updated this information into an online system, along with introducing QR Code "Samaen Nari," a self-created data system that recorded the production data of each member. The group's production operations followed a market-oriented approach, and they conducted consumer demand surveys. The group had consistently practiced organic asparagus cultivation for the past three years, starting in 2017. Members received continuous income from their sales. To achieve this, the farmers utilized the Cloud E Data system to analyze production data accurately. This helped in managing production data efficiently, providing precise production reports to international buyers. Farmers could analyze data to plan their cultivation,

determine the quantity needed by buyers, and calculate the Break-Even Point for their operations. This data also facilitated collaboration with government agencies, enabling accurate problem-solving for farmers.

In the delivery aspect, it was noted that the Ban Pwoagsoong organic asparagus community enterprise faced a challenge regarding their main product, which was fresh asparagus for direct consumer consumption. The group formulated a major goal of maintaining product quality during transportation. They adopted an air packaging system to facilitate the transportation process and preserve the quality of their produce. They utilized a vacuum-sealing system for both fresh and dried products, which helped reduce the risk of contamination, extended the shelf life of fresh vegetables, and prolonged the shelf life of processed products compared to the fresh form. This air-sealing machine was adaptable to various types of bags, including hot bags, cool bags, glass bags, craft bags, and others, eliminating the need for specific packaging.

2. To develop the supply chain management capabilities of processed agricultural products based on the local identity of new-generation agricultural entrepreneurs. From the gathered input emphasizing participation in the ideation and development of packaging solutions by leaders and members of the Ban Pwoagsoong organic asparagus community enterprise, as well as relevant government officials, the following packaging needs were identified for powdered asparagus products.

Table 2 The components of designing product labels and graphics on powdered asparagus product packaging

Components	Description	Image
Name	“Asparagus powder” represents the identity of the community product, with a simple, short, concise name that is easy to remember.	
Symbol	It's a natural agricultural area with a sign that bears the name of the organic farming community group, Tha Pwoagsoong. This conveys information to consumers about the product's characteristics, the nature of the business, and the unique identity of the region, which boasts abundant natural resources and safe crop cultivation in the community.	

Table 2 (continued)

Components	Description	Image
Font	Use easily readable and understandable letters, maintain a semi-formal tone, and convey a clear message in both Thai and English languages. Include green-colored numbers. Use bold letters to motivate and capture the consumers' interest.	<p>Net Weight 100 g.</p> <p>ห่ำไส่ฝรั่ง 100 %</p> <p>ชงรับเครื่องดื่ม ใช้เป็นส่วนผสมสำหรับปูช่าอาหาร</p>
Color	The label background uses cool tones, including mature green, light green, and agricultural shades, which reflect the natural aspect.	<p>C87 M33 Y100 K26 C76 M0 Y100 K0 C50 M0 Y100 K0 C44 M0 Y60 K0 C25 M41 Y66 K76 C41 M70 Y96 K49 C34 M57 Y90 K37</p>
Product information	Display details such as production date, expiration date, quantity (weight), price, production location, contact information for inquiries (phone number, LINE app, and Facebook), and the supporting agencies and organizations that provide funding for research and development of packaging for the Ban Pwoagsoong organic asparagus community enterprise.	
Quantity	Packed in layers within a transparent sealed pouch with clear quantity information. Each pouch contains 100 grams of powdered asparagus.	



Figure 2 Design and develop smart packaging for asparagus powder following the local identity

Discussion

From the study of upstream, midstream, and downstream activities in the agricultural product supply chain of the Ban Pwoagsoong organic asparagus community enterprise, the researchers aimed to leverage this knowledge to enhance the supply chain management capabilities for young smart farmers. The research team conducted site visits to various business establishments, engaged

in in-depth interviews with leaders, and administered questionnaires to the members. Additionally, agricultural experts collaborated in analyzing the potential within the framework of the Business Model Canvas as shown in Figure 3.

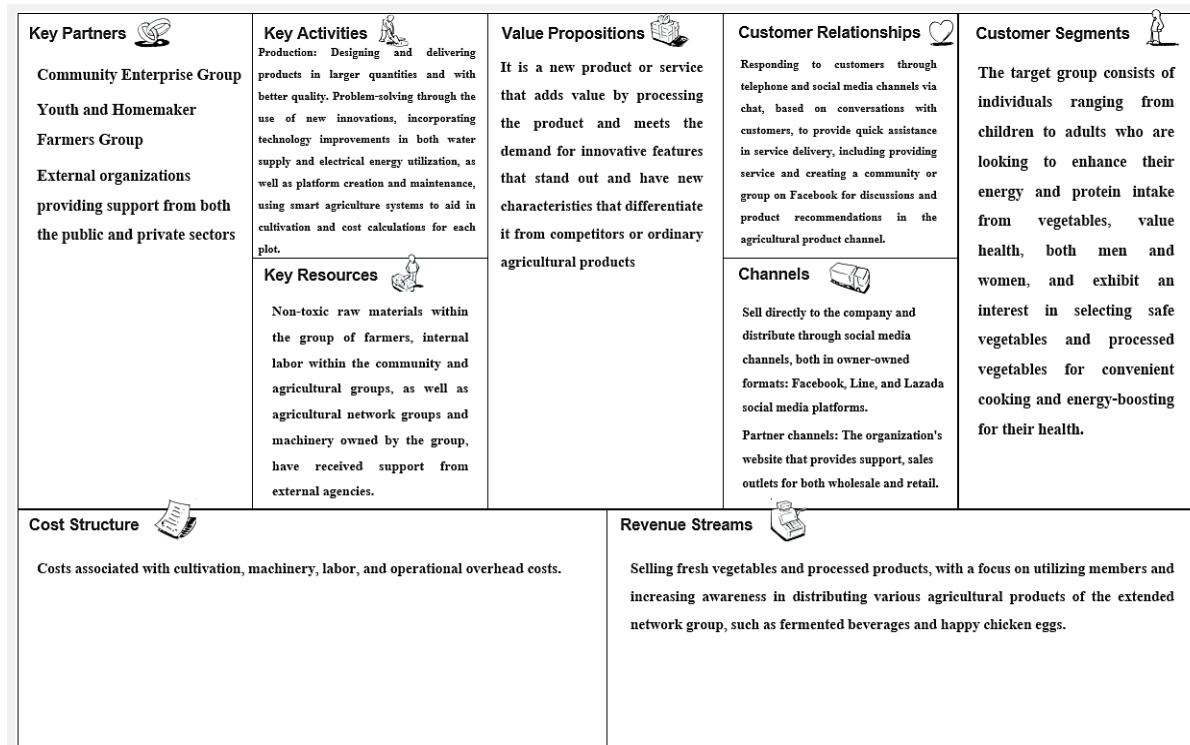


Figure 3 Business Model Canvas of the Ban Pwoagsoong organic asparagus community enterprise

This research focuses on the following issues for discussion of the results:

1. For the development of processed products and logistic packaging for the Ban Pwoagsoong organic asparagus community enterprise, the research team studied the needs of entrepreneurs, brainstorming to provide feedback and recommendations for improving and developing the draft product prototype, packaging prototype, label graphics, and creating the product logo, which is “ຜັກໜ່ວມໄມ້ຜ່ານ” (Powdered Asparagus). This logo reflects the identity of the community product, featuring a simple, concise, and memorable name. It represents a natural agricultural community known as “the Ban Pwoagsoong organic asparagus community enterprise,” which communicates the product's characteristics, business features, and the unique attributes of the region with its abundant natural resources and safe crop cultivation within the community. Additionally, the research emphasizes conveying product details, aligning with the findings of the study by Buaclee (2018), which investigated the design and development of product labels through a participatory communication approach in the context of a sustainable creative economy. This also leads to new and innovative ideas, which are crucial for designing the brand identity and packaging

symbols. Effective brand communication dimensions include symbols, names, packaging, prices, and dimensions related to ideal qualities, such as origin, reputation, emotions, and consumer experiences with the brand (Chanachaiphuwapat, 2019).

2. For the development of packaging from leaders and members of the Ban Pwoagsoong organic asparagus community enterprise, in the need to develop a logistic packaging format for asparagus powder products, the research team designed and developed product branding and label graphics on packaging. These were divided into two formats, where Format A is suitable for adults, and Format B is accessible to teenagers and children. This allows entrepreneurs to choose according to suitability and consumer needs through primarily online distribution channels and various event outlets, providing options for customers to purchase for themselves or as gifts or souvenirs. This aligns with the findings of the study by Chanachaiphuwapat (2019) on packaging, symbols, and communication strategies for Bang Bo Sardine in Samut Prakan Province. The research findings show that packaging designed following principles has standardization, cleanliness, suitability for cost, practicality, value addition, ease of sale, increased sales channels, and improved communication strategies, leading to better brand recognition and business success. Additionally, it is consistent with Sooksai et al. (2022) revealing that in Phatthalung Province, customer satisfaction is likely to result from the alignment of product presentation, composition suitability, and product benefits with accessibility to community products, along with ease of use.

Suggestion

1. Suggestion for Research Utilization

1.1 Organizations that are involved in designing and developing prototype packaging and label graphics for asparagus powder products should have an evaluation and monitoring system in place. This system must ensure that the prototype packaging is being used appropriately by the Ban Pwoagsoong organic asparagus community enterprise.

1.2 It is recommended that the Ban Pwoagsoong organic asparagus community enterprise receives support in registering their trademarks. This process should include an expert evaluation to determine whether the name is available for registration with the Department of Intellectual Property and whether it conflicts with any existing names.

1.3 To promote sustainability in the Ban Pwoagsoong organic asparagus community enterprise, it is recommended to establish a mentoring system or a specialized expert unit. This unit will provide continuous knowledge, support, assistance, and consultation for the development of products and packaging. This will help the group in their business endeavors.

1.4 Efforts should be made to promote and support the creation of networks among community enterprise groups like the Ban Pwoagsoong organic asparagus community enterprise to facilitate mutual support, assistance, and knowledge exchange for the development of products and packaging.

2. Suggestions for Future Research

2.1 The process of designing and developing packaging and label graphics should be more inclusive by extending it to other community enterprise groups. This will enable other producer groups within the community to gain knowledge and understanding of how to develop packaging that accurately reflects the identity of their products and can be used for commercial purposes. This approach will not only enhance the quality of their products but will also create sustainable income opportunities for these groups.

2.2 Research studies ought to investigate alternative approaches to developing packaging, such as eco-friendly packaging solutions.

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