



Cluster-based and Diamond Model Analysis of Herbal City in Thailand: A Case Study of Surin Province

Chonnatcha Kungwansupaphan* and Ubonwan Suwannaputit

Business Administration Department, Faculty of Management Science, Surindra Rajabhat University, Surin, Thailand

*Corresponding author. E-mail address: ckjan55@gmail.com

Received: 8 July 2024; Revised: 20 September 2024; Accepted: 3 October 2024; Available Online: 25 December 2024

Abstract

Clusters are a crucial component that helps create differentiation and competitiveness within industries at both the national and provincial levels in Thailand. This study aims to identify the components and the details of herbal cluster, and assessing the competitiveness of the herbal sector by applying the diamond model concepts in Surin province, recognized as the herbal city of Thailand. This study utilized a qualitative approach, conducting semi-structured interviews with 27 key informants selected based on their expertise or involvement in the development of the herbal sector in Surin province. The findings reveal that Surin province has elements of the diamond model, which include both factors that provide advantages and factors that hinder the development of the herbal sector in the province. Advantageous factors include natural resources, traditional herbal knowledge, the expanding and growing herbal market, a supporting business structure in the herbal sector, as well as numerous government agencies, private organizations, and supporting industries for herbal development. In contrast, several obstacles consist of the production management of herbs from upstream to downstream, business strategies to meet consumer demands, a well-integrated network system in the herbal sector, and inconsistency in policies and promotions by governmental agencies. To enhance the competitiveness of the herbal sector, policy recommendations are drawn to take immediate action to improve conditions in disadvantaged dimensions in the model.

Keywords: Cluster, Diamond Model, Herbal City, Surin Province

Introduction

The COVID-19 pandemic has had a significant impact on the global population's health, prompting a surge in global healthcare awareness and demand for safe consumer products made from natural ingredients. This has led to increased popularity and demand for herbal products derived from nature. Herbs are important products of Thailand that are produced and exported for distribution in the global market. A report by the National Herbal Policy Committee stated that the herbal market size, or consumer spending value on herbal products, averaged 46,916.44 million baht, while the export of raw materials and herbal products from Thailand between 2017–2022 generated a value of over 12,211 million baht, ranking first in the Southeast Asian region (Hfocus, 2022). Additionally, Thailand has continuously placed importance on promoting and developing the herbal sector and industry. One clear example is the National Herbal Development Master Plan, which was implemented for the development of the country's herbal sector for the years 2017–2021. Currently, Thailand is using the second herbal master plan with the goal of developing Thai herbs to drive the country's economy in the future and to lead in the production of herbal products in the ASEAN region.

However, the success of herbal industrial development goes beyond the skills and abilities of farmers and entrepreneurs in production, processing, management, and marketing. Having a network that connects relevant parties, or “clusters” is viewed as an important component that can create a distinctive advantage in the success of industrial development, including in the Thai herbal industry. “Cluster” is a policy that the Thai government has implemented to enhance the strength of value chains, boost the investment potential of Thailand, and promote prosperity in regions and localities (Board of Investment, Ministry of Industry, n.d.). The concept of clusters has



been used as a guideline for the development of Thailand's industries since 2002. The National Economic and Social Development Board has implemented projects to create industrial cluster plans to enhance the competitiveness of Thai businesses, including those in the agriculture sector. Additionally, creating clusters is one of the approaches to developing the agricultural industry, which is a complex and important sector for the country's development. Clusters help to link what has been created in the industry, especially for small businesses that cannot access resources. Such operations will help ensure the sustainable growth of the industry, with the resulting benefits being the development of the overall social and economic aspects of the region (Andriushchenko et al., 2020).

Herbal clusters in Thailand are spread across various provinces nationwide. They were mentioned in the first national master plan for herbal development. The plan designates several provinces as pilot provinces for the country's herbal development and calls these provinces "herbal cities". Some provinces were grouped together according to their specific potential. For instance, Surin, Amnat Charoen, Maha Sarakham, Uthai Thani, and Sakon Nakhon provinces are designated as areas for the herbal raw materials cluster (Ministry of Agriculture and Cooperatives, 2020). This research selected Surin province as a case study because it is one of Thailand's 14 pilot "Herbal Cities", where it is recognized for the agricultural potential in developing herbs for the processed herbal raw material market. The province has long-standing tradition of medicinal herbs that is rooted in ancient Khmer wisdom, as well as embraced commercial herb production to boost income and employment (Land Development Department, Ministry of Agriculture and Cooperatives, 2021).

Apart from that, the COVID-19 situation has brought opportunities for Surin province to expand the herbal market and create economic returns from the increasing demand for herbs. However, to achieve that goal, Surin province needs to overcome various challenges, including the lack of coordination among relevant sectors. Farmers still lack confidence in the market demand for herbal raw materials, herbal trading between farmers and government hospitals involves many steps, and there is a lack of effective connection between the public, private, and local sectors to support herbal processing and product development (Office of the Prime Minister, 2021). Therefore, this study aims to identify the components and the details of herbal cluster based on the Diamond Model concept derived from Porter (1990; 1998). Apart from that, the model was applied to assess the competitiveness of the herbal sector in Surin province. The Diamond Model offers a framework for analyzing national competitive advantage through industrial clusters, with a nation's competitiveness also depending on the productivity levels businesses achieve in their specific location (Porter, 1990). Therefore, applying the Diamond Model and cluster concept is a way to help develop and increase the competitiveness of Surin province's herbal sector, pushing it to become a full-fledged herbal city. This approach will also help farmers and herbal entrepreneurs in Surin province to take advantage of the arising opportunities and reduce problems and obstacles in herbal operations.

The paper begins by presenting the literature on the concepts of clusters and the diamond model. The methodology, based on personal in-depth interviews with stakeholders in Surin province's herbal sector, is then presented, followed by the findings and discussion of the research. The paper concludes with remarks on policy implications and future research opportunities.

Literature Reviews

1. Concept of Clusters

The notion of clusters is extensively utilized within the realm of economic development, particularly for examining the process by which businesses in the same geographic region cultivate competitive advantages within



industrial clusters. Rosenfeld (1997, p. 4) stated that “A cluster is very simply used to represent concentrations of firms that are able to produce synergy because of their geographical proximity and interdependence”. Porter (1998, p. 78) defined clusters as geographic concentrations of interconnected companies and institutions in a particular field, linked by commonalities and complementarities. Further, Delgado et al. (2016, p. 38) described clusters as “geographic concentrations of industries related by knowledge, skills, inputs, demand, and/or other linkages”.

The cluster concept is widely employed in various industries to foster collaboration and elevate levels of innovation. Clusters influence competition by increasing the productivity of their members, driving the direction and pace of innovation, and stimulating the formation of new businesses (Porter, 1998). Clusters also play a pivotal role in the expansion and advancement of numerous businesses in diverse sectors, granting them access to a talented workforce, adept suppliers, and venture capital, resulting in heightened competitiveness and profitability. Cluster members cooperate with each other and engage in mutual knowledge sharing to achieve the aims of cluster formation, which are to enhance business and expand collaboration with other firms and stakeholders, thereby boosting competitiveness locally and internationally (Mirčetić et al., 2019). Additionally, cluster incentives and initiatives are becoming increasingly prevalent in national and local economic policies (Obadić, 2013; Schmiedeberg, 2010) due to their role in regional development and the growth of entrepreneurial and small firms (Audretsch, 2001; Brown et al., 2010; Li et al., 2015).

Further, Porter (1990) classified clusters into 1) vertical clusters, which encompass industries interlinked through buyer–seller relationships, with businesses operating within the same industry, and 2) horizontal clusters, which comprise industries that share a common marketplace for their end products, employ collaborative utilization of technology or labor skills, and demonstrate a demand for similar natural resources. Apart from that, the Board of Investment, Ministry of Industry (n.d.) of Thailand has categorized clusters into 1) the super cluster, which focuses on cutting-edge fields, including advanced technology and future industries such as automobiles and their components, environmentally friendly telecommunications, digital innovations, petrochemical and chemical equipment, etc., and 2) other target clusters, which encompass additional industrial sectors with promising potential, including agricultural processing, textiles, and clothing. Moreover, there is a notable presence of creative product design and development services within these clusters.

In general, clusters consist of firms, suppliers, support services, specialized infrastructure, producers of related products, and specialized institutions that arise in particular fields and areas (Porter, 2008). They also include representatives from the public, private, and non-governmental sectors, as well as individuals and other interested parties. Each stakeholder specializes in a specific stage of the value chain, which is largely self-contained within a specific geographical area, creating significant localized external economic benefits (Di Maria et al., 2019). Therefore, achieving successful cluster development necessitates a myriad of contributing factors. These factors include establishing trust among cluster members, assuming leadership roles in the cluster development process, receiving support from executive members who are actively engaged in the cluster, and fostering the active involvement and participation of all cluster members. An additional crucial element involves formulating a collaborative development strategy that is jointly crafted by all cluster members. Notably, there have been instances where collectively initiated projects have been effectively executed, yielding fruitful outcomes (Jaklič et al., 2004).

Furthermore, the cluster concept provides an important basis for analyzing small-scale clusters in regions or rural areas by adapting it into micro-clusters. Previous research introduced “micro-clusters” for application to micro-scale economic and industrial activities, such as tourism in regional and rural locations (Merrell et al., 2021; Grimstad & Burgess, 2013; Michael, 2007). The micro-cluster approach is considered suitable for examining sectors in rural agricultural areas characterized by family-run enterprises, where the tight-knit community imposes social norms that could negatively affect business activities, economic frameworks, and political choices (Grimstad & Burgess, 2013). Collaborations among institutions, practices, interactions, and local resources are crucial for fostering competitiveness and facilitating the development of micro-clusters. Furthermore, networking among micro-cluster stakeholders within an area “is usually one of the keys to make a cluster strategy a success” (Salvador et al., 2011, p. 13). Additionally, the cluster concept needs more attention in the context of micro, small, and medium enterprises, where it can offer various advantages for businesses located in geographically scattered areas, including improved efficiency in production and marketing as well as a conducive environment for innovation (Naik & Nagadevara, 2010).

2. Concept of Diamond Model

The diamond model is an analytical framework developed by Michael E. Porter in 1990 to explain the reasons for differences in competitiveness and operating success among firms in various countries and industries. Competitiveness in any industry requires the right combination of factors to enable the industry to achieve a competitive advantage in its environment (Porter, 1990). The diamond model was used analytically to examine and determine the causes of an industry’s success in a particular region compared to other regions where success is based on competitive advantage (Jhamb, 2016). Additionally, Porter’s diamond model, with its versatile and multidimensional approach, continues to be a fundamental tool for understanding the dynamics of competitiveness, particularly when applied to specific industries or regions (Fernando, 2021). The model has inherent flexibility and provides an analytical contribution focusing on industrial competitiveness (Vlados, 2019). It offers a more thorough and systematic analysis by examining the micro, meso, and macro factors that influence industrial competitiveness from the perspective of the industrial chain (García Ochoa et al., 2017). Thus, the diamond model has been extensively adopted by scholars according to the characteristics of different industries or contexts (Chunxiang, 2018), including in Thailand’s context. The Diamond Model has been applied to analyze the competitiveness of industries in Thailand, such as the new automotive industry (Chulalongkorn University Intellectual Property Institute, 2017), the tourism industry, and the fashion industry (National Economic and Social Development Board, 2003).

The key to competitive advantage in the diamond model lies in the integration of four basic elements: factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry. There are other auxiliary elements that include government and chance (Porter, 1990; Vlados, 2019). These elements mutually influence each other, creating a system in the shape of a diamond. The interplay among them is easily measurable and universally applicable, thus serving as a compelling foundational framework for analyzing industrial competitiveness (Cronjé & du Plessis, 2020). The diamond model is a useful framework for analyzing and identifying the strengths and weaknesses of interrelated dimensions in a target industry. The results help stakeholders understand and identify which factors should be focused on developing or improving to support the growth and development of the cluster (Boja, 2011).



According to Porter (1990), factor conditions are the specific needs of an industry in order to gain a competitive advantage. They include human resources, natural resources, knowledge resources, capital resources, and infrastructure, which constitute the primary conditions for a certain industry. Each industry may have different factor conditions that impact its productivity, efficiency, quality, and expertise. Demand conditions refer to domestic demand characteristics for a particular good or service that can lead to a competitive advantage for the industry. This is associated with sophisticated and demanding local customers, as well as market size and growth (Porter, 1998). These factors put pressure on local businesses to continuously innovate and raise standards in terms of quality, features, and service, thereby creating a competitive advantage in the industry. These conditions play a role in motivating firms or industries to constantly improve product quality, seek new innovations, and formulate suitable new strategies, resulting in constantly improved efficiency (Porter, 1990). Additionally, demand conditions have a direct effect on the cluster's performance, as firms in the cluster have to focus more on innovation and differentiation rather than producing low-quality and imitative products or services (Kärkkäinen, 2008).

Further, the firm strategy, structure, and rivalry factor includes how a firm is organized, managed, and founded, its objectives, and the nature of competition in its home market. This involves goal setting and management (Porter, 1990). In a highly competitive environment, rivalry stimulates firms to pursue innovation and improvement, making competitiveness a driver of long-term development (Nordin, 2003). Moreover, related and supporting industries consist of suppliers and firms from the same or related industries located in the same area (Porter, 1990). This factor supports cost-effective production inputs for firms in a cluster, participating in the overall industry upgrading process, and stimulating other firms in the supply chain to innovate and improve their performance. The final aspect of the diamond model pertains to governmental influence. Governments create conditions conducive to a high standard of living for their citizens by formulating policies concerning health, safety, the environment, the financial and trade system, and development (Dögl et al., 2012; Deniz et al., 2013). They consist of numerous separate entities and geographical divisions, each exerting its own influence on the business landscape within a specific area (Kharub & Sharma, 2017). Therefore, they play an important role in promoting a cluster both nationally and locally (Porter, 1998) through their policies in developing and creating new clusters or strengthening existing ones. Governments are also crucial in assisting clusters to limit or eliminate barriers to growth. At the same time, government policies and operations can negatively impact the components of the diamond model, such as tax policies and product standard regulations, which may create pressure and consequences for business operations in various industries.

Methods and Materials

1. Case Selection

This research was carried out in Surin province, located in the south of the northeastern region, approximately 450 kilometers from Bangkok. The province covers an area of approximately 8,124.056 square kilometers (approximately 5,077,535 rai). The area of Surin province is divided into 4,260,562 rai (77.45%) of agricultural areas, 481,205 rai (8.75%) of forest areas, 216,267 rai (3.93%) of water areas, with the remaining areas being communities and others (Surin Provincial Office, 2021). Most of the population of Surin province earns income from agriculture. Surin province is one of the provinces designated as a herbal city according to the National Master Plan for the Development of Thai Herbs (Issue 1, Year 2017–2021). A herbal city refers



to a city that has implemented measures and plans for regional development, focusing on the development of herbs in a comprehensive manner from the beginning, middle, and downstream stages (Department of Thai Traditional and Alternative Medicine, Ministry of Public Health, n.d.).

Farmers in Surin province grow herbs both indoors and outdoors, particularly in areas near rice fields. Most herb cultivation involves growing several plants together in the same plot. These farmers include both individuals and groups who grow, gather, process, and sell herbs. They distribute their products through various channels such as community markets, government hospitals, herbal collectors within and outside the province, local and international customers. Surin province boasts 22 groups of herbal producers registered as community enterprises, with 325 community products processed from herbal raw materials registered as OTOP (One Tambon One Product) products (Office of the Prime Minister, 2021).

This study chose Surin province to represent herbal cluster development at the provincial level for two main reasons.

First, Surin is recognized as a 'herbal city' under the Herbal City project, which aims to promote the development of Thai herbs. As part of this initiative, Surin is located within the herbal raw material cluster. Second, according to the Agri-Map Online database, herbs are identified as one of Surin province's future economic crops. The province possesses potential areas conducive to cultivating various medicinal plants, including Turmeric and Gotu Kola (Land Development Department, Ministry of Agriculture and Cooperatives, 2021).

2. Target Group

To gain a comprehensive understanding of the herbal sector, researcher conducted multiple key informant interviews. Twenty-seven key informants were selected for their specific expertise, recent experiences and involvement in promoting and developing the sector. These informants included representatives from various backgrounds: herbal farmers (6), entrepreneurs (2), traders (2), community enterprises (2), academicians and researchers (2), and government agencies (13) engaged in herbal promotion and development.

3. Research Tool

The interview protocol with open-ended questions was developed based on the five factors of the diamond model mentioned earlier. In this study, questions on factor conditions referred to inputs that impact the competitiveness of the herbal sector in Surin province. These inputs include natural resources, human resources (skills and education levels of the workforce), capital, infrastructure, and technological base. Questions on demand conditions focused on the nature and size of the domestic market, as well as consumer preferences for herbal products. Regarding related and supporting industries, questions addressed businesses that could enhance efficiency, innovation, and overall competitiveness within the herbal sector, including close linkages between suppliers, manufacturers, and other related industries. Firm strategy, structure, and rivalry encompassed strategies relevant to increasing market share and business competitiveness, as well as the factors shaping how businesses are created, organized, and managed. Additionally, the government factor pertained to rules, laws, and policies established by governmental agencies at national and provincial levels that significantly influence the competitiveness of the herbal sector.

4. Data Collection and Analysis

To ensure the validity and reliability of this research, data triangulation was employed using multiple sources of data (e.g., interviews with stakeholders, field observations, and government reports) and to cross-check information in order to ensure validity, while the reliability was obtained from the application of several data



collection instruments (Yin, 2018; Fusch et al., 2018; Quintão et al., 2020). Researchers utilized semi-structured interviews and observations as primary sources, supplemented by documentation as a secondary source. Interviews were conducted following a semi-structured interview protocol to facilitate in-depth exploration of the topic. Each interview session lasted approximately 45–60 minutes and took place at the informants' offices or premises. The interview results were recorded and transcribed. Additionally, secondary data on the herbal sector in Surin province was systematically collected from open databases, directly from institutions, and other available sources. The data was analyzed using the Qualitative Content Analysis (QCA) that involved selecting the unit of analysis, coding to establish categories, and identifying meaningful themes (Vears & Gillam, 2022; Mezmir, 2020) to gain a comprehensive perspective of the herbal sector using the diamond model.

Findings

Table 1 illustrates a categorized overview of key informants involved in the herbal sectors of Surin province. These key informants come from a range of fields, including entrepreneurship, trade, community enterprises, academia, herbal farming, and government agencies. Their ages range from 35 to 65 years, with a mix of both male and female participants.

Table 1 Key Informants' Brief Information (Ages and Genders)

Entrepreneurs	Traders	Community Enterprises	Academicians/ Researchers
E1: Male 44 years old	T1: Male 59 years old	C1: Male 45 years old	A1: Female 52 years old
E2: Female 65 years old	T2: Male 48 years old	C2: Male 44 years old	A2: Female 35 years old
Herbal Farmers			
F1: Male 50 years old	F3: Female 62 years old	F5: Female 42 years old	
F2: Male 52 years old	F4: Female 58 years old	F6: Female 45 years old	
Government Agencies			
Agriculture Agencies Health Agencies Industrial/Commerce Agencies			
G1: Male 50 years old	G4: Male 50 years old	G7: Male 55 years old	G10: Female 40 years old
G2: Male 50 years old	G5: Male 55 years old	G8: Female 40 years old	G11: Female 38 years old
G3: Male 50 years old	G6: Male 55 years old	G9: Female 45 years old	G12: Female 42 years old
G13: Female 35 years old			

Source: Authors.

The results of this study are divided into 2 parts that include the components and the details of herbal cluster, and the assessment of the diamond model on Surin's herbal sector as follows;

1. The Components of Surin Province's Herbal Cluster

The components of Surin Province's herbal cluster were revealed through semi-structured interviews, highlighting various actors with different roles depending on the scale and nature of their businesses. Analytically, this study categorized them based on their roles in the cluster as follows:

1.1 Herb Farmers: They cultivate herbs for both household consumption and sale, distributed across various areas throughout the province. In some regions, farmers have organized into formal community enterprise groups, while in others, they have formed informal groups of herbal farmers. Most farmers grow herbs as supplementary crops alongside other economic crops. Currently, herb cultivation is not conducted on a large commercial scale but rather comprises a diverse mix of herb types. Most herbs are sold as fresh produce, as farmers find this easier to handle than processing the herbs.



1.2 Herb Processors: Most of them are micro, small, and medium-sized businesses, along with community enterprises. They primarily process herbs into dried herbs or powder using simple technology, selling them to herbal processors for use in various products such as inhalers, balms, cosmeceuticals, and medicines. Additionally, several herbal traders play a role in purchasing herbs from farmers and collecting them in large quantities before delivering them to customers according to their orders. These herbs are available in both fresh and dried forms. Most customers who order herbs from these traders are located outside Surin province, especially in Bangkok.

1.3 Suppliers: They provide various products and services to support herb farmers in enhancing agricultural productivity. These include suppliers of seeds, fertilizers, soil amendments, irrigation equipment, farm equipment, packaging, and agricultural technology. Some farmers produce their own supplies, such as fertilizers and seeds, while many purchase them from vendors both within and outside the province. Additionally, the agricultural equipment used by farmers in herb cultivation is mostly basic. Therefore, many rely on services provided by agricultural service providers to prepare planting plots (plowing and cultivating the soil).

1.4 Logistics Service Providers: They play a crucial role in establishing marketing channels and distributing herbal products from Surin province to consumers. The province hosts numerous logistics service providers capable of transporting both fresh and processed herbs in various quantities and types. Herbal products can be delivered directly to consumers' doorsteps. Surin province's logistics service providers have sufficient distribution points to efficiently transport herbal products to customers.

1.5 Retail Businesses and Grocery Stores: They retail fresh and processed herbs both offline and online. However, there are few retailers in Surin province dedicated exclusively to herbal products; typically, these products are sold alongside other items in retail stores. Conversely, there are numerous online retailers in Surin province that directly sell herbal products to customers via various online platforms and social media channels, including "Surin Best" an online marketplace developed by the province to facilitate the online sale of local products.

1.6 Financial Service Institutions: They play a crucial role in supporting businesses within Surin's herbal sector. In Surin province, public and private banks are located in every district, offering loans and working capital to herbal farmers, processors, and other businesses. Additionally, the Bank for Agriculture and Agricultural Cooperatives and agricultural cooperatives in the province provide agricultural loans to farmers. Furthermore, farmers, small-scale herb producers, and entrepreneurs can apply for loans from various microfinance businesses in the province.

1.7 Tourism and Healthcare Industries: These industries support the herb sector and establish a mutually beneficial relationship in several ways. Tourism has integrated herbs into Surin's local culinary culture to promote community tourism, featuring dishes that attract tourists such as frogs stuffed with herbs or boiled chicken seasoned with herbs. Herbs are also processed into souvenirs for tourists, including food, beverages, herbal massage oils, balms, inhalers, and compresses. Moreover, many massage parlors in Surin province use herbs to offer massages to tourists and local customers. Additionally, herbal medicines produced by hospitals in Surin province are widely accepted and used by other hospitals, including provincial, district, and subdistrict health-promoting hospitals, as well as hospitals in other provinces.

1.8 Government Agencies: Most of the agencies involved in promoting Surin's herbal sector are listed in Table 2. They operate independently, focusing on specific areas according to policies and funding allocated from their ministries. Consequently, there is a lack of structured planning among government agencies for the advancement of herbal development in Surin province.

**Table 2** Government Agencies Involve in Operations Related to Surin's Herbal Sector

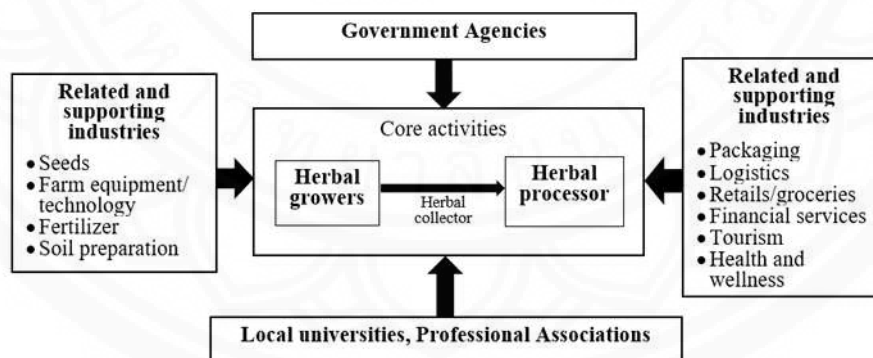
Government Agencies	Operations Related to Herbal Sector
Provincial and District Agricultural Offices, Office of Agriculture and Cooperatives	Promote and develop herbal producers and herbal production.
Agricultural Research and Development Center	Study, research and develop herbs for farmers.
Provincial Public Health Office	Promote knowledge and standard on using/processing medicinal herbs products.
Provincial and district hospitals	Produce and use herbal medicine to treat patients
Provincial Office of Industry	Develop competitiveness of manufacturers of herbal products.
Provincial Office of Commerce	Promote marketing channels for herbal products.
Provincial of Community Development	Promote the development of community herbal products.

Source: Authors.

1.9 Local Universities: There are two local universities that play a role in Surin's herbal sector. Although both universities may have limitations in research, high technology, and innovation, they serve as intermediaries connecting farmers and entrepreneurs to sources of knowledge, technology, and innovation available outside the province. They also support academic knowledge transfer, technology transfer, and the development of entrepreneurs and farmers through training programs, university incubation centers, and laboratory testing related to herbs.

1.10 Professional Associations: The professional associations in Surin province relevant to the development of herbs include the Provincial Chamber of Commerce, the Provincial Farmers Council, the Thai SME Confederation of Surin Province, and the One Tambon, One Product entrepreneur network. These associations promote business connections, facilitate alliances and networks, and exchange knowledge among stakeholders involved in production, marketing, and business.

Figure 1 illustrates the cluster mapping of the herbal sector in Surin province and various actors who play different roles to contribute to the overall functioning of the cluster. Some actors play multiple roles, such as being both a farmer and a product manufacturer or a distributor and retailer. Apart from that, some actors work independently while some actors collaborate with each other to create mutual benefits.

**Figure 1** Surin's Herbal Cluster Map.

Source: Authors.

2. The Diamond Model Dimensions and Competitiveness of the Herbal Sector in Surin Province

This research applied the concept of the diamond model to identify each dimension and analyze the advantages and disadvantages relevant to operation of herbal clusters in Surin province. The results present in Figure 2.

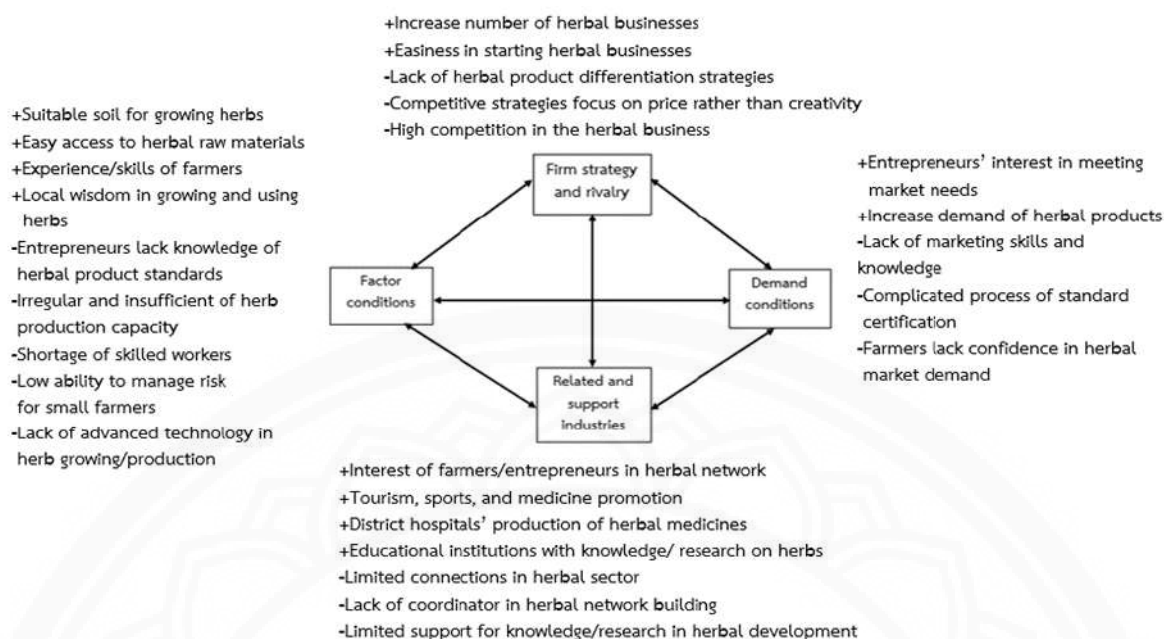


Figure 2 Diamond Model of Surin Province's Herbal Cluster.

Source: Authors.

2.1 Factor Conditions

The interview results highlighted that the primary factors contributing to the competitiveness of Surin province's herbal sector are natural and human resources. However, soil conditions vary, influencing the types of herbs that can be grown effectively. Most farmers in this study cultivated a variety of herbs in their own yards, allowing them to grow naturally, with only some farmers checking and improving the soil conditions before planting herbs. They utilized their land for herb cultivation to generate additional income while waiting for their main crops to mature. Nevertheless, there were farmers who dedicate individual plots specifically for commercial herb cultivation.

Farmers who grew herbs for sale provide a variety of fresh herbs that served as raw materials for processing various herbal products. These raw materials were readily available for purchase in community markets or directly from farmers, particularly in areas where commercial herbs were cultivated. Most farmers in this study mentioned that they have accumulated human capital that could serve as a solid foundation for the development of the herbal cluster, including experience, knowledge, and skills in herb cultivation and processing. The use of herbs has become an important local tradition for food and household consumption, passed down through generations. Surin province is renowned for its local herbal wisdom, dating back to the ancient Khmer period. One farmer addressed that:

“Villagers have been growing herbs since their grandparents' generation. Since I was born, I have seen that herbs are being grown. Most are grown for consumption and household use. I learned how to grow herbs from my parents. Later, an organization came to train and promote knowledge about herbs, so I attended the training many times.” (F1)

However, all interviewees also noted several factor conditions that may hinder herbal development in many areas. Firstly, most farmers and entrepreneurs in Surin province involved in herbal production still lack knowledge and understanding of herbal product standards and market requirements. Secondly, the production capacity for herbs was irregular and sometimes insufficient, causing prices to fluctuate. For instance, during the



COVID-19 period, there was a high demand for *Andrographis paniculata*, but farmers were unable to produce it in time, resulting in a significant price increase. Nevertheless, after the situation resolved, demand decreased sharply, and prices dropped considerably. Many farmers lost confidence and stopped planting this herb. Furthermore, farmers cannot predict market demand for herbs, making it difficult to plan cultivation each year. Additionally, herb production depends heavily on weather and rainfall, which vary unpredictably from year to year. Moreover, the agricultural sector faces a labor shortage for planting and producing herbs. While men typically handle the main farming operations like rice, cassava, and rubber, most herb growers are middle-aged and elderly women.

Lastly, most farmers and entrepreneurs in this study indicated that they lacked the ability to manage risks, especially in an uncertain environment. Many of them did not have plans to manage risks related to cultivation, production, and business operations, which consequently affected herb production volumes and operational efficiency. One farmer expressed the opinion as follows:

“Most farmers do not plan their finances. We grow the same type of crops as we have always grown and take the risk of uncertain prices. If it is herbs, we mostly grow according to orders from hospitals. Some years, there are no orders and the herbs we grow cannot be sold, causing several farmers of us to stop growing herbs.” (F3)

All farmers in the study admitted that they did not have formal risk management strategies in place. Without such plans, they were unprepared to address unforeseen challenges. Addressing these gaps requires a focus on education, training, and the development of more robust risk management frameworks to ensure greater stability in production and operational processes.

2.2 Demand Condition

Most interviewees agreed that the demand for the herbal market has been growing since before COVID-19. Despite the situation returning to normal, herbs are still in demand in both domestic and international markets for health protection and maintenance. All traders in this study noted that the current demand for herbs, both fresh and dried, has increased, but the herbal production in Surin province was still insufficient to meet this demand. However, at the same time, new entrepreneurs have entered the market, selling various types of herbal products.

Nevertheless, entrepreneurs in this study articulated that their herbal products faced competition both within and outside the province as follows:

“In the market now, there are many herbal products, many manufacturers, so there is a lot of competition. My products that I sell are not only competing with products in Surin, but also with similar products from other places.” (E1)

Most of entrepreneurs in this study who produced, processed, and sold herbal products were aware of the competition in the herbal market. Though they realized the importance of producing products that could meet the needs of consumers, they viewed themselves as lacking modern marketing knowledge and skills to compete with competitors, particularly in the standards for growing herbs and producing herbal products. They viewed the certification process as having many steps and being difficult, expensive, and time-consuming, resulting in many herbal products not meeting market-standard requirements. The aforementioned problems occur with farmers who grow herbs as well. This issue was addressed by one of the key informants as follows:



“Government agencies want entrepreneurs to produce standard products, but the certification process is complicated and requires investment. Most small entrepreneurs are not ready and have the ability to do so.” (E2)

Additionally, many farmers have identified problems with unstable demand for different types of herbs each year. They added that market demand for different types of herbs varies unpredictably from year to year. This unpredictability affected their ability to confidently invest in and grow herbs for commercial purposes. As a result, many farmers in Surin province did not have the confidence to grow herbs for commercial sale because it was difficult for them to predict and plan for planting each type of herb in each production year.

2.3 Firm Strategy, Structure, and Rivalry Factor

All informants confirmed that setting up herbal business in the current context was more convenient and easier than in the past. This presented an opportunity for small entrepreneurs in Surin province to enter the herbal market and offer various herbal products to consumers. In the current business context, there are also many contract production services that provide various production services to assist entrepreneurs in manufacturing their own herbal products. These contractors produce herbal products, both in large and small quantities, according to customers' orders. This helps reduce production costs compared to in-house production and provides an alternative for entrepreneurs who want to have their own branded herbal products but do not want to invest in technology and production facilities, which incur high costs. Herbal products from such production include medicines, cosmeceuticals, and various types of skin care products. These products include both those that meet standards from the Food and Drug Administration and those that do not have certified standards. Additionally, many herbal products produced by entrepreneurs and introduced to the market are promoted by local authorities. This was supported by the key informant as follows:

“Developing herbs to meet market demand is easier. Entrepreneurs in Surin Province have various channels to produce products, both in the form of hiring manufacturers or requesting production promotion from government agencies. Some agencies also help entrepreneurs with marketing.” (A1)

Despite the fact that most provinces in Thailand, including Surin province, do not have a database of herbal producers, collectors, and farmers, the estimated numbers in descending order are as follows: farmers, small entrepreneurs producing or selling herbal products, herbal collectors, and herbal product contractors. There are fewer than 10 contract manufacturers producing herbal products in Surin province, particularly those who can apply for standard certification for their products. This is due to most farmers in Surin province are smallholder farmers who grow herbs in limited quantities and may not consistently supply manufacturers with high-quality raw materials. This inconsistent supply could make it difficult for manufacturers to produce at the scale and quality required for their customers. The key informant in this study pointed out that:

“There are still not many herbal factories in Surin Province compared to other provinces that promote herbs. Part of the reason is because there is a lack of connection between farmers and producers, resulting in insufficient raw materials for the factories' production.” (G5)

The same is true of herb collectors in Surin province, who are estimated to number no more than 20 and are distributed across various districts throughout the province. Therefore, it can be concluded that competition among herbal collectors and contract manufacturers of herbal products is not as intense compared to the competition



among small entrepreneurs selling herbal products. As for herbal farmers, although there are many of them, the herbal market also has a high demand for their produce. Thus, they need to produce according to the quantity, standards, and quality that the market demands.

2.4 Related and Supporting Industries

All interviewees mentioned that related and supporting industries encompassed a range of activities that contribute to and complement the cultivation, processing, and distribution of herbs and herbal products. These sectors include agricultural supplies, packaging enterprises, wholesale and distribution channels, retail establishments such as pharmacies and grocery stores, alternative medicine outlets, Thai massage parlors, and community tourism ventures. The herbal sector in Surin province could benefit from related industries such as tourism, spas, wellness, and traditional medicine. These industries not only create a demand for herbal products but also provide a platform to promote local herbal resources, and enhance market visibility. Moreover, cultural and wellness tourism have become the focus of tourism promotion for Surin province in Year 2024. Thus, these related industries could serve as both customers and promotional platforms for herbal producers in Surin. As mentioned by one key informant:

“Previously, our provincial public health office promoted Thai massage and the use of herbs. Now, we are promoting the integration of herbs with tourism in Surin province, focusing on health tourism to support the connection between each other.” (G8)

Further, according to the interview findings, numerous agricultural supply stores were operational across every district in Surin province, offering herbal seeds, farming equipment, and tools essential for herb cultivation. Additionally, packaging firms provide solutions to maintain the quality of herbal products during transit. Several wholesalers and distributors in Surin province are involved in transporting and supplying herbs and herbal products to retailers. These retailers, in turn, sell a diverse range of herbal products directly to consumers, both within and beyond the province.

Several interviewees also pointed out that herbal farmers have created networks among themselves that are mostly informal and loosely organized. Members are from the same or nearby areas or produce the same herbs. At the same time, some groups have formally come together in the form of community enterprises. The number of herbal groupings or networks has increased based on the members’ need to connect with the market, keep up with market changes, and obtain support and assistance from government agencies. Community enterprise key informant mentioned that:

“Our group is made up of members from the same village and sub-district, and from different sub-districts, but we are all doing the same thing with herbs. When we first started doing herbs, we formed an informal group. Later, we established a community enterprise group to receive support from government agencies in various areas.” (C2)

Nonetheless, most of these groups and networks are not very effective at helping each other. Moreover, many herbal growers and small-scale herbal entrepreneurs lacked access to existing networks despite their interest in becoming members. This situation was partly due to the lack of a central organization to coordinate building networks and connections with related industries and supporting herbs in Surin province. As a result, support in terms of knowledge and other necessary assistance in herbal development is limited to certain groups and networks.



2.5 Government

Informants from government agencies confirmed that the Thai government has made herbal development a significant priority on the country's agenda by declaring that the promotion and development of herbs align with the guidelines in the National Master Plan for Thai Herbal Development No. 1, Year 2017–2021. At present, the master plan has been updated to the National Herbal Action Plan, with the second plan implemented for 2023–2027. This plan is carried out through the work of relevant ministries, which forward policies to their respective command agencies at the provincial level. For example, the Ministry of Agriculture and Cooperatives has instructed the Surin Provincial Agriculture Office to promote the cultivation of medicinal herbs to increase their quantity. The Ministry of Public Health has assigned the Surin Provincial Public Health Office the task of developing standards for herbal products. Consequently, several local government agencies provide various advantages and support for farmers and businesses to promote and develop herbs in Surin province. As one government agency addressed this issue:

“The Ministry’s policy states that in 2024–25, local agencies will promote herbal development. Before that, agricultural promotion agencies had implemented several projects, but the groups we promoted may still be limited. However, local universities have helped expand the groups, areas, and herbal development activities.” (G2)

Nevertheless, the promotion of herbal development by government agencies has limitations in terms of budget and manpower. As a result, most operations are short-term projects or activities and do not cover the entire herbal production chain. This has also resulted in the promotion of herbs being limited to certain areas in Surin province. One of the government agencies stated that:

“Our agency’s herbal promotion project also follows the policy received from the ministry. We have meetings and discussions with other agencies, but in practice, we work separately according to the duties of our own agencies.” (G7)

Additionally, although many government agencies promote herbal medicine, such work is not seen as their primary duty. While government agencies may temporarily promote herbal medicine, the lack of continuous support and commitment results in slower progress and limited long-term impact. Hence, the promotion and development of herbs is only a special project that is done as assigned, not a mission that needs to be undertaken continuously.

Discussion

The herbal sector in Surin province comprises a diverse range of actors, each playing a distinct yet interconnected role. These include farmers who cultivate herbs for both household consumption and commercial purposes, herbal specialists, suppliers of essential inputs and services, processors who manufacture herbal products, and collectors and distributors. Additionally, retailers and wholesalers, experts in traditional and alternative medicine, herbal education providers, academic institutions, testing and research organizations, regulatory bodies, government agencies involved in herbal development, financial institutions, and consumers also play vital roles in the herbal value chain.



This study on the herbal sector in Surin province, conducted using the cluster concept and cluster mapping, identified six key components: 1) Core activities, which include production/cultivation, processing, and collection and distribution, 2) Supporting industries, which encompass agricultural input industries and agricultural services, 3) Related industries, consisting of the pharmaceutical industry, food and beverages, cosmeceuticals/cosmetics, traditional and alternative medicine, tourism, logistics/packaging, financial institutions, markets, and export agencies, 4) Government agencies, which include agricultural promotion agencies, public health agencies, and agencies promoting commercial production and marketing, 5) Local educational institutions, and 6) Organizations that support the herbal sector in Surin province. These findings align with the Department of Business Development (2024), which emphasized that herbal entrepreneurs, whether involved in cultivation, production, processing, or retail/wholesale, must rely on collaboration between the public and private sectors. Such collaboration is essential for sharing knowledge, adding value to raw materials, and fostering innovation that drives the industry forward in both domestic and international markets.

The analysis of the herbal sector in Surin province applying the diamond model provided important insights in 4 dimensions as follows;

Factor Conditions Dimension: Positive factors include the province's favorable soil conditions for herb cultivation. This finding is supported by the report from the Land Development Department, Ministry of Agriculture and Cooperatives (2021), which stated that the province's land and soil conditions had the potential for cultivating a variety of herbs. The soil is loose and well-draining, making it suitable for herbs that thrive in strong sunlight and high soil moisture. Additionally, entrepreneurs in Surin had easy access to herbal raw materials, farmers possessed experience and skills in the cultivation process, and the local population hold traditional knowledge about growing and utilizing herbs. Further, Surin province has a long history of using herbs for medicinal purposes, dating back to the ancient Khmer period. Historical evidence indicates the existence of several healing centers known as "Arokayasathan", where people were treated using herbal remedies. This wisdom has been passed down through generations and continues to the present day. This aligns with the Department of Business Development (2024), which states that of the 17,224 registered legal entities engaged in the herbal business in Thailand, the majority are small enterprises. Small businesses have significant opportunities in the herbal market, as they can transform inherited local knowledge into an industry that creates livelihoods. Thailand, with its wide variety of herbs that can be cultivated locally, enables producers to control and reduce production costs while diversifying into various products, providing a competitive market advantage.

In contrast, the obstructive factors included a lack of knowledge and understanding among most entrepreneurs regarding herbal product standards, as well as the use of basic, non-complex technologies, and the supply of herbal raw materials was inconsistent and sometimes insufficient, leading to price fluctuations. There was also a shortage of skilled labor in both the agricultural and production sectors, and small-scale farmers often faced challenges in accessing financial resources. This was supported by the International Labour Organization's report on working conditions and employment in Thailand's agricultural sector, which indicated a decrease in the number of workers in this field. Many Thai workers have shifted to higher-skilled professions, contributing to a labor shortage in the agricultural sector (Musikawong et al., 2021). Similarly, a report by Musikawong et al. (2021) highlighted a decline in agricultural workers, as many have transitioned to higher-skilled careers. Moreover, there was limited use of advanced technology and innovations in herb production. Essential agricultural technologies such as irrigation and harvesting systems were not widely adopted, and herb processing largely relied on basic technologies.



Advanced technologies that add value were primarily found in specific industries such as herbal medicine production and contract manufacturing. Furthermore, most farmers in Surin's herbal sector lacked comprehensive risk management capabilities in terms of production, pricing, marketing, and financial risks. This observation is supported by the Thailand Development Research Institute Foundation (2015), which noted that Thai farmers often have access to multiple loan sources, leading them to borrow more than their repayment capacity allows.

Market Demand Conditions: The positive factors in market demand conditions include the interest of entrepreneurs in processing and developing herbal products, the continuous expansion and growth of the herbal market, the increasing demand for herbal products both within and outside the province, and the rising number of herbal businesses in Surin province. This is supported by the Community Enterprise Promotion Division, Department of Agricultural Extension (n.d.), which reported the number of community enterprises in Surin province registered to produce herbs and spices: 174 groups in June 2021, 198 groups in June 2022, and 204 groups in June 2023. Additionally, the volume of local herbal trade for markets outside the province has also increased. This growth may reflect the rising demand for herbal products, encouraging entrepreneurs and community enterprises to identify business opportunities and introduce herbal products to meet market needs.

On the other hand, negative factors included a lack of diversity and innovation in marketing strategies. The certification process was complex, time-consuming, and required significant investment. Moreover, farmers often lacked confidence in market demand. These findings were supported by Kwankhao et al. (2020), who reported that despite over four decades of government policies promoting herbal medicine in public health, research, development, and human resources have been insufficient to effectively advance the sector. While product registration has increased, very few scientifically developed herbal medicine products have obtained licenses. Furthermore, Pirantaowad and Rojsurakitti (2017), who studied the sustainability of retail businesses for community herbal enterprises in Thailand, found that a majority of farmers faced challenges related to a lack of knowledge and skills in quality production, inadequate collaborative marketing management among farmers, the government, and businesses, and difficulties in the production and certification of many herbal products.

Related and Supporting Industries: Surin boasts a diverse range of supporting industries within the herbal sector, including agricultural production inputs, packaging, logistics, retail, and traditional Thai massage services. The province actively promotes community-based tourism, sports, and health initiatives, all of which can be connected to the use of herbal medicine. Moreover, Surin is home to hospitals that produce herbal medicines and educational institutions with extensive expertise and research in the field. Local farmers and entrepreneurs have also shown interest in forming herbal medicine networks. These findings are consistent with the 2019 Herbal City report, which revealed that Surin has 144 herbal product entrepreneurs, 15 herbal service providers, and 103 Thai traditional medicine practitioners across all districts (Department of Thai Traditional and Alternative Medicine, Ministry of Public Health, n.d.). In addition, Surin has consistently promoted community-based tourism, which has been identified as a key development priority in the Surin Provincial Development Plan for 2023–2027 (Surin Provincial Office, 2021).

In addition to the positive factors, several negative factors were identified, including limited access to herbal networks for farmers and entrepreneurs, a scarcity of supportive networks among related industries, the absence of a central coordinating organization, and a lack of knowledge and research support for farmers and entrepreneurs. These findings align with the research conducted by Wajirum and Inwang (2018), which emphasized the need for continuous knowledge development and the establishment of partnerships, networks, and memberships to foster



the growth of herbal product businesses. The study also revealed that community enterprises frequently encounter challenges due to poor management and inadequate collaboration.

Business Strategy, Structure, and Competition: The dimensions of strategy, structure, and business competition revealed several positive factors. They include the herbal sector encompasses a wide range of business types and sizes, and starting herbal business is relatively easy, as entrepreneurs are not required to handle every aspect themselves. Further, many businesses now offer contract manufacturing services based on customer orders. This flexibility allows for variations in product formats and production quantities to meet client needs. As a result, the cost of contract manufacturing has decreased compared to the past, providing a viable option for entrepreneurs who wish to establish their own herbal product brand without investing in production technology or manufacturing facilities.

Negative factors identified in this dimension included the lack of differentiation among most herbal products, limited development of creative competitive strategies, and intense business competition both within and outside the cluster. This finding was in line with Kerdpitak (2022), who reported that community enterprises in the herbal city of Northern Thailand face various challenges related to organizational performance. Competitive advantage was highlighted as a key factor directly influencing the performance of community enterprises in Thailand's herbal sector. Additionally, the Department of Business Development (2024) emphasized that Thai herbal entrepreneurs need to improve their marketing strategies and enhance essential business management knowledge. Building trade networks and partnerships is also crucial. Moreover, Wachirapanyapong (2018), in a study on strategies for developing the capacity of community herbal processing businesses in Lopburi Province to meet ASEAN Free Trade Agreement (AFTA) requirements, found that consumers had specific expectations for processed herbal products. These expectations included reliable product quality, value-added product development, product credibility, innovation, distribution, and marketing promotion. Furthermore, the ease with which herbal businesses could be established – whether by producing products in-house or through contract manufacturing – has led to a proliferation of herbal products and brands in the market. Consequently, competition has intensified not only among local entrepreneurs but also with those offering similar products from outside the province.

Government: In the past, the government sector of Surin Province has promoted the development of herbs in the province, especially the agricultural and public health sectors, by implementing various projects, most of which focus on activities of planting and processing herbs into community products. Government agencies in local and national levels provide various advantages and support for farmers and businesses to promote and develop herbs in Surin province. The study results are consistent with the Senate Monitoring and Processing Group, The Secretariat of the Senate (2023), which reported that the government, private sector, and educational institutions have continuously promoted herbs through mechanisms under the First National Herbal Action Plan 2017–2022 onwards. These findings are also in accordance with a previous study that found the government factor significantly affects business competitiveness and has a tremendous impact on promoting and supporting the industry (Smit, 2010; Jinachai et al., 2016). Government policies have a direct or indirect influence on the competitive landscape for businesses, potentially reducing external risks for economic activities. These policies and regulations impact all facets of the economic environment (Kharub & Sharma, 2017). Nevertheless, the promotion of herbal development by government agencies has limitations in terms of budget and manpower. As a result, most operations are short-term projects or activities and do not cover the entire herbal production chain.



Conclusion and Implications

This study focuses on the herbal cluster in Surin province, located in the northeastern region of Thailand, with the aim of identifying stakeholders in this cluster and assessing the applicability of the Porter diamond model framework to ascertain the advantages and disadvantages of this herbal cluster. Advantage factors include the presence of natural resources and traditional herbal knowledge, the expanding and growing herbal market in response to increasing consumer demand, the current business structure supporting herbal business development, Surin province's readiness to support the herbal sector, as well as numerous governmental and private organizations promoting herbal development. Conversely, Surin province faces several disadvantages in the operations of herbal clusters, including managing production factors from upstream to downstream (raw materials, manpower, and technology), developing products that meet market demands, refining business strategies to meet consumer demands for diversity and product quality, creating a well-integrated network system, and addressing the inconsistency in policies and promotions by governmental agencies. Therefore, urgent measures are necessary to enhance every aspect of Surin's herbal cluster's diamond model. This includes streamlining regulatory processes, implementing business strategies prioritizing product standards and quality, upgrading the skills and knowledge of farmers and entrepreneurs to align with market demands, and fortifying networks among herbal stakeholders. Meanwhile, local herbal entrepreneurs are recommended to participate in Surin herbal cluster through meetings or events. This engagement would help them to learn about cluster goals, network with key stakeholders, and gain exposure to industry trends.

The results of this research offer theoretical insights into the advancement of clusters at a provincial scale by placing an emphasis on integrating and collaborating with stakeholders to enhance various conditions, including factor conditions, demand conditions, related and supporting industries, firm strategy, structure, rivalry, and governmental support. This study recommends policy makers to take immediate actions in order to improve the conditions in areas where the herbal sector is disadvantaged, as identified by the diamond model, including integrating policies and promotions more consistently across government agencies. For businesses involve in Surin's herbal sector, we suggest them to develop better management strategies from upstream to downstream operations and create more integrated networks within the sector to effectively meet market demands and enhance overall competitiveness. Therefore, this study implies that while the herbal sector in Surin province has several advantages, such as natural resources, traditional knowledge, and market growth, the competitiveness of the sector could be significantly enhanced by addressing recommendations to help resolve obstacles identified in the diamond model analysis.

However, there are limitations to this study due to its focus specifically on one province. Future research comparing herbal clusters in other provinces with different contexts could further enrich our understanding of herbal industrial clusters as effective tools for local governments. Moreover, researching ways to build trust among stakeholders within clusters may also prove beneficial in the future.

Acknowledgments

This research was funded by the Thailand Science Research and Innovation, fiscal year 2023.



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