

SWOT Analysis of the Tropical Agriculture Industry: A Case Study of Areca Catechu Production

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Abstract. Combined with the current status of areca catechu industry development in Hainan Province, this study conducted a SWOT analysis, analyzing the strengths, weaknesses, opportunities, and threats in the industry. Based on this, several developmental suggestions were proposed for areca catechu cultivation, including but not limited to: increasing selection and cultivation management technology demonstration; enhancing scientific research support for the areca catechu industry; expediting the transformation and upgrading of areca catechu production; and delving deeper into the cultural connotation of the Areca catechu industry.

Keywords: SWOT analysis; Areca catechu; industry status; developmental strategy; Hainan Province.

1. Introduction

Areca catechu, a tropical plant belonging to the Arecaceae family, is native to Malaysia and has been introduced into Hainan for over 1,500 years. It is considered one of the most important medicinal plants, with its seeds, fruit peel, and flowers all serving as valuable sources of medicine. Areca catechu is primarily distributed in tropical regions such as Yunnan, Hainan, and Taiwan in China. Due to its strong resistance, wide adaptability, simple management, low planting costs, and high economic benefits, the areca catechu industry in Hainan Province has rapidly developed in recent years. It currently accounts for over 95% of the national planting area and production, making it the second largest tropical economic crop in Hainan Province, following only rubber. It has become one of the main pillars of the local economy[1][2]. In recent years, with the strong support of the Hainan provincial government and the active promotion of the agricultural sector, the areca catechu industry in Hainan Province is rapidly advancing towards environmentally-friendly, sustainable development.

2. Overview of Areca catechu Industry Development in Hainan Province

2.1 Areca nut planting

In recent years, driven by favorable policies and rising market prices, the level of deep processing of areca catechu and its consumption have continuously increased, leading to a rapid expansion of the areca catechu industry in Hainan Province. As of 2021, the total planting area for areca catechu in the province has reached a staggering 172,973 hectares, with a total yield of 276,194 tons of dried fruit. By contrast, the planting area for areca catechu in Hainan Province was only 43,123 hectares and the annual dried fruit production was a mere 55,039 tons in 2003. However, by 2012, the planting area had doubled, and the annual dried fruit production had surged to 202,757 tons. Since then, Areca catechu production and planting area in Hainan Province have continued to climb, and by 2019, the annual dried fruit production had already exceeded 280,000 tons (see Table 1). Over the past two decades, the planting area and production of areca catechu in Hainan Province have increased by four to five times, and the output value has surged from less than one billion yuan in 2003 to nearly 20 billion yuan in 2021, an increase of nearly 20 times. Areca catechu cultivation in Hainan has gradually become concentrated in advantageous regions,

mainly concentrated in 10 cities and counties, including Wenchang, Qionghai, Wanning, Tunchang, Qiongzong, Lingshui, Sanya, Ding'an, Baoting, and Ledong. More than 70% of the rural population is engaged in areca catechu cultivation, with planting areas accounting for over 91% of the entire province, while production yields account for more than 95% of the total[3]. The areca catechu industry has become an important pillar supporting local farmers to increase their income and become wealthy.

2.2 Areca nut processing

Currently, the areca catechu processing industry in Hainan Province is still in its initial stage, with basic drying and edible processing being the primary development focus. The deep processing industry has not yet developed, and over 90% of fresh areca catechu require initial processing and drying to produce dried fruit. Through deep processing, the value of areca catechu products can usually be increased by four to five times. Due to the backward development of areca catechu deep processing in Hainan Province, the total output value of the industry is less than half that of Hunan Province[4]. During the harvest season, many small home-based areca catechu processing plants in the major production areas of Qionghai, Wanning, Ding'an, Tunchang, and other locations begin processing fresh areca catechu, boiling and drying them to produce dried fruit. These products are then supplied to deep processing manufacturers in Hunan for further processing. In fact, over 99% of areca catechu from Hainan Province are supplied to Hunan's deep processing companies either in the form of fresh nuts or initial dried fruit. Eventually, Hainan has become a raw material supply base for Hunan's areca catechu deep processing companies.

Table 1 Distribution of areca catechu area and yields in Hainan

Year	Area / hm ²	Total Yield / t	Yield/ t·hm ⁻²
2003	43123	55039	3.2800
2004	46733	62700	3.3800
2005	47714	64337	3.1000
2006	53066	74800	3.2100
2007	60960	99623	1.7859
2008	62773	116511	1.8604
2009	65820	143557	1.9890
2010	69227	152105	1.9275
2011	79233	169162	1.7550
2012	88153	202757	1.7979
2013	91667	224712	1.8210
2014	94067	231014	1.7816
2015	98047	229200	1.6960
2016	99660	234200	1.6678
2017	102530	255114	3.4535
2018	109950	272203	3.4653
2019	115171	287043	3.4451
2020	124686	283278	3.2025
2021	172973	276194	3.1271

3. SWOT Analysis of areca catechu Industry in Hainan Province

3.1 Strengths

3.1.1 Prominent advantage in areca catechu producing area of Hainan

Areca catechu cultivation requires sufficient natural light and heat conditions, making suitable planting areas limited within China. It is not possible to scale up cultivation outside of Hainan. Hainan has a clear competitive advantage and development potential in terms of cultivation area

and production. Areca catechu varieties in Hainan have obvious advantages such as soft fiber texture, resistance to chewing, and high levels of alkaloids, making them popular among processing companies. This gives the areca catechu industry in Hainan a clear competitive advantage in terms of quality. At the same time, with the guidance of national policies such as the “Belt and Road” initiative and the construction of China’s free trade ports, the development of the areca catechu industry in Hainan has significant geographic advantages.

3.1.2 Further attention paid by the governmental department on the areca catechu industry development

Currently, in the province of Hainan, approximately 500,000 households - consisting of nearly 2.3 million farmers - are engaging in the cultivation of areca catechu. This is providing ample employment opportunities to local farmers, with close to 100,000 individuals involved in post-harvest processing, transportation, sales, and other related activities. Areca catechu has proven to be a vital source of income for agrarian communities in this region[5]. In recent times, the government has bestowed increasing significance on primary areca catechu processing activities. This has been evidenced since 2013 when Hainan Province initiated its green revitalization program for areca catechu drying. Subsequently, supporting regulatory frameworks have been instituted, which includes the Opinions on Strengthening Pollution Prevention and Control in the areca catechu Processing Industry and The Hainan Province areca catechu Industry Development Plan (2020-2030), among other measures. The objective behind these measures has been to encourage the adoption of eco-friendly technologies and equipment, enable the scaling and clustering of the areca catechu processing sector, and foster a healthy and sustainable evolution of the areca catechu cultivation industry.

3.1.3 Gradual prioritization of areca catechu deep processing industry in Hainan Province

Due to historical reasons, the Areca catechu industry chain in Hainan Province has developed a situation where planting occurs in Hainan and deep processing takes place in Hunan. According to surveys and statistics, there are currently 38 areca catechu primary processing enterprises and 7 deep processing enterprises in Hainan Province, with a large number of farmers and cooperatives engaged in primary processing. Meanwhile, there are 121 areca catechu processing enterprises in Hunan Province, with an annual output value exceeding 40 billion yuan. The total output value of the entire industry chain exceeds 70 billion yuan[6][7]. Presently, the consumer group for areca catechu products is expanding from Hunan to the entire country, and the number of betel nut consumers has surpassed 60 million. Market sales continue to increase at an annual rate of more than 20%. To reduce production costs and enhance competitiveness, it is an inevitable trend for betel nut deep processing enterprises to shift from Hunan to Hainan.

3.2 Weaknesses

3.2.1 Extensive cultivation management

The cultivation of areca catechu is known for its extensive reliance on natural and soil conditions, which often leads to inadequate attention from growers towards effective nutrient and water management. As a result, tree growth is impeded by an insufficiency in crucial nourishment[8], ultimately being responsible for diminished yields and a restricted harvesting lifecycle. Presently, the production of areca catechu seedlings in Hainan Province is largely left to spontaneous organization, lacking the benefits of strict market regulation and a comprehensive set of reference breeding techniques. Moreover, due to favorable market prices, it is not uncommon for farmers to engage in indiscriminate and expansive areca catechu cultivation practices, a tendency known for hampering the growth cycle and facilitating the widespread occurrence of pests and diseases.

3.2.2 Inadequate industrial cooperation mechanism

The entities engaged in areca catechu research and development in Hainan Province, including research institutions, universities, and enterprises, are divided among various departments, leading

to a lack of synergy and ineffective collaboration. Consequently, Hainan Province has yet to establish an effective and robust areca catechu industry technology system or alliance, with scattered research efforts and focus. This inability to maximize collaborative advantage along with less efficient communication between industry stakeholders hinders integration among production, research, education, promotion, and application efforts, hence making it challenging to generate significant technological breakthroughs that support the entire industry's growth and success.

3.2.3 Incomplete industrial chain

Currently, Areca catechu products are mainly processed into chewable goods. The production of derivative products from areca catechu in Hainan Province is still in its infancy, with the production of areca catechu polysaccharides and polyphenols (referred to as betel phenol) being the primary focus. As a food ingredient, betel phenol can be used to produce nearly 100 types of food, including drinks, candy, pastries, and liquor. To date, products such as areca catechu liquor, areca catechu coffee, and areca catechu chewing gum have emerged[9], but research and scale development in deep-processing of areca catechu lag behind, hampering the mining of areca catechu's medicinal value. Simultaneously, the marketing, logistics, and social service systems for the areca catechu industry are inadequate, significantly affecting the industry's growth and development.

3.2.4 Insufficient mining of industrial cultural connotation

Hainan Province boasts a rich heritage of areca catechu culture, with areca catechu serving as a unique carrier of local customs. However, the tourism and cultural aspects associated with the areca catechu industry in the Province are yet to be effectively explored. Presently, there are only a few tourism projects centered around areca catechu, such as the "areca catechu Valley Li and Miao Cultural Tourist Area", the "Areca Catechu River Cultural Tourist Area", and the "Wanning areca catechu Museum", among others. The much-talked-about "areca catechu harvesting" project, which has gained popularity both domestically and internationally, has not yet been realized in any tangible form, limiting its potential contribution to regional economic development.

3.3 Opportunities

3.3.1 Increasing importance from the government

Based on the current overall situation, Hainan Province "monopolizes" areca catechu material supplies, while Hunan Province "monopolizes" areca catechu consumption markets. Therefore, the government and enterprises in both regions should establish effective coordination mechanisms, regulate development sizes reasonably and follow market laws, balance the industrial interests of planting and processing, strive for win-win development between upstream and downstream, and ensure the sustainable and healthy growth of the entire areca catechu industry. Furthermore, the Hainan government is gradually attaching greater importance to the development of the areca catechu industry, which presents an opportunity for both the planting and deep processing of areca catechu in the Province.

3.3.2 Gradual increasing market demands

Areca catechu possesses numerous benefits, including energizing, aiding digestion, and enhancing skin health. In recent years, demand for areca catechu has significantly increased, and its consumption market has expanded correspondingly. The resulting scenario often witnesses supply falling short of demand, with only enterprises in Hunan Province purchasing areca catechu dried fruit in the past, and now the consumption market presents itself in 29 provinces and cities nation-wide, incapable of satisfying its own demands. Moreover, with increasing market demands, this presents Hainan Province's areca catechu industry with an opportune moment for growth and development.

3.4 Threats

3.4.1 Higher requirements for food safety by customers

As people's living standards improve and concerns over food safety heighten, particularly in light of recent food safety incidents, consumers of processed areca catechu products as a type of chewed food have begun to express increasingly stringent demands. This presents a significant challenge for researchers and producers in the areca catechu industry.

3.4.2 Serious occurrence of pests and diseases

In recent years, the expanding area affected by chlorosis poses a significant threat to Hainan Province's areca catechu industry. There is currently no effective method to eradicate this disease. According to a preliminary investigation, over ten thousand acres of areca catechu trees in Hainan Province have been affected by chlorosis, resulting in significant losses to the industry. This presents a major threat to the healthy development of the betel nut industry.

4. Suggestions on the Development of Areca catechu Industry in Hainan

4.1 Increasing the demonstration and popularization of breed selection, cultivation and management techniques

High-quality seeds are the foundation of agricultural development, and the areca catechu industry is no exception. At present, the primary cultivated varieties of areca catechu in China include Reyan 1, Binde 1, and Binde 2. It is strongly recommended that the competent and scientific research departments intensify their efforts in areca catechu seed breeding, develop comprehensive, top-quality seedling propagation systems, and cultivate superior, high-yield, and disease-resistant seedlings. Concurrently, it is paramount to initiate research and promote the application of biological and physical control measures, as well as scientific and rational water and fertilizer management practices, in an effort to respond to the specific challenges posed by areca catechu diseases and pests, including chlorosis. The establishment of standardized areca catechu planting demonstration parks in areas of optimal conditions also warrants consideration, to promote the dissemination of key health and efficient planting techniques.

4.2 Increasing support for scientific research in the areca catechu industry

To address the evident disparity between the scientific research level of Hainan's areca catechu industry and its production development, the relevant overseeing departments are strongly urged to strengthen scientific research support for the areca catechu industry. This requires a comprehensive integration of the human and equipment resources of various scientific research institutions and enterprises, culminating in the establishment of a state-of-the-art areca catechu scientific research and development innovation platform. This platform should possess an industry-based layout, focusing on addressing the critical issues encountered in the pre-production, production, and post-production stages of the areca catechu industry. Augmenting investment is also encouraged in the development of areca catechu food and medicinal products, among other relevant domains, to provide substantial scientific and technological support for the industry's expansion.

4.3 Accelerating the transformation and upgrading of areca catechu industry

To further regulate the areca catechu primary processing industry, it is advisable to actively guide primary processing towards the primary production region and establish integrated, modernized areca catechu industrial parks that include planting, primary processing, deep processing, product research and development, cultural tourism, warehousing, and logistics, all within the primary production area. This would create a areca catechu industry cluster, promote product standardization, enhance product quality, and reduce environmental pollution. Additionally, it is crucial to expand areca catechu's medicinal value, invest more in the research and development

of diversified areca catechu products, and focus on developing high-tech, high-value-added deep processed products, such as health supplements, drugs, and cosmetics. This strategy not only diversifies the product line but also stimulates the areca catechu market while mitigating the current risks of a single deep-processed product.

4.4 Digging deep into the cultural connotation of areca catechu industry

By thoroughly exploring the unique product features of Hainan areca catechu, developing specialized product quality standards and production technology standards, and enhancing the product's connotation, a well-known regional areca catechu brand can be established. Additionally, increasing the promotion and advertising of the brand can help to strengthen brand awareness and expand its renown. It is also essential to delve deeper into and protect areca catechu culture, leveraging the role of Hainan as an international tourism and consumption center. With a comprehensive understanding of the relationship between areca catechu culture and Hainan's economic and social development, efforts can be directed towards abstracting, refining, and integrating these elements into a multifaceted industry model that synthesizes multiple industries.

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