

The Role of SWOT in Business Analysis for Enhancing Competitive Advantage at The Kundasang Aquafarm

The Role of SWOT

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ABSTRACT

This research focuses on developing agribusiness strategies for aquaponic systems. This research aims to provide recommendations for business strategies that drive improved performance and business development. The aquaponic agribusiness at Kundasang Aquafarm allows for significant growth. A business strategy provides a long-term plan to manage resources comprehensively, while identifying opportunities that support future business success and achieve optimal levels of profitability. This research was conducted at Kundasang Aquafarm, Kota Kinabalu, which was purposively selected because the aquaponics activity has room for potential development and encourages greater growth. This study used quantitative and qualitative data sourced from primary and secondary data. Primary data was collected through surveys and direct observation by the researcher, while secondary data was obtained from institutional reports, journals, books, news articles, and other literature sources. An internal (IFE) and external (EFE) environmental analysis was conducted to identify factors that could affect business success. The results of this analysis were used in the Internal-External (IE) Matrix which resulted in three main strategies: Growth, Stability, and Reduction strategies. These strategies form the basis of Kundasang Aquafarm's agribusiness development.

Keywords: Aquaponic, Business, Strategic, SWOT

ABSTRAK

Penelitian ini berfokus pengembangan strategi agribisnis sistem akuaponik. Penelitian ini bertujuan memberikan rekomendasi strategi bisnis yang mendorong peningkatan kinerja dan pengembangan bisnis. Agribisnis akuaponik di Kundasang Aquafarm memungkinkan pertumbuhan yang signifikan. Strategi bisnis menyediakan rencana jangka panjang untuk mengelola sumber daya secara comprehensive, sekaligus mengidentifikasi peluang yang mendukung keberhasilan bisnis di masa depan dan mencapai tingkat profitabilitas yang optimal. Penelitian ini dilakukan di Kundasang Aquafarm, Kota Kinabalu, yang dipilih secara purposive karena kegiatan akuaponik terdapat ruang untuk pengembangan potensi dan mendorong pertumbuhan lebih besar. Penelitian ini menggunakan data kuantitatif dan kualitatif yang bersumber dari data primer dan sekunder. Data primer dikumpulkan melalui survei dan observasi langsung oleh peneliti, sedangkan data sekunder diperoleh dari laporan institusi, jurnal, buku,

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artikel berita, dan sumber pustaka lainnya. Analisis lingkungan internal (IFE) dan eksternal (EFE) dilakukan untuk mengidentifikasi faktor-faktor yang dapat mempengaruhi kesuksesan bisnis. Hasil analisis ini digunakan dalam Matriks Internal-Eksternal (IE) yang menghasilkan tiga strategi utama: Strategi Pertumbuhan, Stabilitas, dan Pengurangan. Strategi-strategi ini menjadi dasar pengembangan agribisnis Kundasang Aquafarm.

Kata kunci: Akuaponik, Bisnis, Strategi, SWOT

INTRODUCTION

Sabah, a Malaysian state on the island of Borneo, boasts rich natural, cultural, and historical resources that enhance its tourism and agricultural potential. Agriculture involves cultivating plants and raising animals for food, industrial raw materials, and other human needs. It encompasses processes like planting, fertilizing, irrigation, and distribution, often integrating technological advancements such as modern farming techniques and genetic engineering to boost productivity. Economically, agriculture is vital for income generation, employment, and trade, though its environmental impacts necessitate sustainable practices (Syofya, 2023). Despite its significance, agriculture's contribution to Malaysia's GDP in Q3 2024 was only 3.9%, ranking fifth after construction (19.9%), import duties (16.8%), manufacturing (5.6%), and services (5.2%) (Industry, 2019). This weak national contribution contrasts with Sabah's impressive role in the sector. In 2017, Sabah ranked as Malaysia's second-highest contributor to national agricultural output, highlighting its potential for agricultural excellence (Industry, 2019). These statistics emphasize Sabah's unique position in agriculture, despite the sector's limited overall impact on the national economy.

Agricultural activities include raising animals and cultivating crops. In 2019, Sabah's animal population comprised fish, 9,776 dairy cattle, 30,345 beef cattle, 15,470 buffaloes, 50,445 beef goats, 19,013 dairy goats, and 6,954 sheep (Industry, 2019). Fisheries in Sabah became the primary contributor to Malaysia's national agricultural sector in 2017 due to the minimal land required for their operations. Additionally, crop cultivation, including oil palm, rubber, lettuce, and melons, significantly contributes to Sabah's agricultural output. Oil palm and rubber, managed mostly by large plantations or companies, were the main contributors to Sabah becoming the second-largest contributor to Malaysia's agricultural sector in 2017 (Ng, 2016; Industry, 2019). In contrast, food crops like vegetables, fruits, and grains are generally handled by small-scale farmers (Yusof & Annuar, 2022). To enhance the agricultural sector's contribution to Malaysia's GDP, solutions must focus on increasing the efficiency and sustainability of both crop cultivation and animal husbandry. Aquaponics, a system integrating aquaculture and hydroponics, offers a promising approach (Maucieri et al., 2018). It circulates water between fish tanks and plant-growing media, reducing water use while enabling simultaneous harvesting of fish and crops (Ismail & Kiring, 2021). This method supports space-saving, environmentally friendly, and scalable agriculture.

Aquaponic system is one of the solutions to maximize the agricultural potential found in the region of Sabah as a state of Malaysia (Syamsia et al., 2024). Kundasang Aquafarm is an agro-tourism located in the capital city of Sabah, Kota Kinabalu. Kundasang Aquafarm is one of the successful objects in increasing agricultural potential with the aquaponics method. Kundasang Aquafarm has an area of 1500 m².

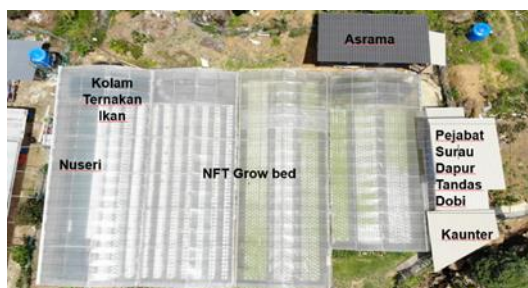


Figure 1. Kundasang Aquafarm Area

Based on Figure 1, in this area there are cultivated plants such as head lettuce, red lettuce, and bokor lettuce. There is also freshwater fish cultivation, but the fish cultivation area is only 10 m². This requires action to increase the effectiveness of the layout in the aquaponics method. Currently, the estimated vegetable harvest of Kundasang Aquafarm in a period of one month is 533 kilograms to 640 kilograms. Unlike the fish harvest produced by Kundasang Aquafarm, fish harvesting activities do not have fixed results in the current Kundasang Aquafarm aquaponics activities. The advantages generated by this system are that it can reduce costs in purchasing plant nutrients and can reduce the use of pesticides on plants. The process of implementing the aquaponics system is still relatively easy so that it can be carried out by various agricultural scales, and the assistive technology needed for the aquaponics system is easy to obtain.

Conventional farmers who have not understood science-based agriculture and effective management practices face difficulties to overcome. Today, agro ecosystems demand modernization, diversification, commercialization and promotion to create food crops to sustain the country and increase export potential. Managerial, technical, and innovative entrepreneurial skills applied in agribusiness are expected to yield positive results. This study aims to analyze the factors that influence agribusiness entrepreneurship at Kundasang Aquafarm. Specifically, it evaluates internal factors (strengths and weaknesses) and assesses external factors (opportunities and threats) relating to agribusiness entrepreneurship at the site. Another advantage is that it helps business people to make decisions when facing various obstacles or challenges, both from internal and external factors.

LITERATURE REVIEW

Aquaponics is a scientific farming system that merges aquaculture (cultivating fish or aquatic organisms) and hydroponics (plant cultivation without soil) into a mutually beneficial ecosystem. In this system, waste from aquaculture is processed by microbes into nutrients that plants absorb. Specifically, fish waste contains ammonia, which bacteria convert into nitrates, essential nutrients for plants. The plants absorb these nutrients while simultaneously purifying the water to return it to the fish pond, ensuring an efficient nutrient distribution cycle. Aquaponics is environmentally friendly, as it eliminates the need for chemical fertilizers and pesticides, making it cost-effective and resource-efficient. It is also adaptable to small spaces and can be implemented vertically, allowing simultaneous harvesting of fish and fresh vegetables. The aquaculture part includes a pond for fish farming, an aeration system that enhances water-oxygen interactions, a mechanical filtration system that removes solid waste (dust, feed residue), and a bio filter with nitrifying microorganisms to convert ammonia into nitrates beneficial for plants. The hydroponic system includes growing media structures, pipes for distributing water from the fish media, and water pumps that circulate water throughout the system. This integration maximizes productivity and sustainability in farming operations (Weidner et al., 2019).

In the current agribusiness landscape, the ease of obtaining information significantly impacts competitiveness. To remain competitive, businesses must adapt to changing

circumstances. According to Shaw (2012), strategy is a tool to achieve organizational goals. Strategic management involves forming and managing concepts while considering various factors to positively impact the organization in the long term (Rachma et al., 2024). According to Gandhi et al. (2024), companies must integrate management, marketing, R&D, production, and information systems into their strategies to achieve business goals. Strategic planning is crucial for aligning an organization's vision and mission while making informed decisions in competitive markets (Pertiwi, 2023). According to Pahlevi & Musa (2023), strategic management consists of three stages: strategy formulation, implementation, and evaluation. In strategy formulation, companies assess their vision and mission, conduct a SWOT analysis, set long-term goals, and create and select appropriate strategies. During strategy implementation, policies are established, short-term targets are set, and budgets and resources are allocated. The evaluation stage assesses the success of the strategic plan through internal and external environmental analysis (Ivančić et al., 2017). According to David (2011), the process for corporate strategy management, highlights the systematic development and implementation of strategic initiatives to drive business growth and sustainability. There is a process that explains the flow of creating corporate strategy management in Figure 2:

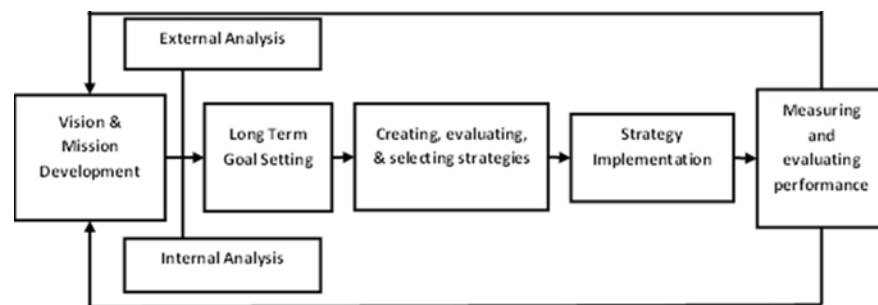


Figure 2. Corporate Strategy Management Process

SWOT (Strengths, Weaknesses, Opportunities, Threats) is a strategic analysis concept that is useful for providing insight into the internal and external position of an organization or business (Rachma et al., 2024). SWOT analysis can also be used as a tool for an organization to evaluate their position in the market (Rozmi et al., 2018). Strengths include internal factors that provide comparative advantage, such as capabilities, good reputation, and resources. Weaknesses come from internal factors that can be a challenge in achieving the vision, mission and goals, covering all activities that are considered less effective and efficient. Other factors such as Opportunities refer to external conditions that need to be utilized for profitability, opportunities come whenever there are changes by doing research and utilizing opportunities will have an impact on integrated results. Meanwhile, threats are external factors that have the potential to have a negative impact, such as intense competition, economic changes, or environmental risks. SWOT analysis can make it easier for organizations to identify all these aspects, so as to design strategies that maximize strengths and opportunities while minimizing weaknesses and threats. This method is also often used in strategic decision-making because it provides a focused view for long-term planning. SWOT is thus a simple yet effective approach to understanding the strengths, weaknesses, opportunities, and threats from the internal and external environment that affect the success of an organization.

Research conducted Yanes et al. (2020), aquaponics is an agricultural concept that is precise, effective, efficient, and environmentally friendly. With a simple concept and no special technology required, aquaponics can increase the productivity of the agricultural sector. This will increase the profitability and contribution of the agricultural sector to national GDP. Therefore, the concept of aquaponics needs to be discussed to provide

insight to agribusiness players so that they can develop their business. The knowledge gained by agribusiness actors will result in a better impact.

METHODS

This study was conducted at Kundasang Aquafarm in Kota Kinabalu, Sabah, Malaysia, chosen due to its ongoing aquaponics activities and development potential. The research utilized both quantitative and qualitative data, sourced from primary and secondary information (Sugiyono, 2013). Primary data was gathered through surveys, observations, and interviews with the aquafarm manager to explore internal and external factors influencing the farm's agribusiness. Secondary data was collected from existing sources like institutional reports, journals, books, news articles, and other scientific works. The development strategy at Kundasang Aquafarm begins with an internal (IFE) and external (EFE) environmental analysis to identify internal and external factors impacting business success. The analysis results were categorized into an Internal-External (IE) Matrix with eleven cells. The primary strategies identified include the Growth Strategy (Cells I, II, VIII, IX, X), Stability Strategy (Cells III, IV, VII, V), and Retrenchment Strategy (Cells VI, XI). The company can choose among four strategic approaches based on its SWOT quadrant position: SO (strength - opportunity), ST (strength - threat), WO (weakness - opportunity), and WT (weakness - threat). The research outcomes include publishing scientific articles as a required output and presenting findings at scientific meetings as an additional contribution.

RESULTS AND DISCUSSION

Two main factors include internal factors and external factors to identify the potential of a business (Dragnić, 2014). Strengths and weaknesses are internal factors to identify Kundasang Aquafarm agribusiness. Kundasang Aquafarm is located at the foot of Mount Kinabalu, the area is at an altitude of 1900 MASL. The geographical conditions of the area are ideal for conducting agribusiness activities. The process of implementing an aquaponic system is not so difficult to do, and the process of combining aquaculture activities with hydroponics requires the help of easy-to-find technology to facilitate the distribution of water from the fish pond to the plants until it returns to the fish pond. The aquaponic system can be implemented in a small area and can be done vertically. The challenge that arises in aquaponic farming is the decline in the quality of plants and fish caused by extreme weather that can damage the greenhouse structure, which generally uses plastic materials. The structure of the plastic building will be damaged when it is attacked by strong winds so that it can damage the plastic as the main protection and when rainwater enters it will hit the plants directly and rainwater will be mixed into the fish pond. This will reduce water quality, to overcome this, technology is needed that can monitor water quality. Monitoring water quality and insect threats is needed regularly until harvest time, which can be done once a month. Harvest time can provide simultaneous results from crop and fishery harvests.

Organic waste generated from damaged plants due to decreased water quality can be processed into organic fertilizer. According to Siregar (2023), organic fertilizers have several advantages such as reducing the risk of environmental pollution, increasing soil fertility, and increasing the sustainability of the agricultural system. Kundasang Aquafarm's agribusiness activity process is relatively natural. This natural process results in the excellence of the products produced. By using the aquaponic method, the plant cultivation process does not require chemicals. The supply of nutrients needed by plants can be fulfilled by the flow of water coming from the fish pond, the water contains nitrates as plant nutrients. Plants that have absorbed nitrates produce good water to be returned to the fish pond. Kundasang Aquafarm always strives to provide a natural process to its agribusiness activities and also agribusiness activities are carried out according to Malaysian agricultural regulations. The advantages produced by Kundasang Aquafarm have resulted in a good reputation and have been recognized nationally and internationally. In addition to the advantages, there are internal factors

(weaknesses) of Kundasang Aquafarm's agribusiness activities, namely the need for improvement in manpower. Manpower in business activities is an important factor because it can affect many aspects that are directly related to operational success and the achievement of business vision, mission and goals. There are four factors that are indicators of Manpower quality, namely: (a) flexibility (b) individual competence (c) organizational competence (d) individual capacity (Ozioma et al., 2017). In order for the resulting performance to be at the maximum, employees need to get competency development, so that workers have individual and group competency levels in the same position.

When the competence of workers is not at the maximum level, it will have an impact on the lack of innovation in the work environment. Lack of innovation can affect business operations, by not utilizing existing technology the manual work process will take a lot of time and the level of human error is very likely to occur. So that business activities run effectively and efficiently, it is necessary to increase employee manpower so that they can conduct joint evaluations related to the needs needed in achieving organizational goals. The use of precision farming technology can enable better monitoring and management of crop conditions, by using sensors and online connected devices farmers can monitor parameters in real time (Hasibuan, 2023).

External identification in the Kundasang Aquafarm Kota Kinabalu business consists of opportunities and threats. Agribusiness using the aquaponics method in Kinabalu has great potential due to geographical conditions that are very supportive of agricultural activities. These conditions can support positive demand for organic products. Although organic products have a higher price than fast food. However, there are consumers who are willing to pay higher costs for organic products because the majority of consumers may realize that their purchasing decisions can have a direct impact on many ecological problems (Biswas & Roy, 2015). This statement is evident in previous research which states, Malaysian consumers are willing to pay a higher price to use environmentally friendly products (Suki & Mohd Suki, 2015). Thus, the study provides a view that the level of consumer awareness in choosing the consumption of organic products has begun to form. There are consumers who are very selective in food selection without regard to price but the positive impact they expect. However, as the agribusiness sector develops and there is a consumer saturation point factor. Businesses need to improve competitiveness and maintain customer loyalty.

Product diversification is a business strategy to survive the many changes and competition. Product diversification can be done by innovating existing products and expanding the variety of products produced (Syafi'i et al., 2023). Diversifying products will be very possible for Kundasang Aquafarm, which uses the aquaponics method in their agribusiness. The aquaponic method that combines vegetable cultivation and fish rearing can produce various types of products. The vegetables and types of fish produced can be adjusted according to market demand, which has a saturation level of the same product. Thus, Kundasang Aquafarm can maximize market share and consumer segmentation. This can help minimize the risk of dependence on one particular product or market, so that in the event of shrinking demand or changing trends, the business remains flexible and ready to make changes. In addition, diversification allows Kundasang Aquafarm to utilize existing resources more optimally, such as infrastructure, technology, or distribution channels. Product innovation mechanisms can stimulate team creativity and adaptability, so that Kundasang Aquafarm's agribusiness activities remain relevant in the midst of competition. Product diversification efforts will open up potential product distribution channels. Distribution channel is one of the elements of the marketing mix which has a very important role in marketing from producers to consumers, which is one of the goals of a business (Firnando et al., 2021). In the current era of digitalization, there are various media in marketing products that are easily accessible to consumers, starting from local restaurants, local supermarkets, to multi-national e-commerce. This will provide an opportunity for a business to expand the scale of target consumers. The wide market

reach of the products we offer provides an opportunity to increase business profitability and increase capital as Kundasang Aquafarm's capital in expanding and innovating.

Although businesses offer growth opportunities, they face several challenges in maximizing these opportunities. Fluctuating economic conditions and regulations that are not aligned with business strategies pose significant risks, especially for companies that are not prepared to adapt. Regulatory changes often disrupt ongoing strategic planning, making it difficult to make strategic decisions to maintain business operations. These changes increase competition, as businesses must innovate and adapt to survive. Failure to do so can result in decreased customer trust. Climate change also presents significant constraints, as it changes temperatures and weather patterns over time, which threatens the sustainability of agriculture (Ainurrohmah & Sudarti, 2022). Because climate change is difficult to accurately analyze, technology is needed to forecast climate patterns and protect agricultural assets from extreme weather. Aquaponic systems, which combine aquaculture and hydroponics, also present a dual challenge. Fish pests and diseases pose significant threats in these systems, as they can compromise the productivity of core products. Sick fish produce waste that fails to support plant growth, leading to overall decreased productivity. Parasites, fungi, bacteria, and pests such as insects and snails can spread rapidly, especially in closed water circulation systems, further impairing plant productivity and water filtration efficiency. The SWOT analysis, through the IE matrix, addresses these challenges in four quadrants: SO (Strengths-Opportunities), WO (Weaknesses-Opportunities), ST (Strengths-Threats), and WT (Weaknesses-Threats) strategies which are then listed in Table 1.

Table 1. SWOT Matrix

Internal Factors	Strength-S	Weakness-W
	Strategic Object Location	Manpower Shortage
External Factors	Easy and Efficient System	Lack Use of Technology
	High Product Quality	
	Good Reputation	
Opportunity	SO Strategy	WO Strategy
Demand in Organic Products is Very High	Increasing Vegetable and Fish Cultivation Capacity (I)	Individual and Organizational Competency Development (VIII)
Product Diversification	Innovation on Existing Products and Expanding Product Range (II)	Conducting Research on Relevant Technologies (IX)
Partnership with Local Restaurants and Supermarkets	Providing Quality Products and Maintaining a Good Reputation (III)	
Treat	ST Strategy	WT Strategy
Adverse Changes in Economic and Regulatory Conditions	Maintaining Product Quality and Consumer Trust (IV)	Formulate existing problems (X) (X)
Extreme Climate Change	Green House Reconstruction by Adapting to Climate (V)	Conducting Scientific Strategic Analysis in Decision Making (XI)
Plant Pests	Using Organic Pesticides (VI)	
Fish Disease	Periodic Water Quality Control (VII)	

Efforts to maximize opportunities are by utilizing internal potential. The strategy implemented is to increase the productivity of the Kundasang Aquafarm Kinabalu, Sabah agribusiness. Currently, the Kundasang Aquafarm agribusiness area is 1500 m² which can be maximized by having 3200 planting media and 10 m² of freshwater fish cultivation media. Kundasang Aquafarm can obtain results from the area of 533 kg - 640 kg for one harvest in one month and for fishery results are not yet at their best potential. Although the area is limited, the aquaponic system can be done vertically, this is a potential that can be maximized to increase the productivity of Kundasang Aquafarm. In addition, there are many layout references to change the concept of the aquaponic system that allows the harvest of vegetables and fish to have the same weight. However, to increase production, Kundasang Aquafarm managers need to prepare a technology system, equipment, and supplies for fish and plant cultivation, as well as water and

electricity sources for Kundasang Aquafarm operations. The addition of technology, equipment and supplies can be financed through business profits or by applying for collaboration from investors or even the government (Li et al., 2021).

The aquaponic system has been proven to produce simultaneous harvests of vegetables and fish (Fernández-Cabanáset al., 2022). This potential can support efforts to diversify products that are tailored to consumer demand. Simultaneous results in Kundasang Aquafarm's agribusiness activities can produce double profitability. This can affect the process of expanding market share. In addition, the flexibility of the products produced allows Kundasang Aquafarm to always be relevant to changes that occur. The aquaponic method applied by Kundasang Aquafarm provides advantages in reducing the use of chemicals in their agribusiness activities. So that the organic products obtained are not contaminated with chemicals and have the best quality. Kundasang Aquafarm has tried to provide the best results in its field and has a good reputation for Kundasang Aquafarm. This reputation can be capital for Kundasang Aquafarm in increasing the value of their business.

Strengths-Threats strategy is used to overcome threats that come with the internal strength of the organization. The threat of unfavorable economic conditions and regulatory changes can occur in an unpredictable time (Al-Thaqeb et al., 2022). Therefore, in overcoming these threats, Kundasang Aquafarm needs to maintain product quality and customer loyalty to their agribusiness. These factors can help Kundasang Aquafarm compete when there are adverse economic and regulatory changes. In maintaining the quality of the products produced, Kundasang Aquafarm needs to consider threats from nature. Currently, the natural threat that often occurs is strong winds that cause damage to the Kundasang Aquafarm greenhouse. The construction of the Kundasang Aquafarm greenhouse mostly uses plastic so it is prone to damage when hit by the wind. To overcome this, Kundasang Aquafarm needs to conduct research related to the construction of a greenhouse that can protect the building from strong winds while still considering access to sunlight for plants and fish. The threat of pests to vegetables can significantly affect the harvest. Pests can cause damage to plants and allow pests to carry bacteria that can worsen the condition of the plants. In conventional agriculture, farmers use pesticides to overcome this. However, scientific agriculture currently has many studies that suggest using organic pesticides that are more environmentally friendly and maintain the quality of vegetables against chemical contamination. The fisheries sector in the Kundasang Aquafarm aquaponic system has threats that can attack fish such as bacterial, viral, and parasitic infections. Water quality needs to be monitored regularly, the use of technology is necessary so that monitoring activities can be carried out automatically and produce historical data that is useful for making improvements and developments.

Weaknesses-Threats strategy is useful in minimizing weaknesses and trying to avoid external threats (Genc et al., 2018). The strategy that can be applied is to formulate the problems faced and conduct a scientific strategic analysis in decision making. This strategy involves collecting appropriate data, SWOT analysis (Strengths, Weaknesses, Opportunities, Threats), and scenario modeling to project the impact of each possible decision. Thus, decision making will be more focused, rational, and can minimize unwanted risks. In addition, decisions taken through this scientific approach are expected to increase effectiveness and efficiency in achieving long-term goals, as well as provide more sustainable solutions and have a positive impact on all parties involved.

CONCLUSION

There are two internal factors of Kundasang Aquafarm agribusiness consisting of Strengths and Weaknesses. The elements of strength in aquaponic cultivation in Kundasang Aquafarm include strategic object locations, easy and efficient cultivation concepts, producing high-quality products, and a good reputation. While the elements of weakness consist of lack of manpower and minimal use of technology in Kundasang Aquafarm activities. External factors that affect agribusiness in Kundasang Aquafarm

consist of opportunities and threats. The opportunities include very high purchasing power for organic products, being able to diversify products, and having the potential to partner with local restaurants and supermarkets. In addition, the threats faced are changes in economic conditions and adverse regulations, extreme climate change, plant pests, and fish diseases. Some suggested alternative strategies include maintaining product quality and consumer trust, reconstructing greenhouses by adjusting the climate, making organic pesticides, periodically controlling water quality using technology, formulating the problems faced, and conducting scientific strategic analysis in decision making to conduct research and development.

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