



Hydroponic Business Development Strategy In Ambon City

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ABSTRACT

This study aims to analyze the development of hydroponic businesses and formulate development strategies in Baguala District, Ambon City. The research method used was a case study with a qualitative descriptive approach supported by quantitative data. Data collection was conducted through interviews, observation, documentation, and Focus Group Discussions (FGDs) with hydroponic business owners and relevant stakeholders. Data analysis used the SWOT method, supported by the IFAS and EFAS Matrices, to identify internal and external business factors. The results indicate that internally, hydroponic businesses have strengths such as hygienic products, affordable prices, availability of production facilities, and the experience of business owners. However, weaknesses include limited technical training, minimal external support, low utilization of digital marketing, and the absence of formal collaborations. Externally, the business has significant opportunities, such as increasing market demand, potential distribution expansion, and public awareness of healthy products. However, it also faces threats such as extreme weather, electricity dependency, and a lack of business regeneration. The SWOT analysis results indicate that the business is relatively balanced between strengths, weaknesses, opportunities, and threats. Recommended development strategies include optimizing strengths to capitalize on market opportunities, increasing capacity through training and marketing digitalization, strengthening business institutions, and developing more targeted and sustainable development strategies

INTRODUCTION

Hydroponics is a method of cultivating plants without soil, utilizing nutrient solutions as a source of nutrients for plants. Rockwool is a commonly used growing medium due to its ability to retain large amounts of water and air (oxygen), thus supporting optimal root growth and nutrient absorption (Susilawati, 2019). The success of hydroponic cultivation is influenced by various factors, including light intensity, air and solution temperature, humidity, nutrient solution pH, and dissolved oxygen content in the growing medium (Susilowati et al., 2020). Proper management of these factors is crucial for optimal plant growth (Ariani et al., 2021).

In recent years, demand for hydroponic vegetables in Indonesia has increased significantly, particularly since the COVID-19 pandemic, along with increasing public awareness of consuming healthy, pesticide-free food. Commonly cultivated vegetables include mustard greens, spinach, lettuce, bok choy, kale, and celery, most of which are marketed to modern markets and hotels, including in Ambon City (Suyono et al., 2023)

LITERATURE REVIEW

Hydroponics

Hydroponics comes from the Greek words hydro, meaning water, and ponos, meaning cultivation or cultivation. Hydroponics is also known as soilless culture, or growing plants without soil, using other media such as sand, gravel, water, and other materials. Growing plants hydroponically offers advantages, including higher-quality plants, better plant control, and reduced pest and disease attacks (Sanubary et al., 2021).

Plant needs can be adjusted by administering nutrient solutions more effectively and efficiently, and it's more manageable because it's not dependent on the season or limited space. Generally, hydroponic nutrients use nutrients A and B, or a mixture of nutrients A and B. These nutrients are available at specialty hydroponic stores. Nutrient A contains potassium nitrate, FeEDTA, and Fe, calcium aminonium nitrate. Nutrient B contains ammonium sulfate, manganese sulfate, potassium dihydrosulfate, magnesium sulfate, zinc sulfate, copper sulfate, ammonium molybdenum, and boric acid (Kusumo, B., & Azis, N. 2021).

Hydroponic System

In principle, a hydroponic system consists of three main aspects. First, the provision of nutrient solutions according to plant needs for optimal growth. Second, regulating aeration to ensure roots continue to receive oxygen. Third, the use of a sterile, lightweight growing medium to support the roots, capable of retaining water and air in a balanced manner.

METHODS

This research uses a case study method with a qualitative descriptive approach supported by quantitative data. The case study method is used to provide an in-depth description of the condition of the hydroponic business based on the specific characteristics of the research object (Nazir, 2011). The research was conducted in Baguala District, Ambon City, by selecting three

active hydroponic business units as research objects. The location selection was done intentionally considering that Baguala District is the center of hydroponic development with the largest production capacity in Ambon City. The sampling technique used purposive sampling, namely the deliberate selection of respondents based on certain criteria, such as the length of business, production capacity, and involvement in marketing. The number of respondents was three hydroponic business actors who were considered to have relevant experience and knowledge. In addition, information collection was also carried out through Focus Group Discussions (FGDs) to obtain more comprehensive data. The data used in this study consisted of: Primary data, obtained through in-depth interviews, direct observation, and documentation, secondary data, obtained from related agencies, research reports, and relevant scientific literature.

Data analysis was conducted using qualitative and quantitative descriptive approaches with the help of SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. This analysis is used to identify the internal and external conditions of the hydroponic business and formulate appropriate development strategies. The SWOT analysis is supported by the IFAS (Internal Factors Analysis Summary) and EFAS (External Factors Analysis Summary) matrices. IFAS is used to evaluate internal factors in the form of strengths and weaknesses, while EFAS is used to analyze external factors in the form of opportunities and threats. Each factor is given a weight (0.0–1.0) according to its level of importance and a rating (1–4) based on the level of business response. The score is obtained by multiplying the weight and rating. The total IFAS and EFAS scores are used to determine the strategic position of the business and as a basis for formulating a hydroponic development strategy.

RESULTS

This research was conducted in the Teluk Ambon Baguala District, Ambon City, Maluku Province. This district is geographically located in the eastern part of Ambon Island and borders Leihitu District (Central Maluku Regency) to the north, South Leitimur District and Sirimau District to the south, Salahutu District to the east, and Teluk Ambon and Sirimau Districts to the west. Data collection was conducted in three residential areas within the administrative area of Baguala District: Passo Larier, Latta Village, and Passo Indah. These three locations were selected because they possess social and geographical characteristics relevant to the research focus.

Respondent Characteristics

All respondents in this study were male (100%), with an age range of 44–54 years, which is considered productive age. Respondents' educational backgrounds varied from high school to master's degree, indicating heterogeneity in human resource capacity in managing hydroponic businesses. The length of business experience ranged from 3 to 10 years, indicating a sufficient level of experience in running a business.

Characteristics of FGD Respondents

This study also involved a Focus Group Discussion (FGD) with participants from three agencies that play a strategic role in hydroponic business development in Ambon City: the Hydroponic Observer Agency, the Village/Sub-district Government, and the Ambon City Trade and Industry Office. It should be clarified that this FGD was conducted using an online questionnaire completed by one representative from each agency. Therefore, the total number of participants was three.

Table 1. Results of the Focus Group Discussion (FGD)

| Internal Factors | (Strengths) | (Weaknesses) |
|------------------|--|--|
| | <ol style="list-style-type: none"> 1. Hydroponic products are considered hygienic and healthier. 2. Product prices are relatively affordable for consumers. 3. The production facilities (greenhouses) owned by the producers are adequate. 4. Most producers have 3–10 years of business experience. | <ol style="list-style-type: none"> 1. . There is no ongoing training or technical assistance. 2. The actors have never received assistance from the government, NGOs, or universities. 3. Marketing has not utilized online media to its full potential. 4. There is no formal collaboration between hydroponic actors |
| External Factors | (Opportunities) | (Threats) |
| | <ol style="list-style-type: none"> 1. . Market demand from hotels, supermarkets, and restaurants is quite high. 2. There is potential for distribution to markets outside Ambon. 3. There is interest in establishing cooperatives or business forums. 4. The market share for healthy products continues to grow. | <ol style="list-style-type: none"> 1. Extreme weather and strong winds can disrupt crops. 2. Dependence on electricity supply for production. 3. Minimal regeneration of business actors (few young entrepreneurs). 4. Some entrepreneurs lack long-term expansion plans. |

a. Strengths

Hydroponic businesses have several key advantages, including hygienic and relatively healthier products due to the use of soil-free nutrient water media, thus lowering the risk of contamination. Furthermore, product prices are relatively affordable due to the efficient use of resources in hydroponic systems. The availability of production facilities, such as greenhouses, also supports

production stability and yield quality. Furthermore, entrepreneurs' experience, ranging from 3 to 10 years, provides important capital for technical management and business decision-making.

b. Weaknesses

The main weakness lies in the lack of ongoing training and technical assistance, resulting in underdevelopment of entrepreneurs' capacities. Furthermore, the lack of support from the government, institutions, and universities limits access to technology and financing. The use of digital media in marketing is also still low, resulting in limited market reach. Furthermore, the lack of formal collaboration between entrepreneurs hinders the strengthening of networks and bargaining positions in the market.

c. Opportunities

Hydroponic businesses offer significant opportunities due to the increasing demand from hotels, restaurants, and supermarkets, which require high-quality, hygienic products. Furthermore, there is potential for market expansion outside the region, as well as the formation of cooperatives or business forums to strengthen institutions. The increasing public awareness of healthy food consumption is also a driving factor in the growth of demand for hydroponic products.

d. Threats

The main threats come from environmental factors, such as extreme weather and strong winds, which can disrupt production. Dependence on electricity supply also poses a risk to the sustainability of hydroponic systems. Furthermore, the low interest of the younger generation in the agricultural sector has the potential to hinder the regeneration of business actors. The lack of long-term development planning among some business actors also poses a barrier to maintaining business sustainability and competitiveness.

SWOT Analysis in Baguala District, Ambon City

The questionnaire results indicated that hydroponic farmers generally have considerable experience and have marketed their products to various segments, such as restaurants, supermarkets, and hotels. However, most respondents have not utilized digital technology for marketing, have not received technical training, and have not received support from the government or other institutions. Furthermore, weather and electricity supply were cited as constraints in the production process.

Table 2. Internal SWOT Analysis

| Strengths | Weaknesses |
|---|---|
| Affordable product prices | No training or technical assistance |
| Hygienic products and in demand in the market | Never received assistance from the government/NGOs/universities |
| Sufficient production facilities (greenhouse) | Not utilizing online media for marketing |
| Manufacturers have considerable experience (3-10 years) | No formal collaboration between hydroponic practitioners (majority) |

Source: Primary Data After Processing, 2025

Table 3. External SWOT Analysis

| Opportunities | Threats |
|---|--|
| Market demand from hotels, supermarkets, and restaurants | Extreme weather and winds that disrupt crops |
| Potential for expanding distribution to markets outside Ambon | Dependence on electricity supply |
| Interest in establishing cooperatives or business forums | No regeneration of actors (minimal number of young actors) |
| Healthy market share continues to grow | No long-term expansion thinking among some actors |

Source: Primary Data After Processing, 2025

Hydroponic businesses in Baguala District have several internal strengths that are sufficient to support business development and From the external side, there are quite large opportunities to develop the business.

DISCUSSION

SWOT Indicators Based on Level of Importance and Weight

Tabel 4. Strength Factors

| No | Strength Factor | Weight | Rating | Score (Weight × Rating) |
|------------------------|--|--------|--------|-------------------------------|
| 1 | Affordable product prices | 0.30 | 4 | 1.20 |
| 2 | Hygienic products that are in demand in the market | 0.25 | 4 | 1.00 |
| 3 | Sufficient production facilities (greenhouses) | 0.25 | 3 | 0.75 |
| 4 | Long experience (3 to 10 years) | 0.20 | 3 | 0.60 |
| <i>Total Strengths</i> | | 1.00 | | 3.55 |

Source: Primary Data After Processing, 2025

Tabel 5. Weakness Factors

| No | Weakness Factors | Weight | Rating | Score (Weight × Rating) |
|-------------------------|---|--------|--------|-------------------------------|
| 1 | No training or technical assistance | 0.35 | 4 | 1.40 |
| 2 | Never received assistance from the government/NGOs/universities | 0.25 | 3.5 | 0.88 |
| 3 | Not utilizing online media for marketing | 0.20 | 3 | 0.60 |
| 4 | No formal collaboration between hydroponic practitioners | 0.20 | 3 | 0.60 |
| <i>Total Weaknesses</i> | | 1.00 | | 3.48 |

Source: Primary Data After Processing, 2025

The IFAS table shows that the main strength of the hydroponic business lies in affordable product prices, followed by hygienic product quality, availability of production facilities, and the experience of the business owners. A total strength score of 3.55 indicates that the business has sufficient internal capital to support development. On the other hand, the main weaknesses are the lack of training and technical assistance, accompanied by minimal institutional support, low utilization of digital marketing, and the absence of formal cooperation between business owners. A total weakness score of 3.48 indicates that significant internal obstacles remain. The relatively balanced comparison of strengths and weaknesses indicates that the business has potential for growth, but requires improvements, especially in aspects of increasing human resource capacity and digital-based marketing strategies. Furthermore, an analysis of external factors through the EFAS is needed to identify opportunities and threats that affect business sustainability, allowing for the formulation of strategies that are more adaptive to business environmental conditions.

Table 6. Threat Factors

| No | Threat Factors | weight | Rating | Score (weight × Rating) |
|--------------|--|--------|--------|-------------------------------|
| 1 | Extreme weather and winds that disrupt crops | 0.30 | 4 | 1.20 |
| 2 | Dependence on electricity supply | 0.25 | 4 | 1.00 |
| 3 | No regeneration of actors (minimal number of young actors) | 0.25 | 3.5 | 0.88 |
| 4 | No long-term expansion thinking among some actors | 0.20 | 3 | 0.60 |
| Total Threat | | 1.00 | | 3.68 |

Source: Primary Data After Processing, 2025

Table 7. Opportunity Factor

| No | Opportunity Factor | Weight | Rating | Scor (Weight × Rating) |
|-------------------|---|--------|--------|------------------------------|
| 1 | Market demand from hotels, supermarkets, and restaurants | 0.30 | 4 | 1.20 |
| 2 | Potential for expanding distribution to markets outside Ambon | 0.25 | 4 | 1.00 |
| 3 | Interest in establishing cooperatives or business forums | 0.25 | 3.5 | 0.88 |
| 4 | Healthy market share continues to grow | 0.20 | 3 | 0.60 |
| Total opportunity | | 1.00 | | 3.68 |

Source: Primary Data After Processing, 2025

The EFAS table shows that the main opportunities for hydroponic businesses stem from high market demand from hotels, supermarkets, and restaurants, followed by the potential for expanding distribution outside Ambon, opportunities for establishing business institutions, and increasing market awareness of healthy products. The total opportunity score of 3.68 indicates that the external environment offers significant development potential for the business. Meanwhile, the main threats include extreme weather, dependence on electricity supply, low business regeneration, and the lack of long-term expansion planning. The total threat score of 3.68 also indicates that external risks are quite significant and require strategic management. The equality of opportunity and threat scores indicates that the business is in a fairly dynamic position, requiring adaptive strategies to optimize opportunities while minimizing the impact of threats in the development of the hydroponic business.

Matriks SWOT

SWOT Analysis Results

| Exsternal | <i>Strengths (S)</i> | <i>Weaknesses (W)</i> |
|---|--|---|
| | <ol style="list-style-type: none"> Affordable product prices. Hygienic products and market demand. Adequate production facilities (greenhouses). Long experience. | <ol style="list-style-type: none"> No training or technical assistance Never received assistance from the government/NGOs/universities Not utilizing online media for marketing No formal collaboration between hydroponic practitioners |
| Internal | <i>Strategi So</i> | <i>Strategi Wo</i> |
| <i>Opportunities (O)</i> | | |
| <ol style="list-style-type: none"> Market demand from hotels, supermarkets, and restaurants. Distribution potential to markets outside Ambon. Interest in cooperatives or business forums. | <ol style="list-style-type: none"> Promote product advantages (affordability and hygiene) to the hotel/supermarket segment through social media. Leverage experience and production facilities to expand beyond Ambon. Form a cooperative based | <ol style="list-style-type: none"> Propose technical training to relevant agencies to prepare for increased market demand. Take advantage of the opportunity to form cooperatives to address the lack of formal assistance and collaboration. Optimize digital media as a promotional tool for the growing healthy market. |

| 4. Healthy market share continues to grow. | on established actors to strengthen distribution and access to assistance. | |
|---|--|--|
| <i>Threats (T)</i> | <i>Strategi St</i> | <i>Strategi Wt</i> |
| 1. Extreme weather and wind. | 1. Leverage the company's experience in dealing with extreme weather, such as adjusting production times or using alternative equipment (solar panels). | 1. Create a production system that is resilient to power outages and weather (e.g., rescheduling planting schedules and backup equipment). |
| 2. Dependence on electricity supply. | | 2. Involve the younger generation through training and business incubation for regeneration. |
| 3. Lack of regeneration of young entrepreneurs. | | 3. Encourage formal cooperation and legality through forums/cooperatives to ensure they are able to respond to long-term challenges and a changing business climate. |
| 4. No long-term expansion plans. | 2. Highlight product advantages through marketing campaigns: creating videos of the hygienic production process, customer testimonials, and brand stories on social media. | |

Source: Primary Data After Processing, 2025

1. The SO (Strengths-Opportunities) strategy aims to leverage internal strengths to seize external opportunities, such as marketing product advantages through social media, expanding markets outside the region by leveraging the experience of players, and establishing cooperatives to strengthen business structures.
2. The WO (Weaknesses-Opportunities) strategy is designed to mitigate weaknesses by capitalizing on existing opportunities, for example, through technical training facilitated by government agencies, establishing cooperatives to strengthen business networks, and utilizing digital media to enhance promotions.
3. The ST (Strengths-Threats) strategy aims to use strengths to mitigate the impact of threats, such as developing standard operating procedures (SOPs) that are resilient to weather and technical disruptions, and enhancing product image through creative digital marketing.
4. The WT (Weaknesses-Threats) strategy focuses on minimizing weaknesses while responding to threats, through strengthening production systems, involving the younger generation in hydroponic businesses through training

and business incubators, and increasing formal cooperation and business legality through the establishment of forums or cooperatives.

SWOT-Based Development Strategy

The SWOT analysis was then followed up with the formulation of a TOWS (Threats, Opportunities, Weaknesses, Strengths)-based strategy as follows.

A. SO (Strengths-Opportunities) Strategy

1. SO1: Optimize the promotion of products with affordable prices and high hygiene standards to potential consumer segments such as hotels, supermarkets, and restaurants through the use of social media (Instagram, Facebook, and WhatsApp Business). In addition, active participation in bazaars and farmers' markets can expand market reach and increase product visibility.
2. SO2: The experience of business actors and the availability of adequate production facilities, such as greenhouses, are essential assets for expanding distribution networks, especially to areas outside Ambon City. This strategy aims to open up opportunities for geographical business expansion.
3. SO3: Establishing cooperatives or forums based on experienced business actors can strengthen the distribution structure and simultaneously serve as a collective means of accessing assistance from the government or other institutions. This collaboration can also improve efficiency in production and marketing management.

B. WO (Weakness-Opportunities) Strategy

1. WO1: Proposing technical and managerial training programs to relevant agencies (e.g., the agricultural office or higher education institutions) is a strategic step to increase the capacity of business actors, so they are better prepared to face growing market demand.
2. WO2: The potential for establishing cooperatives or forums between business actors can be utilized as a solution to the limited technical assistance and low formal collaboration among hydroponic practitioners. This institution also opens up opportunities for more structured mentoring.
3. WO3: Increasing the use of digital media as a product marketing tool is a solution to the current weakness in promotional strategies, while also adapting to the evolving trend of a healthy market.

C. ST (Strength-Threats) Strategy

1. ST1: By relying on the experience of business actors, flexible production standard operating procedures (SOPs) can be developed to address extreme weather disruptions and technical issues such as electricity dependency. This can be done, for example, by adjusting the planting cycle or using alternative energy sources such as solar panels.
2. ST2: To increase competitiveness amidst market competition, a marketing strategy based on product excellence can be strengthened through the development of visual content such as production process videos, customer testimonials, and brand storytelling published on various digital platforms.

D. WT (Weakness-Threats) Strategy

1. WT1: A production system that is adaptive to extreme weather conditions and power supply disruptions should be designed, such as through rescheduling production schedules and providing backup systems, to maintain production continuity.
2. WT2: Efforts to regenerate business actors are needed through training programs, business incubators, and incentives that encourage the involvement of the younger generation in the hydroponics sector to ensure future business sustainability.
3. WT3: Encourage the establishment of forums or cooperatives that can serve as a platform for business legalization and formal collaboration coordination, so that business actors are better prepared to respond to long-term challenges and access strategic partnership opportunities.

CONCLUSIONS AND RECOMMENDATIONS

Based on research results, hydroponic businesses in Baguala District, Ambon City, have significant development potential. Internally, the business is supported by hygienic product quality, affordable prices, the availability of production facilities, and the experience of business owners. However, weaknesses remain, such as limited technical training, minimal external support, low utilization of digital marketing, and the absence of formal collaboration. The IFAS results indicate a relatively balanced internal condition.

Externally, there are significant opportunities in the form of increasing market demand, potential distribution expansion, the establishment of business institutions, and growing consumer awareness of healthy products. However, the business also faces threats such as extreme weather, electricity dependence, low business regeneration, and the lack of long-term development planning. The EFAS results also indicate a relatively balanced environment of opportunities and threats. Based on the SWOT analysis, business development needs to focus on optimizing strengths to capture market opportunities, increasing business capacity through training and marketing digitalization, strengthening business institutions, and developing more targeted and sustainable development strategies.

FURTHER STUDY

This study still has limitations, so further research on Hydroponic Business Development Strategy is needed to refine this study and enhance the insights of readers and the authors.

REFERENCES

- Ariani, N., et al. (2021). Factors influencing the success of hydroponic cultivation. *Indonesian Journal of Agronomy*, 49(2), 123-134.
- Kusumo, B., & Azis, N. (2021). Design of a hydroponic vegetable watering device using Arduino Mega 2560. *Budidarma Informatics Media Journal*, 5(1), 124-128.

Nazir, M. (2011). *Research methods (Revised edition)*. Ghalia Indonesia.

Sanubary, A., Rahmawati, D., & Pratama, R. (2021). Development of hydroponic systems and their advantages in plant cultivation. *Journal of Modern Agriculture*, 15(2), 85-92.

Susilawati, R. (2019). *Development of hydroponic farming in urban areas: Opportunities and challenges*. Alfabeta.