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Sustainable Entrepreneurship Analysis of The Competitive Advantages of MSMEs in The Green Economy Era in Banyuasin Regency

[1]Syahrizal Bin Muhammad Syafii, [2]Rahma, [3]Andika Ramadani, [4]Tia Wati

[1,2,2,4]Institut Teknologi dan Bisnis Nasional , Indonesia
*Email: syahrizalbms2021@gmail.com

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ABSTRACT

PURPOSE This study aims to test the influence of sustainable entrepreneurship (through hydroponic technology) on marketing strategies and the competitive advantage of MSMEs in Banyuasin Regency, using a quantitative approach. The efficiency of environmentally friendly technology is explored as a driver of competitiveness. Consumer awareness was tested as a moderation variable that affects the relationship between factors.

METHODOLOGY – The methodology used was a census, with data collected through an online questionnaire from 89 hydroponic MSMEs in the region. The analysis used Moderated Regression Analysis (MRA) through three regression models (direct effects, moderation, and interaction). Research limitations include the challenge of measuring unobservable variables and establishing cause and effect relationships.

FINDING – The findings show that resource efficiency, product innovation, and technology significantly affect the competitiveness of hydroponics, although the effect of product and technology innovation is relatively weak. Resource and technology efficiency also have a positive impact on consumer awareness, but product innovation does not. However, consumer awareness was found to not significantly affect competitiveness, nor did it moderate the relationship between efficiency, innovation, technology, and hydroponic competitiveness.

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INTRODUCTION

Sustainable entrepreneurship has become a key focus in addressing increasingly pressing global challenges, especially related to the issue of climate change and environmental damage (Handani, 2024) (George et al., 2021). MSMEs (Micro, Small, and Medium Enterprises) have a vital role in the Indonesian economy (Jefri et al., 2021), especially in Banyuasin Regency, in creating jobs, increasing income, and supporting regional economic growth. Banyuasin Regency, which is rich in natural resources, faces great challenges in managing this potential in a

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sustainable way. Unwise management of natural resources, such as agricultural land and fisheries, can cause environmental damage and threaten the sustainability of MSMEs themselves (Haris et al., 2024).

Along with increasing consumer awareness of the importance of environmentally friendly products, MSMEs in Banyuasin Regency are required to adapt to this change. One way that can be done is to apply the principles of sustainable entrepreneurship in product marketing strategies (Hanum et al., 2023). Banyuasin Regency, which is rich in natural resources, faces great challenges in managing this potential in a sustainable way. Unwise management of natural resources, such as agricultural land and fisheries, can cause environmental damage and threaten the sustainability of MSMEs themselves (Septiana dkk, 2024). Along with increasing consumer awareness of the importance of environmentally friendly products, MSMEs in Banyuasin Regency are required to adapt to this change. One way that can be done is by applying the principles of sustainable entrepreneurship in their product marketing strategies (Prasetya & Utomo, 2024).

Efficient and environmentally friendly technologies, such as hydroponic farming, can be an innovative solution to support sustainable MSME product marketing strategies (Ariani et al., 2024.). Hydroponics as a soilless farming method not only improves the efficiency of water and land use, but also reduces dependence on harmful chemicals and pesticides, making it a healthier and more environmentally friendly option. This innovation provides a great opportunity for MSMEs in the agricultural sector in Banyuasin to improve product quality and competitiveness (Gea et al., 2025). The application of hydroponic systems can strengthen the position of MSMEs in the market that is increasingly concerned about sustainability (Prasetya & Utama, 2024).

This study aims to analyze how sustainable entrepreneurship through hydroponic technology can affect the marketing strategy and competitive advantage of MSMEs in Banyuasin Regency. MSMEs that integrate sustainable principles in their marketing strategies are expected to attract a market that increasingly prioritizes environmentally friendly products, as well as improve their reputation and competitiveness both in local and global markets. In addition, with the adoption of technology such as hydroponics, MSMEs in Banyuasin can innovate in creating more diverse and environmentally friendly products, which in turn can support the economic and social welfare of the local community (Sandari et al., 2024) (Nggumo &.Arsyad, 2024).

In the data analysis, the researchers considered the moderation variables that were consistent among previous studies. This study uses a regression model of consumer awareness moderation with primary research data, interviews and surveys. By implementing sustainable practices, MSMEs can achieve better financial growth and contribute to inclusive economic development. In addition, the sustainability of MSMEs also has a positive social and environmental impact. In the data analysis, the researchers considered control variables that were consistent among previous studies. The results of research in the city of Padang show that personal and psychological factors have a significant influence in making decisions to purchase hydroponic vegetables.

Based on the background that has been explained, the formulation of the problem in this study is as follows: 1. Is there an effect of the application of sustainable entrepreneurship principles on the competitiveness of MSMEs in Banyuasin Regency?. 2. Is there an influence that hydroponic technology can support the marketing strategy of MSMEs in Banyuasin Regency in facing market demand that is increasingly concerned about environmentally friendly products?. 3. Is there an effect of the application of hydroponics on the efficiency of natural resource use and

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environmental sustainability in Banyuasin Regency?.

LITERATURE REVIEW

The Competitiveness of MSMEs

Sulistyo and Ayuni (2020) found that entrepreneurial orientation and social capital have a significant effect on the innovation capabilities and operational performance of MSMEs, which ultimately encourages competitive advantage. Meanwhile, Arsawan et al. (2022) explained that process innovation, knowledge sharing, and innovation culture are the main foundations in improving the competitive position of SMEs, especially in developing countries. Furthermore, Hurdawaty and Tukiran (2024) emphasized that strategies to increase the competitiveness of MSMEs include digitalization, product innovation, business processes, and marketing, with government support, access to funding, and network collaboration as the main supporting factors for success. According to Sulistyo & Ayuni (2019), the competitiveness of MSMEs is greatly influenced by the ability to innovate both in products, processes, and business models. There are several *indicators, including*; Product and service innovation, Innovation in the production process, Marketing innovation, New technology development, Visionary leadership.

Resource Usage Efficiency

According to Hidayah dkk (2021), the concept of efficiency is the best comparison between inputs and outputs (benefits and resources used), optimal results are achieved through the use of limited resources. In other words, the relationship between things that have been completed. Efficiency is an ideal condition that people can obtain from the maximum results of the use of their resources. Efficiency is the word for the success of a person or organization that runs a business, measured by the amount of resources used to achieve the results of the activities carried out. Efficiency Indicators Work efficiency indicators can be seen from three aspects: 1) Achievements or goals as expected. 2) Savings or reduction in the use of resources in carrying out activities. 3) Maximize the use of all resources owned.

Eco-Friendly Product Innovation

Morea, Hermawan dkk. (2023) investigated the relationship between eco-friendly product innovation and brand value perception. They argue that green product innovation needs to be accompanied by an ethical aspect of the company in order to effectively increase brand value. According to UNEP, *eco-innovation* is a series of coordinated solutions to products, processes, market approaches, and organizational structures that increase the competitiveness and productivity of companies, especially for SMEs through a business model based on the life cycle. Marco-Lajara et al. (2022**)** In green innovation, products are developed based on the principles of efficiency, sustainability, and environmental responsibility. Variable indicators **include:** The level of energy efficiency of the product, The content of non-toxic or biodegradable materials, The life cycle of the product that pays attention to environmental sustainability, Compliance with international environmental standards (Camiller, 2022.), Product adjustment to the needs of environmentally conscious consumers.

Implementation of Green Technology

Green technology is an innovation specifically designed to reduce negative impacts on the environment by minimizing the efficient use of natural resources and energy. This technology also seeks to reduce waste and harmful emissions that can damage the ecosystem (Arifin dkk 2023). In addition, green technology plays an important role in reducing pollution and environmental damage as a whole, so that it can support the preservation of nature in a sustainable manner. By utilizing resources wisely and environmentally friendly, the application

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of green technology is an important solution in maintaining ecosystem balance and encouraging environmentally sound development (Rahmat, 2024). **Indicators of the application of green technology** that can be used to measure how effective the technology is environmentally friendly and sustainable according to Mahendra (2024) include Energy Use Efficiency, Greenhouse Gas Emission Reduction, Waste Management, Use of Renewable Resources, and Positive Impact on the Ecosystem.

Consumer Awareness

Kotler's et al (2021) Consumer awareness is the level of individual understanding and knowledge of the product, which includes the value, benefits, and social and environmental impacts it causes. This awareness is crucial because it influences more responsible and selective purchasing behavior. In addition, according to Eka dan Nugrah (2021), consumer awareness also includes attitudes and understandings of rights and responsibilities in the purchase process, including awareness of ethical and environmental issues related to products. With this increased awareness, consumers are expected to be able to make wiser decisions and support sustainability and social responsibility in their daily consumption activities. Consumer Awareness Indicators According to Aminingsih dkk (2021), namely Product Knowledge, Awareness of Social and Environmental Impacts, Attitudes to Consumer Rights and Responsibilities, Responsible Consumption Behavior, Ethical Awareness, Attention to Quality and Price.

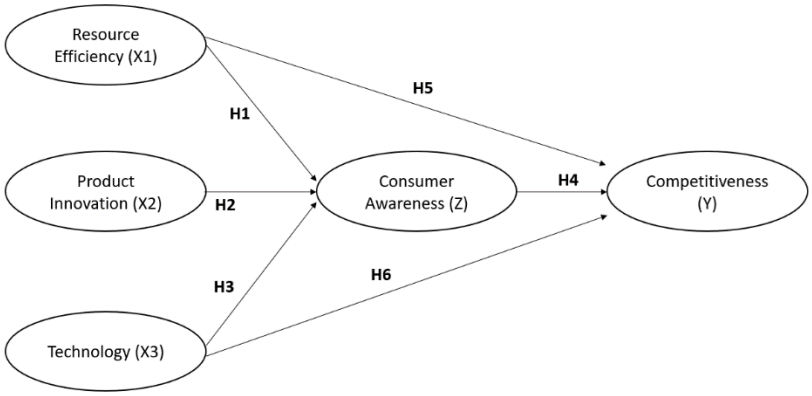

Figure 1. Research Framework

METHODOLOGY

Research Design

The research method was carried out in a quantitative descriptive manner with a survey research design. The quantitative approach is a research approach that is based on numerical data and uses statistical analysis. Survey research design is a method of collecting primary data by giving questions to respondents using questionnaires (sari et al, 2022). The collected quantitative data is then analyzed statistically descriptively. Statistical analysis is performed to describe the distribution of data and test hypotheses. The population in this study is all Hydroponic MSMEs located in Banyuasin Regency. Based on data from the Cooperative Trade Office, SMEs in Banyuasin Regency in 2024 years, there are 89 MSMEs in the field of Hydroponics spread across several sub-districts. The sampling method uses census, namely sampling where all members of the population are used as research samples. The number of samples is determined by the quota of hydroponic farmers spread across the production site (Makrup & Jamaluddin, 2021). Data

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collection was carried out by survey using questionnaires. The questionnaire was distributed online to all respondents. This method has several limitations, such as the inability to correctly explain cause-and-effect relationships and difficulties in exploring variables that are not easily measured (Sulianta, 2024). The analysis method used is emphasized on the primary data analysis approach with MRA Balaka 2022). where the variables are dependent, namely the competitiveness of MSMEs with independent variables, resource use efficiency, environmentally friendly product innovation, and the application of green technology with the variable of moderation of consumer awareness in Banyuasin Regency. The forms of testing carried out for primary data analysis and MRA models are;

Model 1 (Direct Influence of Independent Variables on Dependent Variables):

$$Y=\beta0+\beta1X1+\beta2X2+\beta3X3+\epsilon \quad \text{...}(1)$$

Where:

Y is the competitiveness of MSMEs
X1 is the efficiency of resource usage
X2 is an eco-friendly product innovation
X3 is the application of green technology,
$\beta0$ is a constant,
$\beta1,\beta2,\beta3$ is the coefficient for independent variables,
ε is an error term.

Model 2 (Effect of Moderation Variables on Influence of Independent Variables):

$$Y=\beta0+\beta1X1+\beta2X2+\beta3X3+\beta4Z+\epsilon \quad \text{...}(2)$$

Where:

Z is consumer awareness (moderation variable),
$\beta4$ is the coefficient for institutional support.

Model 3 (Interaction between Independent Variables and Moderation):

$$Y=\beta0+\beta1X1+\beta2X2+\beta3X3+\beta4Z+\beta5(X1\times Z)+\beta6(X2\times Z)+\beta7(X3\times Z)+\varepsilon \quad \text{...............} (3)$$

Where:

X1×Z, X2×Z, and X3×Z are the interactions between independent variables and moderation variables.

$\beta5,\beta6,\beta7$\ is an interaction coefficient that measures how much consumer awareness moderates the relationship between independent variables and the competitiveness of MSMEs.

Analysis Steps

1. **Significance test**: To find out if each coefficient (including interactions) is significant, perform a t-test. If the p< value is 0.05, then the coefficient is significant.
2. **Moderation effect test**: Check the interaction coefficient ($\beta5,\beta6,\beta7$). If one or more of these interactions is significant, then institutional support moderates the relationship between independent variables and the competitiveness of MSMEs.

RESEARCH RESULTS

Results of Research and Discussion To analyze the data used in this study, Smart Partial Least Square (Smart PLS) is suitable for estimating model paths that use latent constructs with multiple indicators so that it can help obtain latent variable values for prediction purposes. Evaluation in smart PLS consists of external model evaluation (measurement model) and inner model evaluation (structural model).

Effect Size

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The value of F2 is the direct influence of the variable at the structural level with the criteria (f-square 0.02 low, 0.15 moderate, and 0.35 high). The results of the F2 test can be explained as follows:

Table 1. Effect Size Test Results (F2)

	HYDROPONIC COMPETITIVENESS
Resource Efficiency > Competitiveness Of Hydroponics	0.036
Product Innovation > Hydroponic Competitiveness	0.101
Consumer Awareness > Competitiveness Of Hydroponics	0.061
Resource Efficiency > Consumer Convenience	0.142
Product Innovation > Consumer Awareness	**0.001**
Consumer Awareness > Technology	**0.608**
Hydroponic Technology > Competitiveness	0.076

Source: Primary data processed, 2025

Based on the table of effect size test results above, the results obtained in this study can be explained as follows: a) The effect size value in the variable Resource Efficiency (X1) on hydroponic competitiveness (Y) is 0.036 with weak criteria. Therefore, it can be said that efficiency has a weak influence on the competitiveness of hydroponics. b) The effect size value in the variable of resource efficiency (X1) to consumer satisfaction (Z) is 0.142 with weak criteria. So it can be said that resource efficiency has a weak influence on consumer awareness. c) The effect size value of the product innovation variable (X2) on competitiveness (Y) is 0.101 with weak criteria. So it can be said that product innovation has a weak influence on competitiveness. d) The effect size value of the product innovation variable (X2) on consumer Preference (Z) is 0.001 with weak criteria. So it can be said that product innovation has a weak influence on consumer awareness. e) The effect size value of the technology variable (X3) on competitiveness (Y) was 0.076 with weak criteria. So it can be said that technology has a weak influence on competitiveness. f). The effect size value of the technology variable (X3) on consumer desperation (Z) is 0.608 with strong criteria. So it can be said that technology has a strong influence on consumer awareness. g). The effect size value in the variable of consumer awareness (Z) on competitiveness (Y) is 0.061 with weak criteria. Therefore, it can be said that consumer awareness has a weak influence on the competitiveness of hydroponics in Banyuasin district.

Hypothesis Test

In this study, the hypothesis test used is direct effect (direct relationship) and indirect effect (indirect relationship). The results of hypothesis testing in this study can be explained as follows:

Dirrect Effect (Direct Relationship)

In the direct effect hypothesis, it can be accepted or said that there is a significant direct relationship if the value of t is <0.05. The results of the hypothesis test can be seen directly as

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follows:

Tabel 2. Hypothesis Test Results Directly (Dirrect Effect)

Variabel	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Information
Resource Efficiency -> Hydroponic Competitiveness	0.154	2.060	0.040	Significant
Resource Efficiency -> Consumer Awareness	0.269	2.991	0.003	Significant
Product Innovation -> Hydroponic Competitiveness	0.234	2.293	0.022	Significant
Product Innovation -> Consumer Awareness	0.021	0.343	0.732	No Significant
Consumer Awareness - > Competitiveness Of Hydroponics	0.264	1.815	0.070	No Significant
Hydroponic Technology > Competitiveness	0.306	2.026	0.043	Significant
Technology - > Consumer Awareness	0.642	7.199	0.000	Significant

Source: Primary data processed, 2025

From the results of the calculation, the following results were obtained:

The first hypothesis (H1) is acceptable, as resource efficiency exerts a significant influence on hydroponic competitiveness. Where the t-static value is 2.060 and the p-value (0.040 < 0.05). This means that any change in resource efficiency can affect the performance of hydroponic competitiveness in Banyuasin district, South Sumatra. The second hypothesis (H2) is acceptable, as product innovation exerts a significant influence on hydroponic competitiveness. Where the t-static value is 2.293 and the p-value (0.022 < 0.05). This means that any change in product innovation can affect the performance of hydroponic competitiveness in Banyuasin district, South Sumatra. The third hypothesis (H3) is acceptable, as technology exerts a significant influence on hydroponic competitiveness. Where the t-static value is 2.026 and the p-value (0.043 < 0.05). This means that any change in technology can affect the performance of hydroponic competitiveness in Banyuasin district, South Sumatra. The fourth hypothesis (H4) is accepted, because there is a significant influence between resource efficiency on consumer awareness. Where the t-static value is 2.291 and the p-value (0.003 < 0.05). This means that every change in resource efficiency will improve the performance of consumer awareness in Banyuasin district, South Sumatra. The fifth hypothesis (H5) was rejected, because there was no significant influence between product

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innovation on consumer awareness. Where the t-static value is 0.343 and the p-value (0.732 < 0.05). This means that any change in product innovation will not improve the performance of consumer awareness in Banyuasin district, South Sumatra. The sixth hypothesis (H6) is accepted, because there is a significant influence between product technology on consumer awareness. Where the t-static value is 7.199 and the p-value (0.000 < 0.05). This means that every change in technology will improve the performance of consumer awareness in Banyuasin district, South Sumatra. The seventh hypothesis (H7) was rejected, as there was no significant influence between consumer awareness of hydroponic competitiveness. Where the t-static value is 1.815 and the p-value (0.070 > 0.05). This means that any change in consumer awareness will not improve the performance of hydroponic competitiveness in Banyuasin district, South Sumatra.

Inderect Effect (Indirect Relationships)

In indirect effects, the hypothesis can be accepted or the occurrence of an indirect relationship at the t < value of 0.05. The results of the hypothesis test can be indirectly seen as follows:

Table 3. Indirect Hypothesis Test Results

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Information
Resource Efficiency -> Consumer Awareness -> Hydroponic Competitiveness	0.071	1.568	0.117	Insignificant
Product Innovation -> Consumer Awareness -> Hydroponic Competitiveness	0.006	0.247	0.805	Insignificant
Technology -> Consumer Awareness -> Hydroponic Competitiveness	0.169	1.703	0.089	Insignificant

Source: Primary data processed, 2025

From the results of the calculation, the following results were obtained:

1. The eighth hypothesis (H8) is not accepted, because consumer awareness is not able to mediate resource efficiency on hydroponic competitiveness in Banyuasin Regency, South Sumatra. Where the t-static value is 1.568 and the p-value (0.117 > 0.05). This means that consumer awareness has not been able to influence the efficiency of resources in increasing hydroponic competitiveness in Banyuasin Regency, South Sumatra Province.
2. The ninth hypothesis (H9) is not accepted, because consumer discretion is not able to mediate product innovation on hydroponic competitiveness in Banyuasin Regency, South Sumatra. Where the t-static value is 0.247 and the p-value (0.805 > 0.05). This means that good consumer awareness is able to influence product innovation in increasing hydroponic competitiveness in Banyuasin Regency, South Sumatra.
3. The tenth hypothesis (H10) was not accepted, because consumer awareness was unable to mediate technology on the competitiveness of hydroponics in Banyuasin Regency, South Sumatra. Where the t-static value is 1.703 and the p-value (0.089 > 0.05). This means that

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consumer awareness is not able to influence technology in increasing the competitiveness of hydroponics in Banyuasin Regency, South Sumatra.

Discussion

The first hypothesis (H1) is acceptable, as resource efficiency exerts a significant influence on hydroponic competitiveness. Where the t-static value is 2.060 and the p-value (0.040 < 0.05). This means that any change in resource efficiency can affect the performance of hydroponic competitiveness in Banyuasin district, South Sumatra. The effect size value in the variable Resource Efficiency (X1) on hydroponic competitiveness (Y) is 0.036, which is relatively small. These findings confirm that the efficient use of resources, such as the use of water, fertilizers, and labor, continues to contribute to increasing the competitiveness of hydroponic businesses. This research is in line with the findings by Trisnawati dkk (2024) who stated that the efficiency of using agricultural inputs supports the productivity and competitiveness of modern farming businesses, including hydroponic farming systems.

The second hypothesis (H2) is acceptable, as product innovation exerts a significant influence on hydroponic competitiveness. Where the t-static value is 2.293 and the p-value (0.022 < 0.05). This means that any change in product innovation can affect the performance of hydroponic competitiveness in Banyuasin district, South Sumatra. The effect size value of the product innovation variable (X2) on competitiveness (Y) was 0.101 with weak criteria. So it can be said that product innovation has a weak influence on competitiveness. This means that even though product innovations such as the development of plant variants, attractive packaging, or new planting techniques are able to increase competitiveness, the impact is still limited. This can be due to a lack of technology adoption or a market that is not yet fully responsive. These findings are supported by research by Ramadhani,(2024) which states that innovation has an impact on competitiveness, even though it is influenced by the market context and the readiness of actors.

The third hypothesis (H3) is acceptable, as technology exerts a significant influence on hydroponic competitiveness. Where the t-static value is 2.026 and the p-value (0.043 < 0.05). This means that any change in technology can affect the performance of hydroponic competitiveness in Banyuasin district, South Sumatra. The effect size value of the technology variable (X3) on competitiveness (Y) was 0.076 with weak criteria. So it can be said that technology has a weak influence on competitiveness. This means that the use of technologies such as automated irrigation systems, nutrition sensors, or digital monitoring applications contributes to increased competitiveness, but the impact is still not optimal. This can be due to limited access, investment costs, or lack of training. Research by Sudarwati, dkk (2025) supports this finding, stating that the adoption of technology has a positive impact but depends on the readiness of farmers' resources.

The fourth hypothesis (H4) is accepted, because there is a significant influence between resource efficiency on consumer awareness. Where the t-static value is 2.291 and the p-value (0.003 < 0.05). This means that every change in resource efficiency will improve the performance of consumer awareness in Banyuasin district, South Sumatra. The effect size value of the resource efficiency variable (X1) on consumer desirability (Z) was 0.142 with weak criteria. Therefore, it can be said that resource efficiency has a weak influence on consumer awareness. This indicates that efficiency practices, such as water conservation, the use of organic fertilizers, and waste reduction, are starting to gain consumer attention, but are not yet a major factor in shaping their awareness. These findings are in line with research by Aziz dan Shihab, (2024), which states that resource efficiency can increase positive perceptions of consumers, but requires continuous education to strengthen its impact.

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The fifth hypothesis (H5) was rejected, because there was no significant influence between product innovation on consumer awareness. Where the t-static value is 0.343 and the p-value (0.732 < 0.05). This means that any change in product innovation will not improve the performance of consumer awareness in Banyuasin district, South Sumatra. The effect size value of the product innovation variable (X2) on consumer desirability (Z) is 0.001 with weak criteria. So it can be said that product innovation has a weak influence on consumer awareness. This indicates that even though business actors implement innovations in the form of new products, attractive packaging, or variations of hydroponic plants, it has not been enough to attract attention or build consumer awareness. These findings are reinforced by the study of Salsabila dkk (2024), which states that innovation does not automatically increase consumer awareness without effective communication, promotion, and education strategies.

The sixth hypothesis (H6) is accepted, because there is a significant influence between product technology on consumer awareness. Where the t-static value is 7.199 and the p-value (0.000 < 0.05). This means that every change in technology will improve the performance of consumer awareness in Banyuasin district, South Sumatra. The effect size value of the technology variable (X3) on consumer desperation (Z) was 0.608 with strong criteria. So it can be said that technology has a strong influence on consumer awareness. indicates that the use of technology in hydroponic production and marketing—such as automated planting systems, digital marketing, and technology-based labeling—has significantly increased consumer awareness. Consumers tend to be more interested and aware of products associated with modern, efficient, and sustainable technology. This research was strengthened by Judijanto dkk (2024) who found that the use of digital technology significantly increases consumer visibility and awareness of agricultural products.

The seventh hypothesis (H7) was rejected, as there was no significant influence between consumer awareness of hydroponic competitiveness. Where the t-static value is 1.815 and the p-value (0.070 > 0.05). This means that any change in consumer awareness will not improve the performance of hydroponic competitiveness in Banyuasin district, South Sumatra. The effect size value in the variable of consumer awareness (Z) towards competitiveness (Y) was 0.061 with weak criteria. This indicates that although consumers may be aware of hydroponic products, this awareness has not been able to directly encourage the increase in competitiveness of business actors. Other factors such as price, distribution, and product quality are likely to be more decisive. These findings are in line with a study by Ahmadi, (2024), which states that consumer awareness needs to be followed by purchasing actions to have an impact on competitiveness.

The eighth hypothesis (H8) is not accepted, because consumer awareness is not able to mediate resource efficiency on hydroponic competitiveness in Banyuasin Regency, South Sumatra. Where the t-static value is 1.568 and the p-value (0.117 > 0.05). This means that consumer awareness has not been able to influence the efficiency of resources in increasing hydroponic competitiveness in Banyuasin Regency, South Sumatra Province. This shows that while resource efficiency is important, its improvement has not been sufficiently responded to by consumers consciously to drive competitiveness. Low consumer understanding or concern for environmental efficiency practices is an inhibiting factor. These findings are consistent with research by Annaufal, (2024), which states that consumer awareness is not effective as a mediator without massive education and communication of sustainability values.

The ninth hypothesis (H9) was not accepted, because consumer curiosity was unable to mediate product innovation on hydroponic competitiveness in Banyuasin Regency, South

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Sumatra. Where the t-static value is 0.247 and the p-value (0.805 > 0.05). This means that good consumer awareness is able to influence product innovation in increasing hydroponic competitiveness in Banyuasin Regency, South Sumatra. Despite the innovations, existing consumer awareness is not strong enough to bridge the influence on increasing competitiveness. This can be due to a lack of promotion or education to consumers about the added value of hydroponic product innovation. This finding is in line with research by Sari, (2024). which states that without consumer understanding of innovation, its impact on competitiveness becomes insignificant.

The tenth hypothesis (H10) was not accepted, because consumer awareness was unable to mediate technology on the competitiveness of hydroponics in Banyuasin Regency, South Sumatra. Where the t-static value is 1.703 and the p-value (0.089 > 0.05). This means that consumer awareness is not able to influence technology in increasing the competitiveness of hydroponics in Banyuasin Regency, South Sumatra. This means that even though technology has been used in the hydroponic production process, consumer awareness of the use of this technology is not enough to encourage increased competitiveness. Low understanding or concern of consumers for technological aspects is the main obstacle. These findings are in line with a study by Suryani & Hidayat (2021), which states that the adoption of new technologies requires the support of consumer education in order to have a significant impact on product competitiveness.

CONCLUSION

This study found that resource efficiency, product innovation, and technology have a significant influence on the competitiveness of hydroponics in Banyuasin Regency, although the effect of product and technology innovation is relatively weak. Resource efficiency also has a significant effect on consumer awareness, while product innovation has no significant effect on consumer awareness. Technology has a strong influence on consumer awareness. However, consumer awareness does not have a significant effect on competitiveness and is unable to mediate the relationship between resource efficiency, product innovation, and technology to hydroponic competitiveness. Hydroponic business actors are advised to develop more innovative product innovations and combine effective marketing strategies to attract attention and build consumer awareness. The government and the Agriculture Office need to increase education and socialization programs regarding the efficiency of modern resources and technology in hydroponics so that consumer awareness increases, which can ultimately strengthen the competitiveness of products. This study has several limitations, namely the sample used is limited to hydroponic actors in Banyuasin Regency so that the results cannot be generalized to other regions. Future research is recommended to use mixed methods with a qualitative approach to delve deeper into consumer behavior and motivation in purchasing hydroponic products.

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