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Mapping and rebranding ornamental fish farming in Depok, West Java, contributions to the SDGs

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Abstract

Purpose: This study aims to identify and prioritize effective rebranding strategies for the ornamental fish farming industry in Depok, West Java, using the Analytic Hierarchy Process (AHP) to address challenges such as limited market access, environmental sustainability issues, and economic feasibility concerns while aligning with Sustainable Development Goals (SDGs).

Research Methodology: The research employs a mixed-method approach, combining qualitative research through in-depth interviews with key stakeholders and quantitative analysis using the AHP to systematically evaluate and prioritize rebranding strategies based on multiple criteria.

Results: The study identified market access as the most critical criterion, followed by environmental sustainability and economic feasibility, with digital marketing emerging as the most effective rebranding strategy, scoring 0.67, followed by sustainability certification (0.22) and community outreach programs (0.11).

Limitations: The research is limited by a small sample size, potentially affecting result generalizability. The AHP methodology introduces possible subjective biases through pairwise comparisons. The study's regional specificity may constrain broader applicability. Furthermore, the emphasis on rebranding strategies may not encompass all potential solutions to industry challenges.

Contribution: This research provides actionable insights for stakeholders in the ornamental fish farming industry to implement sustainable development strategies, aligning with SDGs 1, 8, and 14. It offers a systematic approach to decision-making through the application of AHP.

Novelty: This study innovatively applies the AHP to rebranding strategies in ornamental fish farming, uniquely integrating sustainable development principles with quantitative decision-making. This approach offers a new paradigm for strategic planning in aquaculture, contrasting with traditional qualitative methods in the field.

Keywords: *Analytic Hierarchy Process, Aquaculture Sustainability, Ornamental Fish Farming, Rebranding Strategies, Sustainable Development Goals*

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1. Introduction

Ornamental fish farming in Depok, West Java, has emerged as a significant sector with substantial potential for local economic development. This industry not only generates employment opportunities for the local population but also has the capacity to stimulate economic growth through export activities. For instance, the cultivation of neon tetra fish, a popular ornamental species, has been identified as a lucrative opportunity, with potential for both local and international markets. This contributes to the local economy and provides jobs in the community, aligning with broader economic development goals. However, the sector faces several multifaceted challenges that require careful consideration. These include limited market access, which constrains the industry's growth potential; environmental sustainability issues, which raise concerns about long-term viability and ecological impact; and economic feasibility concerns, which affect the profitability and competitiveness of fish farming operations (Bishagazi, 2021; Setiyowati, Nugroho, & Halik, 2022).

The COVID-19 pandemic has further exacerbated these challenges, disrupted supply chains, and reduced market demand (Beritayogya.com, 2021). These effects have highlighted the vulnerability of the sector to external shocks and emphasized the need for resilience and adaptability in the face of unforeseen circumstances (Amanah, Sena, Suhendra, Yatim, & Zaki, 2024). Despite these obstacles, the sector's demonstrated resilience and adaptability have underscored the need for effective rebranding strategies. Such strategies could enhance market presence and align the industry with sustainable development principles (Amegayibor, 2023). Rebranding efforts have the potential to reposition the industry, making it more competitive and sustainable in the long term (Worldbank, n.d.).

In alignment with the United Nations' Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty), SDG 8 (Decent Work and Economic Growth), and SDG 14 (Life Below Water), it is crucial to explore rebranding strategies that not only improve market access but also promote environmental sustainability and economic feasibility (FAO, 2020). This approach ensures that the industry's growth contributes to broader social and environmental objectives. This study aims to address these challenges by identifying and prioritizing effective rebranding strategies using the AHP (Chen, De Bruyne, & Bollempalli, 2020; Lie & Setiyowati, 2024; Setiyowati, Nugroho, & Halik, 2023). The systematic approach of AHP allows for a comprehensive evaluation of multiple criteria, ensuring that the strategies selected are well-informed and tailored to the needs of the stakeholders involved. This methodological choice reflects a commitment to rigorous, evidence-based decision-making in addressing complex industry challenges.

The significance of this research lies in its potential to provide actionable insights for a diverse range of stakeholders, including local government entities, fish farmers, and market experts. These insights can inform the implementation of strategies that support sustainable development, balancing economic growth with environmental and social considerations. By integrating AHP, the study offers a systematic and quantitative approach to decision-making, ensuring that the selected strategies are based on a comprehensive evaluation of multiple criteria (Setiyowati et al., 2023).

In summary, this study addresses the pressing need for effective rebranding strategies to overcome the challenges faced by the ornamental fish farming industry in Depok. By aligning these strategies with the SDGs, the industry can pursue sustainable growth and contribute meaningfully to local economic development (Lestari & Setiyowati, 2023; Setiyowati, Nugroho, & Halik, 2022). This approach not only seeks to enhance the sector's economic performance but also to ensure its long-term sustainability and positive impact on the local community and environment.

The research questions guiding this study are:

1. What are the primary criteria that influence the success of rebranding in ornamental fish farming?
2. What are the most effective rebranding strategies for ornamental fish farming in Depok?
3. How can AHP be utilized to systematically prioritize rebranding strategies based on stakeholder input?

4. How do the prioritized rebranding strategies align with and support the SDGs?

This systematic inquiry aims to enhance the viability and sustainability of ornamental fish farming in the region, ensuring its contribution to both local and global economic landscapes.

2. Literature review

2.1. Sustainable Development Goals (SDGs)

The SDGs framework emphasizes the integration of economic growth, social inclusion, and environmental protection as essential components for achieving sustainable development (Mabhanda, 2024). This comprehensive approach is critical in addressing pressing global challenges such as poverty, inequality, climate change, and environmental degradation. Within the context of this study, sustainable development serves as a lens through which to analyze how ornamental fish farming can contribute to realization of the SDGs. Specifically, ornamental fish farming aligns with several SDGs, including the promotion of sustainable agriculture (SDG 2), the fostering of economic growth and decent work (SDG 8), and the encouragement of responsible consumption and production patterns (SDG 12) (Food and Agriculture Organization (Bappenas, 2020; FAO, 2020; Fauzia & Movanita, 2021; Setiyowati, Nugroho, & Halik, 2022; Ulwiya, 2019; Yulia, 2020).

Ornamental fish farming not only presents substantial economic prospects but also significantly contributes to biodiversity conservation and ecosystem management. By implementing sustainable practices, fish farmers can reduce their environmental impact while ensuring the long-term sustainability of aquatic resources (Makailipessy, Abrahamsz, & Tubalawony, 2023). Additionally, involving local communities in ornamental fish farming promotes social inclusion and empowerment, thereby aiding in the realization of SDG 10, which aims to reduce inequality within and among countries (Fagerholm et al., 2021). The interconnected nature of these goals emphasizes the importance of a comprehensive approach to sustainable development, where economic, social, and environmental aspects are aligned to foster resilient communities and ecosystems (Bappenas, 2020; FAO, 2020).

2.2. Participatory Mapping Theory

Participatory mapping theory advocates for the active involvement of local stakeholders in the mapping process to obtain accurate and contextually relevant data. This approach is particularly instrumental in identifying key production areas, challenges, and developmental potential within ornamental fish farming (Haryani & Setyowati, 2018). Engaging local communities makes the mapping process more inclusive and reflective of the actual conditions on the ground, facilitating better-informed decision-making.

The participatory mapping process not only enhances the accuracy of data collected but also empowers local stakeholders by giving them a voice in planning and management processes. This empowerment fosters a sense of ownership and responsibility towards sustainable practices in ornamental fish farming. Furthermore, insights gained from participatory mapping can guide policymakers and practitioners in developing targeted interventions that address the specific needs and challenges faced by local communities, ultimately promoting more effective and sustainable development outcomes (Makailipessy et al., 2023).

2.3. Rebranding Theory

Rebranding theory emphasizes the importance of creating a new image and enhancing product value through innovative marketing strategies. In the context of ornamental fish farming, effective rebranding strategies can significantly increase the competitiveness of products in both local and international markets (Racbhini, Wulandjani, Thalib, Setiyowati, & Sasmito, 2021). By repositioning ornamental fish as premium products that embody sustainability and ethical farming practices, stakeholders can attract a broader customer base and command higher prices.

Successful rebranding transcends mere alterations in perception; it necessitates that the foundational practices are congruent with the promoted values. This entails the adoption of environmentally sustainable farming methods, ensuring fish welfare, and engaging in fair trade practices. Such alignment fosters consumer trust and differentiates products in a competitive landscape. Furthermore, effective rebranding can bolster the overall sustainability of the industry by promoting responsible consumption and supporting local economies (Setiyowati, Nugroho, Murgianto, Ratnawati, & Riyadi, 2022).

2.4. Digital Marketing Theory

Digital marketing theory explores the utilization of digital technology and social media in marketing strategies (Novanda, 2023). In the ornamental fish industry, digital marketing can be leveraged to expand market reach and increase sales through online platforms (Ellis-Chadwick & Chaffey, 2012). The rise of e-commerce and social media has transformed consumer interactions with brands, providing new opportunities for fish farmers to showcase their products and connect with potential buyers.

By employing targeted digital marketing strategies, ornamental fish farmers can reach niche markets and engage with consumers who prioritize sustainability and ethical sourcing. Social media platforms serve as powerful tools for storytelling (Kosasih & Sulaiman, 2024), allowing producers to share their farming practices, highlight the unique qualities of their fish, and build a community around their brand. Furthermore, digital marketing can facilitate direct sales, reducing reliance on intermediaries and enabling farmers to capture a larger share of the profits.

2.5. Social and Economic Sustainability Theory

Social and economic sustainability theory emphasizes the importance of balancing social and economic aspects in achieving overall sustainability (Sulaiman, Fitralisma, Fata, & Nawawi, 2023). In the context of ornamental fish farming, this theoretical framework can aid in understanding the economic and social impacts of farming practices on local communities (Prayuda, 2019; Setiyowati, Nugroho, Murgianto, et al., 2022). The integration of social and economic sustainability principles can lead to more equitable outcomes for fish farmers and their communities. Ensuring fair wages and working conditions can contribute to poverty alleviation and improved livelihoods within these communities. Additionally, fostering community engagement and participation in decision-making processes enhances social cohesion and resilience.

3. Research methodology

3.1. Qualitative Research

This study will employ qualitative research methods (Creswell & Creswell, 2017) through in-depth interviews with key stakeholders in the ornamental fish farming sector of Depok, West Java. Participants will include local fish farmers, fishery experts, government officials, and representatives from non-governmental organizations (NGOs) involved in environmental conservation and economic development. The objective of these interviews is to gather comprehensive, contextual insights into the challenges faced by farmers, perceptions of market dynamics, infrastructure issues, and opportunities for growth and sustainability in the ornamental fish farming sector.

3.1.1. Data Collection

Semi-structured interviews will be conducted to facilitate flexible exploration of themes related to mapping and rebranding strategies. All interviews will be recorded, transcribed, and subsequently analysed thematically to identify recurring patterns, key issues, and diverse perspectives.

3.1.2. Data Analysis

Thematic analysis will be utilized to extract meaningful themes and patterns from the interview transcripts. This approach facilitates a nuanced understanding of the complexities inherent in stakeholders' experiences and viewpoints regarding ornamental fish farming in Depok.

3.2. Analytic Hierarchy Process

The AHP serves as a robust tool to enhance qualitative insights with a structured decision-making framework (Astriani & Siallagan, 2024). This framework is particularly valuable for prioritizing criteria and strategies pertinent to mapping and rebranding efforts within the ornamental fish farming sector. AHP is recognized as a multi-criteria decision-making technique that facilitates a systematic evaluation and comparison of alternatives grounded in a defined set of criteria (Setiyowati et al., 2023).

3.2.1. Criteria Identification

The identification of criteria is fundamentally rooted in the preferences and priorities expressed by stakeholders during qualitative interviews. These insights will inform the establishment of criteria that are critical for decision-making in the ornamental fish farming sector. Key criteria may encompass market access, which assesses the ability to reach consumers; environmental sustainability, focusing on practices that minimize ecological impact; economic feasibility, evaluating the financial viability of proposed strategies; and community benefits, which consider the social implications and advantages for local populations. This foundational work ensures that the decision-making process is aligned with the interests and needs of those involved in the sector.

3.2.2. Pairwise Comparisons

A core component of the AHP methodology is the process of pairwise comparisons. In this phase, stakeholders engage in ranking the identified criteria and alternatives based on their relative importance. This systematic approach allows for the quantification of subjective judgments and preferences, transforming qualitative insights into measurable data. By comparing criteria in pairs, stakeholders can articulate their priorities more clearly, leading to a more informed decision-making process that reflects the collective values and objectives of the community involved in ornamental fish farming.

3.3. Benefits and Integration

3.3.1. Comprehensive Insight

The combination of qualitative research and AHP fosters a comprehensive understanding of the socio-economic and environmental dynamics that influence ornamental fish farming in Depok. This integrated perspective aids in identifying not only the challenges faced by the industry but also the opportunities for sustainable growth and development.

3.3.2. Decision Support

AHP provides a structured methodology for prioritizing strategies that resonate with stakeholder preferences (Harriz, Akbariani, Setiyowati, & Santoso, 2023a). This alignment is crucial for effectively contributing to the achievement of SDGs, particularly those related to economic growth, environmental sustainability, and community well-being. By employing AHP, decision-makers can ensure that their strategies are not only practical but also socially responsible and ecologically sound.

3.3.3. Practical Application

The findings derived from qualitative research play a significant role in informing the qualitative dimensions of decision-making. Simultaneously, AHP offers a quantitative basis for prioritizing strategies, thereby enhancing the robustness and applicability of the study's recommendations. This synthesis of qualitative and quantitative approaches aims to deliver actionable insights and strategic recommendations that bolster the sustainability and market competitiveness of ornamental fish farming in Depok. Ultimately, these efforts contribute to local economic development and facilitate the attainment of SDG targets, ensuring that the sector thrives in a responsible and sustainable manner.

4. Results and discussions

4.1. Identification of Key Criteria

The study identified three key criteria crucial for the success of rebranding ornamental fish farming in Depok:

1. Market Access (C1): With a weight of 0.65, market access emerged as the most critical factor. This indicates that strategies enhancing market visibility and reach are of paramount importance in the rebranding process.
2. Environmental Sustainability (C2): Weighted at 0.23, this criterion underscores the significance of adopting environmentally sustainable practices to ensure long-term viability of the industry.
3. Economic Feasibility (C3): With a weight of 0.12, this criterion highlights the necessity for economically viable strategies that offer tangible financial benefits to farmers.

4.2. Evaluation of Alternative Rebranding Strategies

Three alternative rebranding strategies were evaluated:

1. Digital Marketing (A1): This strategy achieved the highest score of 0.67, indicating its substantial potential to significantly enhance both market access and economic feasibility.
2. Sustainability Certification (A2): With a final score of 0.22, this strategy is deemed essential for promoting environmental sustainability. However, it ranks lower in terms of market access and economic feasibility compared to digital marketing.
3. Community Outreach Programs (A3): This strategy scored 0.11, suggesting that while it plays an important role, it has the least immediate impact on market access and economic feasibility relative to the other strategies.

4.3. Applying AHP for Decision-Making

4.3.1. AHP Process Overview

In this study, the AHP was utilized to evaluate and rank rebranding strategies for ornamental fish farming in Depok, West Java. The assessment involved pairwise comparisons conducted by thirty participants, which included local government stakeholders, fish farmers, and market experts. These participants evaluated the strategies across three defined criteria and three alternatives (Setiyowati et al., 2023).

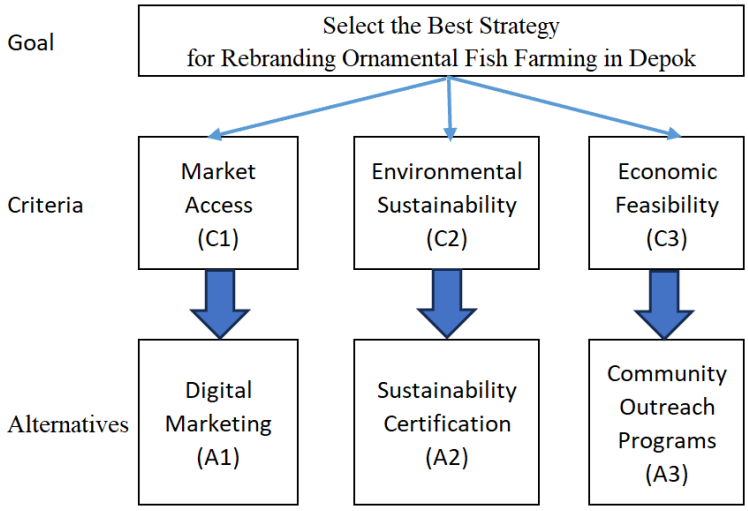

Figure 1. AHP decision hierarchy

The AHP framework is visually represented in Figure 1, which illustrates the hierarchical structure employed to prioritize rebranding strategies. At the apex of the hierarchy lies the overall goal of the decision-making process: to identify the optimal rebranding strategy for the ornamental fish farming sector.

The second tier of the hierarchy comprises three primary criteria: Market Access (C1), Environmental Sustainability (C2), and Economic Feasibility (C3). These criteria serve as the evaluative benchmarks for the three potential rebranding strategies positioned at the third level: Digital Marketing (A1), Sustainability Certification (A2), and Community Outreach Programs (A3).

Within the AHP framework, pairwise comparisons were systematically conducted for each criterion and alternative. Weights were assigned based on the relative importance determined by the participants, leading to final scores that reflect the priority of each alternative in relation to the overarching goal. The hierarchical structure depicted in Figure 1 effectively conveys the relationships and priorities established through this analytical process.

4.3.2. Pairwise Comparison Matrix

The pairwise comparison matrix constitutes a fundamental element of the AHP, a systematic and hierarchical decision-making approach utilized for assessing and prioritizing alternatives based on multiple criteria. In the context of the AHP hierarchy developed for selecting the optimal rebranding strategy for ornamental fish farming in Depok, three principal decision criteria were identified and incorporated: Market Access (C1), Environmental Sustainability (C2), and Economic Feasibility (C3). These criteria were carefully chosen to reflect the diverse aspects influencing the success and sustainability of the rebranding efforts. The pairwise comparison matrix for these criteria is meticulously presented in Table 1. This matrix elucidates the relative significance of each criterion in relation to every other criterion, thereby facilitating a comprehensive and balanced evaluation process. It is noteworthy that the values within the matrix are derived from expert judgments, which compare the importance of each criterion pairwise, using a scale ranging from 1 (equal importance) to 5 (very strong importance). This structured approach ensures that the final decision is grounded in a thorough and objective assessment of all relevant factors. By employing this scale, the evaluation process remains nuanced and reflective of the specific context and priorities of the stakeholders involved.

Table 1. AHP Criteria

	C1	**C2**	**C3**
C1	1	3	5
C2	1/3	1	2
C3	1/5	1/2	1
Sum	1.53	4.5	8

Table 1 presents the pairwise comparison matrix for the AHP criteria, revealing several insightful relationships among the decision factors. Notably, Market Access (C1) is considered to hold three times the importance of Environmental Sustainability (C2) and five times the importance of Economic Feasibility (C3). This underscores the significant role that market dynamics play in the strategic decision-making process for ornamental fish farming in Depok. Furthermore, Environmental Sustainability (C2) is deemed twice as important as Economic Feasibility (C3), reflecting a commitment to ecological considerations in the pursuit of long-term success.

These comparisons were meticulously conducted using a predetermined numerical scale, resulting in a matrix that was subsequently employed to compute the weights or priorities of each criterion. The sum of the values in each column of the matrix is particularly noteworthy, as it signifies the relative importance of that criterion in comparison to the others. For instance, the sum of the values in the Market Access column is 1.53, indicating a high level of influence in the decision-making process. In contrast, the sum of the values in the Environmental Sustainability column is 4.5, and for Economic Feasibility, it is 8.

To further refine the analysis, the next step involved normalizing the pairwise comparison matrix. This process was undertaken to ensure that the values within the matrix are proportionally scaled, facilitating a more accurate comparison of the criteria. The normalization process involved dividing each element in the matrix by the sum of its respective columns. This transformation yields a normalized pairwise comparison matrix, where the sum of the values in each column equals one.

Table 2. AHP Normalized Pairwise Comparison Matrix

	C1	**C2**	**C3**	**Criteria Weights**
C1	0.65	0.67	0.63	(0.65 + 0.67 + 0.63) / 3 = 0.65
C2	0.22	0.22	0.25	(0.22 + 0.22 + 0.25) / 3 = 0.23
C3	0.13	0.11	0.13	(0.13 + 0.11 + 0.13) / 3 = 0.12

Table 2 presents the AHP Normalized Pairwise Comparison Matrix, offering a nuanced perspective on the relative weights or priorities of each criterion. This table is a result of a meticulous normalization process, where each element in the original pairwise comparison matrix was divided by the sum of its respective column. This transformation ensures that the values within the matrix are proportionally scaled, enabling a more precise and meaningful comparison of the criteria.

The normalized matrix reveals that Market Access (C1) holds a significant weight of 0.65, indicating its prominent role in the decision-making process. This high value underscores the critical importance of market dynamics in the strategic rebranding of ornamental fish farming in Depok. Environmental Sustainability (C2), with a weight of 0.23, also plays a substantial role, reflecting the commitment to ecological considerations in the pursuit of sustainable and responsible business practices. Lastly, Economic Feasibility (C3) carries a weight of 0.12, highlighting the necessity of financially viable strategies.

The criteria weights were calculated by averaging the normalized values for each criterion, as illustrated in Table 2. This method ensures that the final weights are representative of the overall importance of each criterion relative to the others. The resulting weights of 0.65 for Market Access, 0.23 for Environmental Sustainability, and 0.12 for Economic Feasibility provide a clear and objective basis for evaluating the alternatives.

The consistency ratio (CR) calculation is a pivotal step in the AHP method, serving as a safeguard to ensure the reliability and validity of the decision-making process. This step is crucial for verifying that the judgments made in the pairwise comparisons are logically consistent, thereby enhancing the credibility of the final decision. Before determining the consistency ratio, it is essential to calculate the consistency index (CI) first. The CI provides a measure of the inconsistency in the pairwise comparison matrix. A lower CI value indicates a higher degree of consistency in the judgments made. The CI is calculated using the formula (1):

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad (1)$$

Where $\lambda_{\max}$ is the principal eigenvalue and n is the number of criteria. In this study, the value of n is 3, as there are three decision criteria: Market Access (C1), Environmental Sustainability (C2), and Economic Feasibility (C3).

Once the CI is obtained, the next step is to calculate the random index (RI), which is a value based on the number of criteria being compared. The RI value for $n = 3$ is 0.58, as reported by Mu and Pereyra-Rojas (2016). The CR is then calculated using the formula (2):

$$CR = \frac{CI}{RI} \quad (2)$$

The CR value serves as a critical indicator of the consistency of the pairwise comparison matrix. If the CR value is less than 0.1, the matrix is considered consistent, indicating that the decision-making process is reliable and valid. This threshold ensures that any inconsistencies in the judgments are within an acceptable range, thereby maintaining the integrity of the AHP method.

Following the verification of consistency, the next step in the AHP method is the calculation of the weighted sum, which is presented in Table 3. The weighted sum is obtained by multiplying the normalized values of each criterion by their respective weights and then summing the products for each alternative. This step integrates the relative importance of each criterion with the performance of each alternative, providing a comprehensive evaluation that considers all relevant factors.

Table 3. AHP Weighted Sum

	C1	**C2**	**C3**	**Weighted Sum**
C1	0.65	0.67	0.63	0.65 + 0.67 + 0.63 = 1.95
C2	0.22	0.22	0.25	0.22 + 0.22 + 0.25 = 0.69
C3	0.13	0.11	0.13	0.13 + 0.11 + 0.13 = 0.37

Furthermore, the maximum eigenvalue ($\lambda_{\max}$) was calculated to determine the CI. The $\lambda_{\max}$ value is a critical component in assessing the consistency of the pairwise comparison matrix. Table 4 outlines the calculation of $\lambda_{\max}$, which involves dividing the weighted sum by the priority vector.

Table 4. Calculation of $\lambda_{\max}$

Weighted Sum	**Priority**	**Sum**
1.95	0.65	3
0.69	0.22	3.13
0.37	0.13	2.84

The $\lambda_{\max}$ value is calculated by dividing the weighted sum by the priority vector, as shown in table 4. The calculation of $\lambda_{\max}$ is as follows (3):

$$\lambda_{\max} = \frac{(3 + 3.13 + 2.84)}{3} = 2.99 \quad (3)$$

Using the $\lambda_{\max}$ value, the consistency index (CI) can be calculated as follows (4):

$$CI = \frac{2.99 - 3}{3 - 1} = -0.005 \quad (3)$$

Finally, the consistency ratio (CR) can be calculated by dividing the consistency index (CI) by the random index (RI) (5):

$$CR = \frac{-0.005}{0.58} = -0.008 \quad (3)$$

A CR value less than 0.1 indicates that the matrix is reasonably consistent, thereby ensuring the reliability and validity of the decision-making process. In this case, the CR value is −0.008, which is well below the threshold of 0.1. This result confirms that our judgment matrix is consistent, providing confidence in the robustness and accuracy of the AHP method employed.

Table 5 presents the Alternatives AHP, which is the culmination of a meticulous evaluation process using the AHP method. This table displays the performance of each alternative against the established criteria, as well as their final scores, which are calculated using the weights derived from the pairwise comparison matrix.

Table 5. Alternatives AHP

	C1 (0.65)	**C2 (0.23)**	**C3 (0.12)**	**Final Score**
A1	0.65	0.7	0.6	(0.65 * 0.65) + (0.7 * 0.23) + (0.6 * 0.12) = 0.67
A2	0.23	0.2	0.3	(0.23 * 0.65) + (0.2 * 0.23) + (0.3 * 0.12) = 0.22
A3	0.12	0.1	0.1	(0.12 * 0.65) + (0.1 * 0.23) + (0.1 * 0.12) = 0.11

After conducting thorough pairwise comparisons for both the criteria and the alternatives, the AHP analysis yielded the final weights for each criterion. These weights, as previously calculated, are as follows: Market Access (C1) with a weight of 0.65, Environmental Sustainability (C2) with a weight of 0.23, and Economic Feasibility (C3) with a weight of 0.12. These weights were then used to calculate the final scores for each alternative, as illustrated in Table 5. The final scores were obtained by multiplying the weight of each criterion by the corresponding score for each alternative and subsequently summing the products.

As shown in Table 5, Alternative A1 achieved the highest final score of 0.67. This was followed by Alternative A2 with a score of 0.22, and Alternative A3 with a score of 0.11. These scores indicate that Alternative A1 is the most preferred strategy for rebranding ornamental fish farming in Depok. This preference is largely due to its exceptional performance in terms of Market Access, which was the most heavily weighted criterion in the decision-making process. While Alternative A2 and Alternative A3 also hold significance, their relatively lower scores reflect their lesser impact on Market Access and Economic Feasibility.

The AHP analysis not only identified the optimal rebranding strategy but also revealed the broader implications of these strategies on the SDGs. Firstly, by enhancing market access and economic feasibility, digital marketing can contribute to increasing income for fish farmers, thereby reducing poverty levels and supporting SDG 1 (No Poverty). Secondly, all three strategies promote sustainable practices and improve market opportunities, directly aligning with SDG 8 (Decent Work and Economic Growth). Lastly, sustainability certification programs encourage environmentally friendly practices that protect aquatic ecosystems, thus supporting SDG 14 (Life Below Water).

The high weighting of market access in the AHP analysis underscores the current challenges faced by ornamental fish farmers in Depok, such as limited market reach and intense competition. Digital marketing emerged as the top strategy due to its potential to significantly enhance visibility and connect with broader markets. Although environmental sustainability is a crucial factor, its lower weighting compared to market access suggests that immediate economic benefits are a higher priority for stakeholders. Nevertheless, integrating sustainability through certification programs remains vital for long-term viability and the overall success of the rebranding efforts.

By employing the AHP method, the decision-making process becomes transparent, data-driven, and aligned with strategic objectives. This structured approach ensures that the final decision is robust,

reliable, and reflective of the priorities and needs of the stakeholders involved in the rebranding of ornamental fish farming in Depok.

5. Conclusion

5.1. Conclusion

The study successfully applied the Analytic Hierarchy Process (AHP) to prioritize rebranding strategies for ornamental fish farming in Depok, demonstrating the effectiveness of this structured decision-making approach. The results of the AHP analysis indicated a clear preference for digital marketing as the most favored strategy. Following closely were sustainability certification and community outreach programs, each with significant roles to play in the rebranding effort.

The high weighting of market access in the AHP analysis reflected the pressing challenges currently faced by ornamental fish farmers in Depok. These challenges include limited market reach and intense competition, both of which hinder the growth and success of the industry. By emphasizing market access, the AHP method highlighted the urgent need to address these obstacles to unlock the full potential of the ornamental fish farming sector.

Moreover, the prioritized rebranding strategies were found to contribute to several Sustainable Development Goals (SDGs). Specifically, the strategies aligned with SDG 1 (No Poverty) by aiming to increase income for fish farmers through enhanced market access and economic feasibility. Additionally, they supported SDG 8 (Decent Work and Economic Growth) by promoting sustainable practices and improving market opportunities. Lastly, the strategies directly supported SDG 14 (Life Below Water) by encouraging environmentally friendly practices that protect aquatic ecosystems.

One of the key strengths of the AHP analysis was its incorporation of inputs from various stakeholders. This inclusive approach ensured a comprehensive evaluation that balanced immediate economic needs with long-term sustainability goals. By considering the perspectives of different stakeholders, the decision-making process became more robust and reflective of the collective priorities and aspirations of those involved in the ornamental fish farming industry in Depok.

In conclusion, the successful application of the AHP method in this study underscored its value as a tool for strategic decision-making. The results provided a clear roadmap for rebranding efforts, emphasizing the importance of digital marketing while also recognizing the significance of sustainability certification and community outreach programs. The alignment of these strategies with the SDGs further highlighted their potential to drive positive change, both for the industry and the broader community.

5.2. Limitation

While the study provided valuable insights into the prioritization of rebranding strategies for ornamental fish farming in Depok, several limitations must be acknowledged. Firstly, the AHP analysis considered only three criteria and three alternatives. Although these were carefully selected to represent key aspects of the decision-making process, they may not have encompassed all relevant factors affecting the rebranding efforts. The complexity of the ornamental fish farming industry and the diverse range of influences at play suggest that additional criteria and alternatives could have provided a more comprehensive evaluation.

Secondly, the study relied on the input of a limited number of stakeholders. While efforts were made to include a diverse range of perspectives, the sample size may not have been fully representative of all stakeholder groups. This limitation could potentially introduce biases or overlook important viewpoints, thereby affecting the robustness of the findings. A more extensive stakeholder engagement process could have yielded a more nuanced and inclusive set of inputs, enhancing the validity of the results.

Thirdly, the study did not consider the potential impact of external factors on the effectiveness of the prioritized rebranding strategies. Factors such as changes in market demand, fluctuations in economic conditions, or shifts in government policies can significantly influence the success of any rebranding initiative. By not incorporating these dynamic elements into the analysis, the study may have overlooked critical variables that could affect the implementation and outcomes of the proposed strategies. A more dynamic and adaptive approach that accounts for these external factors could provide a more realistic and forward-looking assessment.

In summary, while the AHP method offered a structured and systematic approach to decision-making, the limitations outlined above highlight areas for potential improvement in future research. Addressing these limitations could enhance the comprehensiveness, representativeness, and practical applicability of the findings, ultimately providing a more robust foundation for strategic decision-making in the ornamental fish farming industry in Depok.

5.3. Suggestion

Future studies could substantially augment the current research by expanding the AHP analysis to incorporate a broader range of criteria and alternatives, including social and cultural factors such as consumer preferences and local traditions, as well as environmental considerations like climate change impacts and biodiversity conservation. Engaging a larger and more diverse cohort of stakeholders encompassing fish farmers, industry experts, policymakers, environmental advocates, and consumers would ensure a more comprehensive and representative evaluation. To address the influence of external factors, future research could employ scenario analysis or sensitivity analysis to rigorously assess the robustness of the prioritized rebranding strategies under varying market conditions and policy environments. Furthermore, integrating advanced decision-making methods, including the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), the Preference Ranking Organization Method for Enrichment of Evaluations (PROMETHEE), Multi-Criteria Decision Analysis (MCDA) with Fuzzy Logic, Agent-Based Modeling (ABM), and sophisticated Machine Learning (Harriz, Akbariani, Setiyowati, & Santoso, 2023b) and Artificial Intelligence (AI) techniques (Setiyowati, Mayatopani, Hariyanto, & Harriz, 2024), could further refine and enhance the evaluation process. Additionally, adopting a longitudinal approach to monitor the long-term impacts of the implemented rebranding strategies, coupled with developing comprehensive impact assessment frameworks to measure social, economic, and environmental outcomes, would ensure alignment with the SDGs. By incorporating these state-of-the-art methods and considerations, future studies can provide a more thorough, robust, and forward-looking evaluation of rebranding strategies for ornamental fish farming in Depok, thereby elevating the decision-making process and ensuring that the selected strategies are effective, sustainable, and aligned with the broader objectives of the industry and the community.

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