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Analysis of Key Entrepreneurial Success Factors in Tilapia Hatchery Businesses

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ABSTRACT

Aim: This study explores the key factors influencing the success of tilapia hatchery businesses in Nagori Wonorejo, with a particular focus on social capital and social media utilization. By understanding these factors, the research aims to provide insights into effective strategies that can enhance business sustainability and competitiveness in the aquaculture sector.
Method: A quantitative research design was applied, utilizing multiple linear regression analysis to assess the relationship between social capital, social media utilization, and business success. Data were obtained through structured questionnaires distributed to tilapia hatchery entrepreneurs. To ensure reliability and validity, statistical evaluations, including validity tests, reliability assessments, and hypothesis testing, were conducted using appropriate analytical tools.
Findings: The results indicate that social capital does not have a significant partial effect on business success, likely due to the fluctuating nature of social interactions, which makes its influence inconsistent. However, social media utilization plays a crucial role, significantly contributing to business expansion through digital marketing, customer interactions, and network development. When examined collectively, social capital and social media utilization together influence business performance, suggesting that while social capital alone may not drive success, its combination with digital strategies enhances efficiency and market reach.
Significance: These findings emphasize the increasing importance of digital adaptation in aquaculture businesses, demonstrating that entrepreneurs who effectively integrate digital tools with strong business relationships have a greater likelihood of achieving long-term stability and competitive advantage. This study provides practical insights for policymakers, financial institutions, and industry stakeholders in developing supportive policies, funding opportunities, and training programs to strengthen the resilience and growth of small-scale hatchery businesses.

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INTRODUCTION

Indonesia's rapidly increasing population—estimated at 238.5 million in 2015 and projected to surpass 271 million by 2020 (BPS, 2015)—has intensified national concerns around food availability and nutritional adequacy. In response to these growing demands, fish farming has emerged as a practical solution to ensure accessible and affordable sources of animal protein. Among the varieties of fish cultivated, tilapia (Oreochromis niloticus) has gained widespread acceptance due to its favorable taste, affordability, and ease of access for lower-income communities. Its biological characteristics, such as fast reproduction and adaptability to confined spaces, make it highly suitable for cultivation by small-scale and household-based farmers, as recommended by the Food and Agriculture Organization (FAO) (Suryanto, 2010).

The rising demand for tilapia has naturally increased the need for its hatchery operations, particularly in supplying fingerlings to support the broader supply chain. In regions such as Wonorejo Village, local farmers have begun to develop hatchery systems using multiple ponds. However, despite having a seemingly adequate number of production units, many hatchery businesses still fall short of meeting market expectations, as indicated by the constant sell-out of available fingerlings. This situation highlights the presence of operational and entrepreneurial challenges that go beyond technical fish

farming skills and instead point toward broader management and growth factors (Adégbola et al., 2022; Dhinakaran, 2023).

In the digital era, two non-material factors have gained importance in supporting business growth, particularly in micro and small enterprises: social media utilization and social capital. Social media serves as a low-cost yet high-impact marketing platform that allows entrepreneurs to expand their visibility and reach new customers with speed and ease. On the other hand, social capital—comprising elements such as interpersonal trust, reciprocal relationships, and active community engagement—has been identified as an essential resource for business continuity, especially in closely-knit rural communities (Siriringoringo & Anugrahini, 2023). These factors, when effectively integrated, may offer a competitive advantage for entrepreneurs facing limited access to formal capital and infrastructure.

To place these considerations in a broader scholarly context, recent studies have examined various drivers of entrepreneurship success, from institutional support to individual competencies. Recent discussions in entrepreneurship research have revealed a wide variety of elements that contribute to business success across different industries and cultural contexts. For example, Sevilla-Bernardo et al. (2024) emphasized the interconnectedness between entrepreneurial development, academic support, and societal outcomes, while Heriyati et al. (2024) investigated the evolution of social enterprises in Indonesia through the lens of business model innovation. Other studies such as those by George & Dhaliwal (2024) addressed the barriers experienced by women entrepreneurs in diverse settings, and Gómez-Olmedo et al. (2024) offered insight into how consumer behavior influences the performance of crowdfunding initiatives. Likewise, innovation strategies and collaborative efforts were examined by Navarro-Castillo et al. (2024) and Bae & Choi (2024) as key enablers of business resilience. In the agricultural sector, Tao et al. (2024) utilized decision-making models to identify strategic priorities for farming entrepreneurs, while Adam et al. (2024) explored factors that sustain female-led businesses. Contributions from Ntshangase et al. (2024) and Mishra & Mukherjee (2024) discussed the impact of digitalization and personal capability on business outcomes, especially in tourism and retail industries. Furthermore, research by Wahab et al. (2024), Chhabra et al. (2024), and Patiu et al. (2024) highlighted the relevance of institutional dynamics and entrepreneurial skill sets in ensuring business longevity. Managerial and operational aspects were also explored in studies by Gardner et al. (2024), Kimball (2024), and Mittal et al. (2024), who investigated leadership traits, startup mechanisms, and the significance of social entrepreneurship. Meanwhile, research by Stazharova et al. (2024), Maharaj & Doorasamy (2024), and Basher et al. (2024) explored business adaptation during economic disruption and crisis recovery. Collectively, these works offer meaningful insights into the dynamics of entrepreneurship under varying conditions.

Nevertheless, there remains a limited understanding of how social capital and digital engagement via social media interact to support the development and sustainability of businesses in rural aquaculture settings. Although several studies have explored either social or technological dimensions independently, few have analyzed their combined effects in the context of community-based hatchery enterprises, such as those engaged in tilapia breeding. In areas like Nagori Wonorejo, where aquaculture has become a key livelihood activity, understanding these influences is critical to unlocking sustainable growth strategies. This study seeks to address this research gap by examining the extent to which trust-based social networks and the use of digital platforms contribute to the entrepreneurial success of local tilapia hatchery businesses.

METHOD

Research Design

This study employs a quantitative research approach designed to explore the relationship between social capital, social media utilization, and business success in the context of small-scale tilapia hatchery enterprises. The research follows an explanatory research model, which aims to analyze and explain how specific independent variables (social capital and social media engagement) influence a dependent

variable (business success). By applying a multiple regression analysis, this study quantifies the extent to which these factors contribute to the success of fish hatchery businesses. The study utilizes structured surveys as the primary data collection method. This ensures that responses are systematically gathered and comparable across respondents. To enhance the depth of understanding, semi-structured interviews were also conducted with selected respondents. This mixed approach provides both numerical insights and qualitative perspectives, offering a more holistic view of how digital and social resources influence business performance.

Population and Sample

The population of this study consists of entrepreneurs engaged in tilapia hatchery operations in Nagori Wonorejo, Pematang Bandar District. This location was selected due to its active aquaculture sector, where local entrepreneurs manage breeding ponds to supply fish fingerlings to the broader market. Given the growing demand for tilapia, understanding the factors that contribute to the success of hatchery businesses in this region is crucial for improving sustainability and economic viability. A purposive sampling technique was used to select respondents who meet specific criteria:

- Actively involved in tilapia hatchery management.
- Utilize social media for business promotion and networking.
- Have been in operation for at least one year to ensure experience-based responses.

The total sample consists of 100 respondents, a sufficient number for statistical analysis based on multiple regression requirements. This sample size allows for meaningful inferences about the broader tilapia hatchery business community while maintaining feasibility in data collection.

Data Collection

The study collects data from both primary and secondary sources to ensure a comprehensive understanding of the research topic.

1. **Primary Data**

   Primary data were obtained directly from the tilapia hatchery entrepreneurs through structured survey questionnaires. The questionnaires were designed to capture:

   - Social Capital – respondents' perceptions of trust, reciprocity, and community engagement in their business.
   - Social Media Utilization – frequency and effectiveness of social media use for marketing and customer interaction.
   - Business Success – indicators such as revenue growth, production output, and customer base expansion.

   Each item in the questionnaire used a five-point Likert scale (1–5) to standardize responses and facilitate quantitative analysis. Additionally, semi-structured interviews were conducted with selected respondents to gain qualitative insights into how social interactions and digital platforms impact their business growth.

2. **Secondary Data**

   Secondary data were collected from various official sources and scholarly publications, including:

   - Government Reports: Data from Badan Pusat Statistik (BPS) and the Department of Fisheries related to Indonesia's aquaculture sector, including production trends and economic impact.
   - Academic Literature: Previous studies on entrepreneurship, social capital, and digital business strategies, serving as a theoretical foundation for this research.
   - Industry Reports: Documents providing insights into market conditions, supply chain dynamics, and consumer preferences related to tilapia aquaculture.

   These secondary sources support and validate the primary data, ensuring a well-rounded analysis of the research problem.

Measurement and Variables

This study investigates the impact of two key independent variables—social capital and social media utilization—on the business success of tilapia hatchery enterprises. The dependent variable, business success, is evaluated based on three key indicators: financial growth, which is measured through changes in annual revenue; production performance, assessed by the number of fish harvested per cycle;

and household economic stability, determined by the monthly per capita income of business owners. The first independent variable, social capital, represents the extent to which entrepreneurs leverage their social networks, trust, and community engagement to sustain and grow their businesses. It comprises three main aspects: institutional trust, which reflects reliance on local business networks and government support; social reciprocity, which involves the mutual exchange of resources and information among hatchery entrepreneurs; and community engagement, which indicates participation in local business-related activities and collaborations.

The second independent variable, social media utilization, examines how entrepreneurs use digital platforms to enhance business visibility and customer reach. This factor includes customer interaction, referring to the frequency of communication with buyers via social media; market expansion, which assesses the extent of online marketing efforts; and reliance on digital tools, indicating the adoption of e-commerce platforms or social media features designed for business operations. All variables are measured using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing for a structured and standardized evaluation of entrepreneurial success factors in the tilapia hatchery sector.

Data Analysis

To analyze the relationships between the independent and dependent variables, this study employs several statistical techniques, ensuring both descriptive and inferential analysis.

1. **Descriptive Statistical Analysis**

   Descriptive statistics are used to summarize key characteristics of the sample, including:

   a. Mean, standard deviation, variance – to assess the distribution of responses.
   b. Maximum, minimum, and range values – to identify variations in business success.
   c. Kurtosis and skewness – to evaluate the normality of data distribution.

2. **Inferential Statistical Analysis**

   Inferential analysis is conducted to test the research hypotheses and examine the effects of social capital and social media utilization on business success. The following methods are applied:

   a. Multiple Linear Regression Analysis

      A regression model is used to evaluate the predictive power of the independent variables on business success:

      $$Y = a + b_1X_1 + b_2X_2 + b_nX_n + e$$

      where:

      - Y = Business Success
      - X1 = Social Capital
      - X2 = Social Media Utilization
      - b1, b2 = Regression Coefficients
      - a = Constant
      - e = Error term

   b. Hypothesis Testing

      - t-test (Partial Influence Test): Examines the individual effect of social capital and social media on business success.
      - F-test (Simultaneous Influence Test): Determines whether both independent variables together significantly impact business success.
      - Adjusted R^2 (Coefficient of Determination): Measures the extent to which social capital and social media utilization explain variations in business performance.

RESULTS AND DISCUSSION

Results

Nagori Wonorejo is a region predominantly characterized by agricultural and aquaculture activities, with a significant portion of its land dedicated to rice fields and fish farming. Administratively, the village is part of Pematang Bandar District and is located approximately 3 km from the district capital. Given its reliance on agriculture and aquaculture, the area's economic stability largely depends on these sectors.

The land use distribution in Nagori Wonorejo reflects the community's strong dependence on farming, particularly rice cultivation. According to the most recent data, rice fields account for 63.78% of the total land area, making it the dominant land use category. Other land categories include dry land

(10.14%), residential yards (3.62%), and other mixed-use areas (22.46%). The dominance of agricultural land, particularly rice fields, suggests a potential synergy between farming and aquaculture, where land and water resources are managed collectively to optimize productivity.

Table 1. Land Use Distribution in Nagori Wonorejo (2020)

No	Land Use Description	Area (km^2)	Percentage (%)
1	Rice Fields	176	63.78
2	Dry Land	28	10.14
3	Residential Yards	10	3.62
4	Other Lands	62	22.46
Total	**-**	**276**	**100%**

Source: Kantor Pangulu Nagori Wonorejo, 2020

As shown in Table 1, the largest land use in Nagori Wonorejo is rice fields (63.78%), while the smallest portion is residential yards (3.62%).

The population distribution in Nagori Wonorejo provides insight into the available workforce and economic contributors in the community. The total population of 3,062 people is nearly evenly divided between males (51.40%) and females (48.60%). The slight predominance of males suggests a potentially higher engagement of men in labor-intensive sectors such as aquaculture and agriculture. However, the relatively balanced gender distribution indicates that economic contributions come from both men and women, which may have implications for the involvement of female entrepreneurs in fish hatchery businesses.

Table 2. Population by Gender in Nagori Wonorejo (2020)

No	Gender	Population (persons)
1	Male	1,574
2	Female	1,488
Total	**-**	**3,062**

From Table 2, it is evident that the male population (51.40%) slightly exceeds the female population (48.60%).

Among the respondents surveyed for this study, the majority fall within the 21–40 age range, comprising 66.67% of the sample. This indicates that the fish hatchery industry in Nagori Wonorejo is primarily managed by individuals in their prime working years, suggesting a stable and experienced workforce in the sector. Interestingly, a notable proportion of younger entrepreneurs, aged 19–20 years (10% of respondents), have also entered the industry, reflecting growing interest among younger generations in aquaculture as a viable livelihood option.

Table 3. Age Distribution of Respondents

Age Range	Frequency	Percentage (%)
1–20 years	3	10.00
21–40 years	20	66.67
41–60 years	7	23.33
Total	**30**	**100%**

Source: Primary Data Processed, 2020

The longevity of businesses surveyed in this study highlights the relative youth of the fish hatchery sector in Nagori Wonorejo. Most businesses (83.33%) have been in operation for less than ten years, while only a small fraction (3.33%) has operated for more than two decades. This suggests that fish hatchery enterprises in the region are still in a developmental phase, potentially facing challenges related to sustainability and long-term viability.

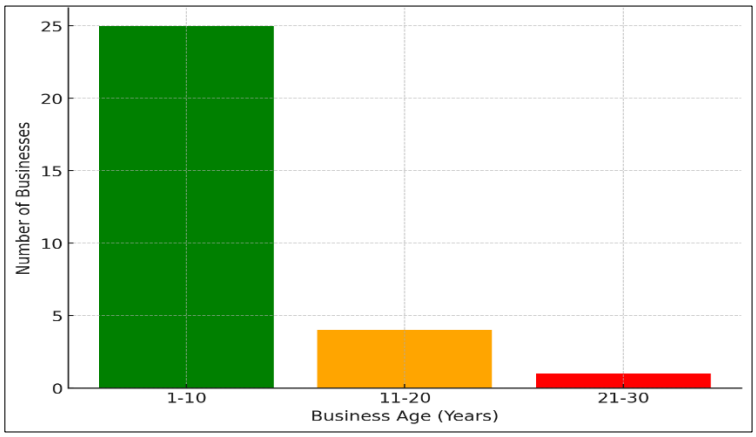

Figure 1. Business Longevity in Tilapia Hatchery Industry (2020)

The majority of hatchery businesses (83.33%) have been operating for less than 10 years, indicating a relatively young industry in the region.

The operational and financial performance of hatchery businesses in Nagori Wonorejo demonstrates a structured approach to fish production. On average, each business produces 364,667 fish per cycle, requiring approximately 447,000 fingerlings and 28 kg of feed per cycle. The high demand for feed is reflected in the significant costs associated with fish farming, with total feed expenses averaging Rp 10,217,000 per cycle. Additional expenses include the use of chemical fertilizers (Rp 88,800 per cycle) and miscellaneous costs (Rp 713,333 per cycle).

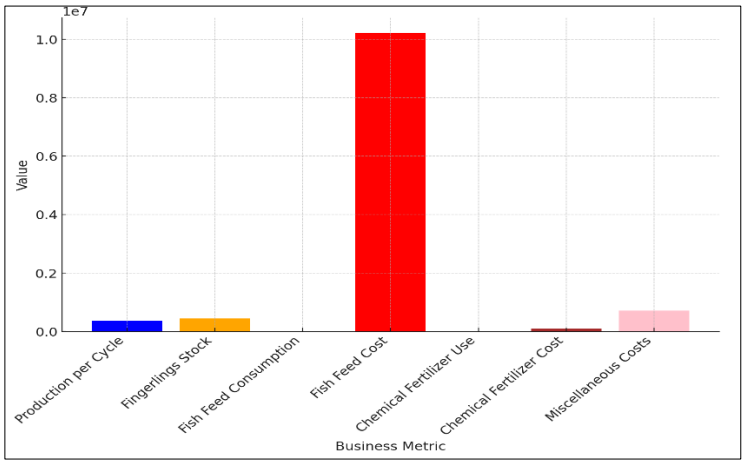

Figure 4. Bar Chart of Operational Costs and Production Metrics in Tilapia Hatchery Businesses

The findings of this study reveal critical aspects of the fish hatchery industry in Nagori Wonorejo. The region's strong agricultural base provides a supportive environment for aquaculture, but businesses still face challenges related to sustainability and operational costs. The sector is largely dominated by individuals in their productive working years, with a growing presence of young entrepreneurs entering the industry. The majority of hatchery businesses are still relatively new, emphasizing the need for continued support and innovation to ensure long-term growth. The financial investment required for hatchery operations further underscores the importance of strategic management, particularly in optimizing feed consumption and production efficiency.

Discussion

The findings of this study provide valuable insights into the dynamics of tilapia hatchery businesses in Nagori Wonorejo, particularly in relation to land use, population demographics, business characteristics, and operational efficiency. The analysis highlights key factors that influence the success of fish hatchery businesses, including the role of social capital and social media utilization, which serve as critical determinants in business performance (Syabena et al., 2023). The land use distribution in Nagori Wonorejo is dominated by agricultural land, particularly rice fields, which occupy 63.78% of the

total area (Badan Pusat Statistik, 2020). This reflects the traditional reliance of the local economy on farming and aquaculture, which are interdependent in rural economies. While dry land and residential yards make up a smaller percentage of land use, the presence of other land types (22.46%) suggests potential for expanding aquaculture activities. The availability of water resources, labor, and market demand plays a crucial role in determining the profitability and sustainability of tilapia hatchery businesses in this region (Suryanto, 2010).

From a demographic perspective, the male population (51.40%) slightly outnumbers the female population (48.60%), which aligns with the nature of the industry, where men typically dominate labor-intensive activities such as pond maintenance, fish feeding, and harvesting (Kawarazuka et al., 2020). However, the growing involvement of female entrepreneurs in small-scale aquaculture, particularly in the marketing and distribution aspects, cannot be overlooked (Gopal et al., 2020; Irwin et al., 2020). Moreover, the age distribution of fish hatchery entrepreneurs reveals that 66.67% fall within the 21–40 age group, suggesting that the sector is largely managed by individuals in their prime working years (BPS, 2020). Notably, 10% of respondents are young entrepreneurs aged 19–20 years, indicating a growing interest among the younger generation in fish farming as a viable economic activity.

An essential aspect of the study is the longevity of businesses, which highlights that 83.33% of tilapia hatchery businesses have been in operation for less than 10 years, with only 3.33% surpassing the 20-year mark. This trend suggests that the industry is still developing and expanding, with newer businesses entering the market. The relatively short operational history of most businesses may indicate challenges in long-term sustainability, such as access to capital, knowledge of efficient farming techniques, and adaptation to changing market demands (Hu & Zeng, 2024). These challenges emphasize the importance of support systems, training programs, and digital marketing strategies to ensure the continued success of new entrants in the industry.

Regarding business operations, the study found that on average, each hatchery produces 364,667 fish per cycle, requiring approximately 447,000 fingerlings and 28 kg of feed per cycle (BPS, 2020). The high dependency on feed is reflected in its significant cost, averaging Rp 10,217,000 per cycle, making it the largest operational expense in tilapia hatchery businesses. Additionally, chemical fertilizers are used in small quantities (15 kg per cycle), with an average cost of Rp 88,800, suggesting that while fertilizers are utilized, they do not constitute a major expense compared to feed. The miscellaneous costs, averaging Rp 713,333 per cycle, highlight the additional financial burden associated with running a hatchery, which may include maintenance, water management, and unforeseen operational challenges. A closer examination of the financial structure of these businesses indicates that profitability is highly dependent on production efficiency (Taufik, 2022). Given the significant investment in feed and fingerlings, hatchery owners must optimize their operations by minimizing losses, improving breeding techniques, and leveraging technology for efficient management. The high cost of feed suggests that any price fluctuations in fish feed could have a direct impact on business sustainability, making it essential for entrepreneurs to explore alternative feed sources or adopt cost-saving strategies (Sezgin & Aydın, 2021). The role of social capital and social media utilization in the success of tilapia hatchery businesses is another crucial aspect of this study. Social capital, which encompasses institutional trust, reciprocity, and community engagement, provides a supportive environment for business operations (Guragain, 2024). Entrepreneurs who actively participate in business networks and maintain strong relationships with buyers, suppliers, and other stakeholders are more likely to experience business stability. Additionally, the utilization of social media platforms has emerged as a powerful tool for marketing and customer engagement. Entrepreneurs who leverage digital platforms for product promotion, customer interaction, and market expansion can significantly enhance their business visibility and sales performance.

The findings indicate that social media is an effective means of expanding customer reach and improving business performance. Entrepreneurs who actively engage with their customers through Facebook, Instagram, WhatsApp, and other digital platforms benefit from enhanced brand recognition and increased sales (Mir et al., 2024). The role of social media in facilitating direct communication with

customers allows hatchery businesses to build stronger relationships with buyers, gather feedback, and adjust their strategies based on market demand (Sanbella et al., 2024; Wu et al., 2022). The ease of information dissemination and access to a broader market gives businesses a competitive advantage over those that rely solely on traditional marketing methods.

Despite the benefits of social media and social capital, several challenges persist in the industry. The study identifies financial constraints, limited access to technology, and knowledge gaps as major hurdles that affect the growth and sustainability of hatchery businesses. Additionally, external factors such as market price fluctuations, environmental conditions, and regulatory policies can pose risks to long-term profitability. Addressing these challenges requires a multi-faceted approach that includes training programs, financial assistance, and policy interventions to create a more conducive environment for aquaculture development. In conclusion, the study underscores the importance of production efficiency, digital marketing, and community support in determining the success of tilapia hatchery businesses. While the industry presents significant opportunities for economic growth and employment, overcoming key challenges such as cost management, technological adaptation, and market access remains essential for ensuring the long-term viability of these businesses.

Implications

The findings of this study highlight key implications for entrepreneurs, policymakers, financial institutions, and aquaculture support organizations. Tilapia hatchery owners must enhance production efficiency, particularly in feed cost management, as it represents the largest operational expense. Exploring alternative feed sources, optimizing feeding strategies, and fostering cooperative networks can improve sustainability and profitability. Strengthening business relationships through social capital also provides greater access to financial resources, knowledge-sharing, and market opportunities.

From a policy perspective, government support is essential in facilitating credit access, providing technical training, and introducing subsidies for fish feed. Establishing cooperative models and digital marketplaces can enhance market reach and create fairer pricing structures. Financial institutions should offer low-interest loans and financial literacy programs to support the expansion of small-scale hatcheries. Additionally, aquaculture extension services should focus on capacity-building initiatives, equipping farmers with skills in modern hatchery techniques, disease prevention, and digital marketing to boost competitiveness in an increasingly online-driven market.

Limitations and Future Research

This study is limited to Nagori Wonorejo, which may not fully represent conditions in other regions. Future research should include multiple locations to provide a broader perspective. The sample size is also limited, focusing mainly on hatchery entrepreneurs. Expanding the study to include input suppliers, middlemen, and consumers would offer a more comprehensive understanding of the tilapia supply chain. The research primarily examines business operations, excluding environmental sustainability and climate resilience. Future studies should explore water management, disease control, and climate adaptation strategies to improve long-term aquaculture sustainability. Additionally, the study is based on cross-sectional data, which does not capture seasonal fluctuations or long-term business cycles. Conducting longitudinal research would provide deeper insights into market trends and industry challenges over time.

Further investigation is needed on sustainable feed alternatives, the role of digital transformation in aquaculture, and consumer market preferences. Exploring cost-effective feeds and AI-driven farm management tools could enhance efficiency. Understanding consumer behavior, pricing strategies, and sustainability concerns would help hatchery businesses align with market demands. Finally, gender participation in aquaculture remains underexplored. Research on barriers faced by women entrepreneurs and strategies for promoting gender-inclusive aquaculture businesses would provide valuable insights for fostering equitable industry growth. Addressing these gaps will contribute to a holistic understanding of aquaculture success and inform policies to ensure the long-term sustainability of the sector.

CONCLUSION

The findings of this study indicate that social capital does not have a significant partial effect on the success of tilapia hatchery businesses, as reflected by a significance value of 0.066 (>0.05), suggesting that the ever-changing nature of social relationships makes its impact less predictable. In contrast, social media utilization has a significant partial effect, with a significance value of 0.000 (<0.05), demonstrating the growing role of digital platforms in expanding market reach, facilitating business networking, and enhancing promotional efforts. Additionally, when analyzed together, social capital and social media utilization significantly influence business success, as indicated by an F-value of 14.917 and a significance level of 0.000, showing that while social capital alone may not be a strong determinant, its integration with digital engagement strategies helps improve operational effectiveness and competitive positioning. These results emphasize the importance of digital adaptation in the aquaculture sector, suggesting that entrepreneurs who leverage technology while maintaining collaborative business relationships will have a greater potential for long-term sustainability and growth.

AUTHOR CONTRIBUTIONS STATEMENT

The Author Contributions Statement can be up to several sentences long and should briefly describe the tasks of individual authors. The Author Contributions Statement should be included at the end of the manuscript before the References.

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