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Local Honeybee Postharvest and Marketing Challenges in Bongkasa Pertiwi Village, Bali, Indonesia

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ABSTRACT

Sarining Trigona Pertiwi, a beekeeping group established on June 6, 2020, in Bongkasa Pertiwi Village, Badung Regency, Bali, emerged during the COVID-19 pandemic to provide supplementary income amidst economic turmoil. Starting with 470 colonies of stingless bees, including *Tetragonula laevicheps* and *Heterotrigona itama*, the organization has expanded to 620 colonies and now consists of 22 members. With financial backing from The Aqua, a private company, the group produces honey in 250 ml and 100 ml sizes and has embraced eco-tourism to educate visitors about honey harvesting and environmental conservation. Despite employing best practices such as regular hive inspections and sustainable harvesting methods, Sarining Trigona Pertiwi faces substantial postharvest and marketing challenges. These include a lack of standardized postharvest protocols, inadequate hygiene and storage practices, high moisture content in honey, and the absence of commercial licenses. Marketing obstacles encompass an undefined market, poor packaging and labeling, limited social media presence, and ambiguous brand identity. Addressing these issues is critical for enhancing Sarining Trigona Pertiwi's operations' productivity and sustainability, ensuring this community initiative's long-term success and economic stability.

Contribution to Sustainable Development Goals (SDGs)

SDG 1: No Poverty

SDG 2: Zero Hunger

SDG 8: Decent Work and Economic Growth

SDG 12: Responsible Consumption and Production

1. INTRODUCTION

1.1. Background

Bongkasa Pertiwi Village, located in the serene Badung Regency of Bali, Indonesia, is home to Sarining Trigona Pertiwi, a beekeeping group founded on June 6, 2020, during the COVID-

19 pandemic. This initiative emerged from the community leader's hobby and a need to generate additional income amid widespread job losses and economic uncertainty caused by the pandemic. The organization started with 470 colonies of stingless bees, including *Tetragonula laevicheps* and *Heterotrigona itama* species, and has since grown to 620 colonies. Sarining Trigona Pertiwi now comprises 22 members and offers honey in two sizes,



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250 ml, and 100 ml. With financial support from The Aqua, a private company, the organization has taken steps to develop its operations and contribute to community welfare.

Sarining Trigona Pertiwi demonstrates a commitment to sustainable beekeeping practices to ensure the longevity and productivity of their operations. Regular hive inspections are conducted to monitor colony health and disease management, aligning with best practices identified in similar studies [1]. The organization limits honey harvests during the rainy season to 30%, preserving 70% for the bees' sustenance, reflecting a dedication to colony welfare and sustainable honey production [2]. Moreover, their initiative in eco-tourism engages tourists in honey harvesting activities and promotes environmental stewardship within the community [3].

Despite their sustainable practices, Sarining Trigona Pertiwi faces substantial postharvest processing and marketing. Challenges Studies highlight similar issues within the local beekeeping industry, such as inadequate postharvest processing techniques, lack of standardized practices, and deficiencies in storage and inventory management [4]. The absence of licenses for commercial honey sales further hinders their market reach and profitability.

The marketing landscape presents additional hurdles for Sarining Trigona Pertiwi. Challenges include a lack of defined market segments, insufficient packaging and labeling standards, minimal social media presence, and an unclear brand identity. These factors limit their ability to expand beyond the local community [5]. Research emphasizes the critical role of efficient marketing structures in enhancing the profitability of bee products, highlighting the need for improved packaging, promotional strategies, and market access [6].

A descriptive method employing qualitative data analysis is recommended to address these challenges effectively. This approach will provide insights into specific issues faced by Sarining Trigona Pertiwi, facilitating tailored solutions for enhancing postharvest processing techniques and refining marketing strategies. Studies on local product marketing underscore the importance of digital tools and adaptive strategies to remain competitive in dynamic markets [7].

The case of Sarining Trigona Pertiwi in Bongkasa Pertiwi Village showcases both the potential and challenges of community-based beekeeping enterprises. By addressing postharvest processing deficiencies and adopting robust marketing strategies, Sarining Trigona Pertiwi can unlock its full potential, contributing to sustainable economic development and environmental stewardship in the region.

Above all, the researchers aim to gain a holistic understanding of postharvest and marketing operations to provide a solution to address this gap. Through a comprehensive assessment, the researchers seek to: 1). Identify the postharvest and marketing challenges. 2). Propose a Business Recommendation to address the business challenges.

1.2. Literature Review

1.2.1. Theoretical Framework

Integrated Theories of Supply Chain Management and Market Orientation Theory ground the present study. The two theories highlight the need to address both the logistical and market-driven aspects of postharvest management and marketing (Figure 1).

To establish Sarining Trigona Pertiwi as a successful enterprise in Bali, Indonesia, integrating theories of Supply Chain Management (SCM) and Market Orientation is crucial. As conceptualized by Ref. SCM [8], focuses on managing the flow of goods and services from raw materials to final products. For Sarining Trigona Pertiwi, a beekeeping group, this entails optimizing processes from bee sourcing to postharvest management and marketing. Recent literature emphasizes the evolving nature of SCM, highlighting the importance of digitalization and sustainability practices within supply chains [9]. Identifying bottlenecks in these stages—such as bee sourcing costs, inconsistent harvesting methods, and challenges in brand positioning—will be pivotal in devising practical solutions to enhance operational efficiency and product quality.

According to Ref. [8], SCM involves "integrating and coordinating the flows of materials and information among all partners in the supply chain to achieve superior customer value at less cost." This concept emphasizes the importance of streamlining operations to meet consumer demands effectively. Recent studies have underscored the role of agility and resilience in SCM, particularly in volatile environments such as agriculture, suggesting that adaptive strategies can mitigate risks and improve performance [10]. For Sarining Trigona Pertiwi, applying SCM principles will involve addressing supply challenges through strategic partnerships for reliable bee sourcing, implementing standardized harvesting techniques, and improving postharvest processes to ensure product consistency and quality.

Moreover, the Market Orientation theory, articulated by Ref. [11-12], complements SCM by emphasizing customer-centric strategies. Market Orientation involves generating market intelligence, disseminating it across the organization, and responding to customer needs effectively. This approach is crucial for Sarining Trigona Pertiwi to identify target markets, understand consumer preferences for bee products, and develop tailored marketing strategies that resonate with eco-conscious tourists and local consumers in Bali.



Figure 1. Theoretical Framework

Recent research by Ref. [13-14] explores the integration of Market Orientation with digital marketing strategies, suggesting that leveraging digital platforms enhances market responsiveness and customer engagement. This digital aspect is increasingly relevant for Sarining Trigona Pertiwi, as it seeks to connect with people who are well-versed in technology and are interested in sustainable and authentic agricultural experiences.

Define Market Orientation [11] as "the organization-wide generation of market intelligence," highlighting the importance of customer insights in shaping business strategies. [12] extend this by emphasizing that Market Orientation adopts an organizational culture focused on creating superior customer value and achieving sustained business performance. For Sarining Trigona Pertiwi, adopting a Market Orientation will involve conducting market research to understand consumer preferences for eco-friendly products and developing marketing campaigns highlighting the unique benefits of their organic honey and bee-related products.

Integrating SCM and Market Orientation, theories will enable Sarining Trigona Pertiwi to achieve a holistic approach to business development. By optimizing supply chain processes and aligning them with market demands, the beekeeping group can enhance operational efficiency, improve product quality, and effectively cater to consumer needs. This integration addresses immediate challenges in postharvest production and marketing and lays a foundation for sustainable growth and customer satisfaction in Bali's competitive agri and eco-tourism sectors.

In conclusion, the application of Supply Chain Management and Market Orientation theories offers Sarining Trigona Pertiwi a comprehensive framework to navigate postharvest and marketing challenges and take on the opportunity to establish itself as a potential agri and eco-tourism enterprise in Bali, Indonesia. By leveraging these theoretical insights with practical solutions, the beekeeping group can create a path toward sustainable growth, profitability, and positive community impact.

1.2.2. Conceptual Framework

The researchers will apply the Input-Process-Output (IPO) model to conceptualize the framework for the research study of "Local Honeybee Postharvest and Marketing Challenges in Bongkasa Pertiwi Village, Bali, Indonesia." (Figure 2),

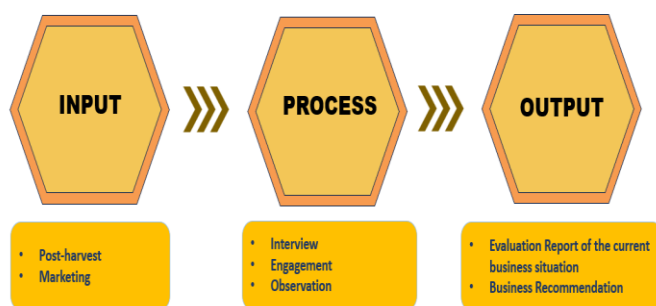


Figure 2. Conceptual Framework

The input phase identifies the challenges faced in postharvest and marketing operations. Postharvest issues include the absence of standardized practices, insufficient hygiene and sanitation measures, ineffective storage and inventory procedures, high moisture and water content of honey, and the lack of necessary sales licenses. Marketing challenges include a transparent or specific market, inadequate packaging and labeling, lack of social media presence, and an unclear brand identity.

The research phase involves gathering data through interviews, engagement, and observation. Semi-structured interviews with key stakeholders provide detailed insights into

the postharvest processes, marketing strategies, challenges, and best practices. Engagement in the organization's daily operations, including hive inspections, honey harvesting, processing, and packaging, allows for a first-hand understanding of seasonal variations and operational phases. Additionally, observation of beekeeping activities, postharvest processes, and marketing efforts focuses on hygiene and sanitation practices, storage procedures, packaging, and customer interactions.

The output phase is the tangible and actionable results the researchers will derive from processing the input data. The researchers will develop an Evaluation Report of the current business situation, which details all findings from interviews, engagement, and observation, providing a holistic view of Sarining Trigona Pertiwi in Bongkasa Pertiwi Village. Another output that the researcher will come up with is the Business Recommendation based on the evaluation report. This business recommendation strategy will focus on bridging the gaps and providing solutions to post-harvesting and marketing challenges.

1.3. Objective

To identify and evaluate the key challenges in postharvest processing and marketing faced by Sarining Trigona Pertiwi in Bongkasa Pertiwi Village. This objective focuses on understanding the issues affecting the group's operations, such as inadequate processing techniques and marketing hurdles, to provide a clear foundation for solutions.

To propose sustainable and practical business strategies for improving postharvest processes and marketing efforts. This objective aims to develop recommendations that optimize postharvest practices and enhance marketing strategies, such as better packaging, digital promotion, and brand development, ensuring the group's growth and market reach.

Integrate supply chain management and market orientation theories to address operational inefficiencies and market-driven challenges. This objective seeks to apply theoretical frameworks to improve Sarining Trigona Pertiwi's supply chain and market alignment, ensuring efficient operations and customer-centric marketing strategies for long-term sustainability.

2. Methodology

2.1. Method

This study employs a descriptive method with a qualitative approach to achieve specific objectives. The methodology covers several steps, including data collection through interviews, engagement, and observation. The data is then analyzed qualitatively to provide a comprehensive understanding of the challenges that the organization faces.

2.2. Participants

The participants of this study are the Key stakeholders, including the leader of Sarining Trigona Pertiwi, and other group members. Their insights were essential for a comprehensive understanding of their current problems.

2.3. Data collection

The primary data was collected through semi-structured interviews, engagement, and observation. Interviews involved key stakeholders such as the leader of Sarining Trigona Pertiwi and other group members, focusing on postharvest processes and

marketing strategies to gain insights into operational challenges. Engagement includes researchers actively participating in daily operations like hive inspections, honey harvesting, processing, and packaging to understand practical challenges and workflows. Observations were made on beekeeping activities, hygiene practices, storage procedures, packaging, and customer interactions to identify areas for improvement. Secondary Data Collection was obtained through a literature review. The literature review included academic journals and relevant publications on beekeeping and honey production to contextualize primary data within the global and local scope.

2.4. Data analysis

Data was organized into themes such as postharvest processes and marketing challenges. Coding was applied to identify recurring themes and patterns from the interview transcripts, observational notes, and documents. Triangulation was used to cross-verify data from interviews, observations, and secondary sources, ensuring the reliability and validity of the findings by seeking convergence of evidence from different sources. Narrative construction involved creating detailed descriptive narratives to illustrate the postharvest and marketing challenges faced by Sarining Trigona Pertiwi, highlighting effective practices and areas for improvement. Finally, the findings were presented coherently and systematically, supported by quotes from primary and secondary data, and actionable recommendations were provided to address the identified challenges and enhance the sustainability and profitability of the beekeeping operations.

3. RESULT AND DISCUSSION

Table 1 presents the identified postharvest and marketing challenges faced by Sarining Trigona Pertiwi through the interviews conducted, engagement, and observations of the researchers on the organization's business operation.

Table 1. Postharvest and marketing challenges faced by Sarining Trigona Pertiwi

Postharvest <i>Identified challenges</i>	Marketing <i>Identified challenges</i>
Absence of standardized practices	No explicit or specific market
Insufficient hygienic/sanitation measures	Inadequate packaging and labeling
Absence of effective storage and inventory procedures	Lack of social media presence
High moisture/water content of honey	Locatability/discoverability
No license to sell	Unclear brand identity

3.1. Post-Harvesting Challenges

The absence of standardized practices or proper postharvest procedures is a significant challenge for Sarining Trigona Pertiwi. This deficiency leads to inconsistencies affecting honey's taste and quality and hinders the ability to scale operations effectively. It is best if the organization can adopt the best practices from other successful beekeeping organizations to emphasize the necessity of standardized procedures to maintain the quality of the honey and the efficiency of the business. Implementing these

standardized postharvest procedures is crucial for maintaining product quality and operational efficiency. Therefore, developing and documenting a set of standardized postharvest procedures tailored to the specific needs of Sarining Trigona Pertiwi is highly encouraged.

Insufficient hygiene and sanitation measures present another major problem. Poor hygiene can lead to contamination, affecting the safety and quality of honey and potentially causing health risks. High standards of cleanliness are essential in food production to prevent contamination and ensure product safety. Ensuring strict hygiene and sanitation of tools used in honey harvesting can significantly improve honey quality and safety. Thus, implementing a strict hygiene protocol, including regular cleaning schedules and sanitation training for all members, is advisable.

Another challenge is the absence of effective storage and inventory procedures, worsening postharvest activities. Ineffective storage and inventory management can result in honey spoilage, loss of inventory, and financial losses. Effective storage and inventory management are critical for efficiently preserving honey quality and managing supply. Proper storage and inventory procedures can help maintain product quality and optimize inventory management. Establishing a systematic storage and inventory management system, including temperature-controlled storage and regular inventory audits, is necessary.

High moisture and water content in the honey produced is another identified problem. High moisture content can lead to fermentation, affecting the taste and quality of honey. Ideal honey should have low moisture content to ensure stability and quality. Currently, Universitas Warmadewa is assisting the organization by sharing their laboratory, which contains the equipment used to reduce the water or moisture content of the honey produced by the stingless bees. This issue is a significant contributing factor to why Sarining Trigona Pertiwi lacks the license to sell honey, as their products do not meet the established honey standards in Indonesia. Controlling moisture content is essential for producing high-quality honey. Investing in moisture control equipment and training to ensure the honey is harvested and processed with optimal moisture levels is recommended.

The organization has no license to sell honey, limiting market access and restricting sales opportunities. A license is necessary to sell honey and legally access broader markets. Obtaining a license is crucial for expanding market opportunities and ensuring regulatory compliance. Applying for the required licenses and certifications to legally sell honey in various markets is essential.

3.1.1. Marketing Challenges

The marketing challenges faced by Sarining Trigona Pertiwi are equally significant. There is no clear or specific market for the honey, resulting in inefficient marketing efforts and missed sales opportunities. Identifying and targeting specific market segments can enhance marketing effectiveness and sales. Defining a clear market target is essential for focused and effective marketing strategies. Conducting market research to identify potential customer segments and tailor marketing strategies accordingly is necessary.

Inadequate packaging and labeling further hinder marketing efforts. Poor packaging can affect the product's attractiveness and safety, while inadequate labeling can hinder brand recognition and customer trust. High-quality packaging and clear labeling are important for product appeal and compliance with regulations.

Improving packaging and labeling can enhance product appeal and customer trust. Investing in professional packaging and labeling solutions to improve product presentation and compliance is advisable.

The organization also has no social media presence and cannot be located on Google Maps, which limits brand visibility and customer reach. Social media is a powerful tool for marketing and customer engagement, and being listed on Google Maps can improve local search visibility. Establishing an online presence is crucial for modern marketing and customer engagement. Creating and maintaining active social media profiles and ensuring the organization is listed on Google Maps for better online visibility is recommended.

Lastly, the brand identity is unclear, which can confuse customers and weaken brand loyalty. A strong, clear brand identity helps in building customer trust and loyalty. Establishing a clear and strong brand identity is vital for market differentiation and customer loyalty. Developing a clear brand identity, including a compelling brand story, consistent visuals, and a unique selling proposition to differentiate the product in the market, is essential.

3.1.2. Recommendations

Based on the study's findings, several strategic recommendations are proposed to address the identified postharvest and marketing challenges Sarining Trigona Pertiwi faces.

As a recommendation for postharvesting, developing a comprehensive quality assurance manual to standardize postharvest processes is imperative. This manual should be created in collaboration with private or public organizations to ensure it incorporates best practices in quality control, hygiene, sanitation, storage, and inventory management. Implementing standardized procedures will mitigate inconsistencies in honey quality, enhance product safety, and streamline operations, ultimately improving both the efficiency and scalability of honey harvesting. A member or delegate of Sarining Trigona Pertiwi can be introduced to and trained in these practices through the assistance of private or public linkages. This individual can then disseminate the acquired knowledge and skills to fellow members, facilitating a gradual improvement in addressing the identified gaps.

As a recommendation for marketing, a revamp of the existing labeling and packaging is essential. Investing in high-quality, professional packaging and labeling solutions will enhance the honey products' visual appeal and ensure compliance with regulatory standards. Clear and attractive packaging can significantly boost brand recognition and consumer trust, driving sales and market expansion. In addition, creating informative and visually appealing infographics about stingless honeybees and the honey they produce is recommended. These graphics should highlight stingless bee honey's unique characteristics and medical benefits, educate consumers, and differentiate the product in the market. This educational approach can increase consumer awareness and appreciation, promoting greater demand for the product. Building a robust social media presence for modern marketing and customer engagement is also crucial. Active profiles on platforms such as Facebook, Instagram, and Twitter can enhance brand visibility, facilitate direct communication with customers, and provide a platform for sharing educational content and promotional campaigns. Additionally, ensuring that Sarining Trigona Pertiwi is pinned on Google Maps will improve

capability and discoverability, attracting more visitors and potential customers to the village.

Another recommendation is to develop tour activities and impose a standard fee for visiting tourists to generate additional revenue and promote the beekeeping project as a unique eco-tourism experience. Structured tours with interactive honey harvesting demonstrations and educational sessions about stingless bees can enhance the visitor experience. Establishing a strong brand identity is fundamental for positioning Sarining Trigona Pertiwi as an eco or agri-tourism spot. The brand should be clearly defined and communicated, emphasizing beekeeping practices' eco-friendly and sustainable nature. Including Sarining Trigona Pertiwi in local and international tour packages can enhance its visibility and attractiveness as a tourist destination.

Furthermore, incorporating the B.E.E. abbreviation as part of the brand can effectively communicate the core values and mission of the organization. The dual meanings—B-Beneficial, E-Economical, E-Ecological and B-Become, E-Educational, E-Enterprising—highlight the multi-layered benefits and aspirations of the beekeeping initiative, reinforcing its appeal to both local communities and tourists. These recommendations, when implemented, can significantly enhance the operational efficiency, market reach, and overall sustainability of Sarining Trigona Pertiwi, which may lead to its continued growth and success as a community-based enterprise.

4. CONCLUSION

On the marketing front, enhancing product labeling and packaging, combined with educational infographics, will strengthen brand recognition and build consumer trust. A robust social media presence will further increase visibility and customer engagement. Additional strategies, such as listing Sarining Trigona Pertiwi on Google Maps and developing eco-tourism experiences, can diversify income streams while positioning the enterprise as a distinctive community attraction. Finally, creating a compelling brand identity—potentially leveraging the B.E.E. (Beekeeping, Eco-consciousness, Entrepreneurship) concept to reflect the organization's core values—will solidify its market positioning. Together, these initiatives provide a holistic framework that will drive the sustainable growth and long-term success of Sarining Trigona Pertiwi, transforming it into a thriving, community-based enterprise.

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