



Acceleration of Siamese Citrus Agro Business through Food Processing Technology and Digital Marketing

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Abstract—This article discusses the outcomes of a community service program conducted to accelerate the Siamese citrus agro-business in Pelaga Village, Bali. The initiative focused on addressing key challenges faced by local farmers, including limited post-harvest processing capabilities and a lack of digital marketing knowledge. The program aimed to empower farmers by introducing modern food processing technologies and enhancing their digital marketing skills, thereby improving both the quality and marketability of their products. Over the course of the program, farmers participated in comprehensive training sessions that covered techniques for processing oranges into value-added products such as packaged fruit juice and orange powder. Additionally, the program provided essential equipment and facilitated technology transfer to support these new practices. Digital marketing strategies were also a core component, with farmers receiving guidance on how to effectively utilize social media and e-marketplace platforms to reach a broader customer base. The results of the program were significant, leading to increased income for farmers, reduced post-harvest losses, and expanded market access both locally and internationally. The introduction of these innovations not only enhanced the economic resilience of the farming community but also promoted sustainable agricultural practices. This article presents a detailed account of the program's methodology, the outcomes achieved, and the broader implications for similar agribusiness initiatives. The findings underscore the potential of integrated technological and marketing interventions in driving rural economic development and empowering local communities.

Keywords: agro business; food processing technology; marketing; siamese citrus



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INTRODUCTION

Siamese oranges, scientifically known as *Citrus nobilis*, are a variety of tangerines that have long been cherished for their distinct flavor, nutritional value, and adaptability to various culinary uses. Originating from Siam (modern-day Thailand), these oranges, locally known as som kin wan, have become a staple fruit in Southeast Asia, including Indonesia. In Bali, particularly in Pelaga Village, Siamese oranges have been cultivated for generations, forming a significant part of the local agribusiness. The oranges are distinguished by their thin, smooth, and shiny skin, which adheres closely to the fruit's flesh, making them easy to peel and consume. The fruit is prized for its sweetness, with an average weight of around 75.6 grams per orange, and a typical tree yielding about 7.3 kilograms of fruit annually.

The cultivation of Siamese oranges in Pelaga Village benefits from the region's favorable climate and soil conditions. Located at an altitude of less than 700 meters above sea level, the village provides the ideal environment for growing these oranges, which require fertile, well-drained soil and a humid climate. Despite these advantages, the farmers of Pelaga Village face significant challenges that hinder their ability to fully capitalize on the economic potential of their produce. These challenges include limited knowledge of post-harvest processing techniques and an underdeveloped understanding of digital marketing, which have confined their sales largely to local markets and middlemen. This reliance on traditional marketing channels often results in lower profit margins and missed opportunities for broader market penetration.

The community service program discussed in this article was initiated to address these challenges by introducing advanced food processing technology and digital marketing strategies to the Siamese citrus farming group in Pelaga Village. The program aimed to enhance the farmers' capacity to produce value-added products and to access wider markets, thereby increasing their income and contributing to the sustainable development of the local agribusiness sector.

Challenges Faced by Siamese Citrus Farmers

The primary challenges faced by the Siamese citrus farmers in Pelaga Village are twofold: limited post-harvest processing capabilities and a lack of digital marketing knowledge. These issues are deeply intertwined and have a significant impact on the economic outcomes for the farmers.

Limited Post-Harvest Processing Capabilities

Post-harvest processing is crucial for extending the shelf life of agricultural products, reducing waste, and increasing the marketability of produce. However, the farmers in Pelaga Village have historically lacked the necessary knowledge and equipment to engage in such activities. As a result, a significant portion of their harvest is either sold at low prices to middlemen or remains unsold, leading to considerable economic losses. The perishable nature of fresh oranges exacerbates this issue, as the fruits rapidly deteriorate in quality if not sold or processed within a short period. The absence of post-harvest processing also limits the farmers' ability to produce higher-value products, such as fruit juice or instant orange powder, which could command premium prices in both local and international markets.

Underdeveloped Digital Marketing Strategies

The second major challenge is the farmers' limited knowledge and utilization of digital marketing strategies. In an increasingly digital world, the ability to market products online is essential for reaching broader audiences and increasing sales. However, the Siamese citrus farmers have continued to rely on traditional sales methods, primarily targeting local communities and middlemen. This approach not only limits their market reach but also reduces their bargaining power, often resulting in lower prices for their produce. The underutilization of digital platforms such as social media and e-marketplaces means that the farmers miss out on opportunities to engage di-

rectly with consumers, build brand recognition, and expand their customer base beyond the local market.

Program Design and Objectives

The community service program titled "Acceleration of Siamese Citrus Agro Business through Food Processing Technology and Digital Marketing" was specifically designed to address these challenges. The program had several key objectives aimed at enhancing the farmers' capabilities in both post-harvest processing and digital marketing, thereby maximizing the economic potential of the Siamese citrus farming group in Pelaga Village.

Enhancing Post-Harvest Processing Capabilities

The first objective of the program was to increase the knowledge and skills of the Siamese citrus farmers in post-harvest processing techniques. By equipping the farmers with the ability to produce value-added products such as packaged fruit juice and instant orange powder, the program aimed to reduce post-harvest losses, extend the shelf life of the oranges, and increase their economic value (Mangku, 2001). This objective was to be achieved through a series of training sessions, hands-on demonstrations, and the provision of necessary equipment such as juicers, stainless steel pans, and drying racks.

Improving Digital Marketing Competence

The second objective was to empower the farmers with digital marketing skills and tools necessary to market their products effectively online. This included training in the use of social media platforms and e-marketplaces to reach a broader audience both locally and internationally. By developing an online presence, the farmers could bypass traditional middlemen, engage directly with consumers, and tap into new markets, thereby increasing their sales and revenue (Indiani & Fahik, 2020; Indiani et al., 2015).

Increasing Economic Value and Income

The overarching goal of the program was to maximize the income of the Siamese citrus farming group by enabling them to produce and market higher-value products. By reducing reliance on middlemen and focusing on direct-to-consumer sales through digital platforms, the program aimed to help farmers set higher price points and ultimately increase their overall profitability. This approach was expected to contribute to the economic growth of the farming community and improve the living standards of the farmers.

Fostering Sustainable Agro-Business Practices

Another important objective was to promote sustainable agricultural practices within the community. The program encouraged the optimization of resource use, minimization of waste, and exploration of environmentally friendly technologies in both farming and processing activities. These practices are essential for ensuring the long-term viability of the citrus farming business in Pelaga Village.

Solutions Implemented

To address the challenges faced by the farmers, the program implemented a series of targeted solutions that were tailored to the specific needs of the community.

Post-Harvest Processing Training and Technology Transfer

The program provided comprehensive training on post-harvest processing techniques, including washing, peeling, juicing, and drying of oranges. Farmers were also trained in the use of

the new equipment provided by the program. The introduction of this technology enabled the farmers to produce high-quality orange juice and instant orange powder, which not only extended the shelf life of their products but also added significant value.

Digital Marketing Training and Support

The program also focused on building the farmers' digital marketing capabilities. Training sessions were conducted to teach farmers how to create and manage e-marketplace listings, as well as how to effectively use social media to promote their products. The program provided ongoing support to help farmers develop and refine their digital marketing strategies, ensuring that they could successfully engage with the online consumer base and increase their sales.

Product Development and Market Expansion

The farmers were guided through the process of developing new products and improving existing ones to meet market demands. The program facilitated the creation of attractive packaging and labeling, which helped the products stand out in the market. Additionally, efforts were made to expand the market reach of the farmers by promoting their products through both online and offline channels.

METHOD

The program was implemented in several phases, each designed to address specific aspects of the challenges faced by the farmers. The methodology included:

Needs Assessment: An initial needs assessment was conducted to identify the key challenges faced by the farmers, particularly in the areas of post-harvest processing and marketing. This assessment involved interviews, observations, and discussions with the farmers to understand their current practices and the limitations they face.

Training and Capacity Building: Based on the needs assessment, a series of training sessions were organized to equip the farmers with the necessary skills to process Siamese oranges into value-added products such as packaged fruit juice and orange powder. These sessions included hands-on demonstrations and practical exercises to ensure that the farmers could effectively apply the techniques learned.

Technology Transfer: The program introduced essential processing equipment, including juicers, stainless steel pans, and packaging materials, to the farmers. Training was provided on the use of these tools, with a focus on producing high-quality products that meet market standards.

Digital Marketing: Farmers were trained in digital marketing strategies, including the creation and management of e-marketplace listings and the use of social media platforms to promote their products. Content creation workshops were held to help farmers effectively communicate the quality and uniqueness of their products to potential customers online.

Monitoring and Evaluation: The implementation of the program was closely monitored to assess its effectiveness and to identify any challenges that needed to be addressed. Regular feedback sessions were held with the farmers to ensure that the program was meeting their needs and to make any necessary adjustments.

RESULTS AND DISCUSSION

The implementation of the community service program in Pelaga Village brought about significant positive changes for the Siamese citrus farmers, addressing their key challenges through a combination of technological innovation and strategic market expansion. The program's out-

comes are multifaceted, impacting not only the farmers' income but also their skills, market reach, and overall community empowerment.

Increased Revenue

The introduction of food processing technology played a pivotal role in transforming the economic landscape for the farmers in Pelaga Village. Traditionally, the farmers had been selling fresh oranges, which were highly perishable and often had to be sold quickly to avoid spoilage. This urgency typically resulted in lower prices, particularly when selling through middlemen who exploited the farmers' lack of market access. However, with the program's emphasis on value-added processing, the farmers were able to convert their fresh oranges into packaged juice and orange powder, products that not only have a longer shelf life but also fetch significantly higher prices in the market.

These processed products were particularly appealing to both local and broader markets, as they met the growing consumer demand for convenient, shelf-stable food items. The ability to store and transport these products over longer distances without spoilage opened up new sales channels and allowed the farmers to negotiate better prices. As a result, the farmers experienced a substantial increase in their income, which, according to the program's evaluation, has led to improved living standards within the community.

Enhanced Skills and Knowledge

One of the core components of the program was the comprehensive training provided to the farmers, which covered both post-harvest processing techniques and digital marketing strategies. This training was essential in bridging the knowledge gap that had previously prevented the farmers from maximizing the potential of their produce. Through a series of hands-on workshops and ongoing support, the farmers gained a deeper understanding of how to process their oranges into higher-value products.

The training sessions were designed to be practical and directly applicable to the farmers' day-to-day operations. For example, they learned how to use juicers, drying racks, and other equipment to produce orange juice and powder that met market standards. Additionally, the farmers were educated on the importance of packaging and labeling, which are critical components of product differentiation and brand building in competitive markets.

The knowledge acquired through this training has had a lasting impact. The farmers are now equipped to continuously innovate and improve their production processes, ensuring that they remain competitive in an ever-evolving market. Moreover, the digital marketing training has empowered them to reach out to new customers and manage their online presence effectively, further contributing to the sustainability of their businesses.

Market Expansion

The program's focus on digital marketing has been instrumental in expanding the market reach of the farmers' products. Prior to the program, the farmers primarily relied on traditional sales methods, which limited their customer base to local communities and a few middlemen. This approach not only restricted their potential earnings but also left them vulnerable to fluctuations in local demand and pricing.

By incorporating digital marketing strategies, the farmers were able to tap into broader markets, both regionally and nationally. The creation and management of e-marketplace listings, along with targeted social media campaigns, allowed the farmers to showcase their products to a wider audience. Online sales, facilitated through these digital platforms, have been particularly successful in reducing the farmers' dependence on middlemen and increasing their profit margins.

The expansion into online sales also provided the farmers with valuable data on consumer preferences and purchasing behavior, which they could use to further refine their marketing strate-

gies and product offerings. This direct engagement with consumers has not only boosted sales but also helped build brand recognition and customer loyalty.

Reduction in Post-Harvest Losses

One of the most significant impacts of the program has been the reduction in post-harvest losses. Prior to the introduction of processing technology, a considerable portion of the farmers' harvest would go unsold or be sold at a loss due to spoilage. This was particularly problematic during peak harvest periods when the market was saturated with fresh oranges, leading to a decline in prices.

The ability to process oranges into juice and powder has dramatically reduced these losses. The processed products can be stored for extended periods, allowing the farmers to sell them when market conditions are more favorable. This not only stabilizes their income but also contributes to environmental sustainability by minimizing food waste.

Furthermore, the program's emphasis on using lower-grade oranges for processing has provided the farmers with an additional revenue stream. Previously, these lower-grade fruits were often discarded or sold at very low prices, but they can now be utilized to produce high-quality juice and powder, further enhancing the economic resilience of the farming community.



Figure 1. Orange Juice Production Process



Figure 2. Orange Powder Production Process



Figure 3. Content Creating and Marketing Sharing Session

CONCLUSION

The community service program aimed at accelerating the Siamese citrus agro-business in Pelaga Village has demonstrated significant potential to enhance the livelihoods of local farmers. Through the introduction of food processing technology and digital marketing strategies, the program addressed critical challenges faced by the farmers, resulting in increased income, reduced waste, and greater market penetration. The program has laid a strong foundation for the sustainable development of the Siamese citrus agro-business in the region, and its success provides valuable insights for similar initiatives in other rural communities.

Moving forward, the program should focus on expanding its reach to include more citrus farming communities in Bali and other regions, while also exploring opportunities for product diversification and further strengthening digital marketing efforts. Continuous support and monitoring will be essential to ensure the long-term sustainability of the program, and efforts should be made to involve more members of the local community, particularly women and youth, in the program's activities.

Despite the many successes, the program also encountered several challenges, particularly in the adoption of new technology and the competitive nature of the digital marketplace. Some farmers initially struggled with the use of the new equipment, requiring continuous support and follow-up training to ensure proficiency. The learning curve associated with mastering the processing techniques and digital tools was steep for some, highlighting the need for ongoing education and capacity building.

Additionally, standing out in the crowded digital marketplace posed challenges, particularly for farmers who were new to online sales. The importance of branding and unique selling propositions (USPs) in marketing strategies became evident as the farmers worked to differentiate their products from those of competitors. This experience reinforced the need for strong, consistent branding and the development of distinctive product attributes that could appeal to discerning consumers.

Another challenge was the infrastructure limitations in certain areas of Pelaga Village, particularly with regard to internet connectivity. This issue hindered the full potential of digital marketing efforts, as some farmers found it difficult to maintain a consistent online presence. Addressing these infrastructure gaps will be crucial for the long-term success and scalability of the program.

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