

Innovation in the Application of Appropriate Technology and Marketing Strategies for Cashew Products in Kudi Village, Wonogiri Regency

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Abstract: Agricultural and livestock businesses need development towards a better direction. One of the potentials for developing livestock and agricultural businesses is found in Kudi Village, Wonogiri Regency. This area faces challenges such as extreme poverty, susceptibility to landslides, and drought due to its topographical conditions. This program focuses on empowering two main partners, namely Gapoktan Kudi Makmur in the agricultural sector. Situation analysis identified a number of priority issues, including: the cashew processing production process, which is still manual, unhygienic, and high-risk; limited market access and the absence of product standardization. The implementation of community service activities adopts a sequential five-stage methodology, namely socialization, training, technology application, mentoring and evaluation, as well as institutional strengthening to ensure sustainability. Monitoring and evaluation results show significant progress. Notable achievements that have been realized include improvements in the quality and quantity of cashews, the establishment of the 'Kudiro' product brand, increased production capacity, and the diversification of processed cashew products. The conclusion of this community service activity is that an integrative approach combining technology transfer, human resource capacity building, and institutional strengthening has proven effective in creating a sustainable impact. This community service program provides solutions to technical problems at the production level and builds a cashew agricultural economic ecosystem.

Keywords: Kudi Village, Green Economy, Cashew, Community Empowerment, Appropriate Technology.

Introduction

The Community Service Program is implemented in Kudi Village, Wonogiri Regency, Central Java, as a response to the high rate of extreme poverty reaching 10.86% and the disaster-prone geographical conditions.

Kudi Village is located 54 km from the city center with steep topography (slope inclination of 15-40%) that has the potential for landslides (BPS Wonogiri, 2023). This situation is exacerbated by limited access to clean water and the vulnerability to seasonal drought disasters, which negatively affect food security and local

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agribusiness productivity. Wonogiri Regency was chosen because the business potential in the cashew sector is very large, especially in Central Java, as can be seen in Table 1.

Table 1. Area and Production of Cashew

No	Regency/City	Area (ha)	Production (ton)
1	Wonogiri	20.505,00	7.145,00
2	Sragen	1.088,50	297,40
3	Blora	1.023,07	290,28
4	Jepara	740,57	233,85

Source: Sutrisno, 2023

In this context, Gapoktan Kudi Makmur is present as the main target partner operating in the field of cashew cultivation and processing. This farmers' group consists of 16 members and involves around 100 farming households, with a production potential of more than 20 tons per harvest season. However, the group faces fundamental problems in the aspects of production and marketing. In terms of production, the cashew processing is still carried out manually without adequate peeling tools, resulting in low productivity and poor product quality with many broken cashew nuts. Out of a total production of 20 tons per season, only 1.2 tons (6%) were successfully shelled, and the result is still in the form of raw products (raw cashew nuts) which have very low market value. In fact, ready-to-eat cashews have a stable and open market prospect, both domestically and internationally (Listyanti & Sudjarmoko, 2011). In terms of marketing, limitations in packaging and the still conventional marketing methods result in a very limited market for cashew products and suboptimal turnover values.



Figure 1. Socialization of Cashew Processing.

This program aims to improve the capacity and quality of cashew production through the application of appropriate technology in the form of a cashew shelling machine with a capacity of 100 kg/day, which can

reduce the level of cashew nut damage and increase production capacity. The application of appropriate technology in processing agricultural products has proven effective in improving efficiency and product quality (Setiawan and Pratama, 2020). In addition, this program also aims to increase product added value through the development of flavor variants, labeled packaging, and building the 'Kudiro' product brand as a market identity. The right branding and packaging strategies are significant in enhancing the competitiveness of processed agricultural products (Handayani and Susanto, 2022). To expand market access, the program will develop e-commerce marketing channels and conduct digital marketing strategy training, which is expected to increase sales turnover by at least 50% within one harvest cycle. The use of e-commerce has become an effective strategy in expanding the market for agricultural products in remote areas (Prasetyo and Fitriani, 2021).

Method

The implementation of the community service program in Kudi Village is carried out using a participatory and collaborative approach, involving lecturers, students, village government, and local farmer-livestock groups. The activity method is designed in five main stages that are sequential and interconnected as shown in Figure 2. This approach refers to a community empowerment model based on appropriate technology.



Figure 2. Empowerment model approach

Problem Identification: The initial stage focuses on field observations and guided group discussions (Focus Group Discussion/FGD) with the residents of Kudi Village to map existing conditions, local potentials, and the main problems faced.

This identification includes; analysis of the potential of leading commodities (cashew), issues in

processing harvest results, obstacles in product marketing, and low digital literacy among village entrepreneurs. The results of this stage are used as a basis for designing technological solutions and community empowerment strategies that are relevant to local needs (Rahmiyati et al., 2015).

Activity Planning: At this stage, a work plan and appropriate technology (TTG) design to be applied are prepared. The implementation team, together with the community, determines the types of equipment needed, such as; automatic cashew nut cracking machines, drying ovens, and a 10 m³ biogas installation for cashew processing. In addition, programs for digital marketing training, product packaging design, and small business management are also designed. Each activity is equipped with a schedule, achievement targets, success indicators, and a post-program sustainability plan (Definiati, et al 2023).

Implementation of Appropriate Technology: The technology implementation phase includes activities for knowledge transfer and technology adoption to the community through hands-on training and tool demonstrations. Steps taken include; Manufacturing and installation of production equipment (cashew nut shelling machine, drying oven, biogas digester), Training on operation, maintenance, and work safety, Pilot production to ensure product quality meets hygienic standards. This activity encourages the community to understand the principles of zero waste farming, where livestock waste is processed into biogas and organic fertilizer to be reused on agricultural land.

Implementation of Marketing Strategy: The next stage is the application of digital marketing strategies and the branding of the product 'Mete Kudi'. This activity includes; Training on creating business accounts on social media (Instagram, Facebook, TikTok) and marketplaces (Shopee, Tokopedia), Training in product photography and creating digital promotional content, Designing new attractive packaging that meets PIRT standards, Assistance with micro business licensing administration. With this method, villagers are trained to adapt to digital technology and understand modern consumer behavior (May et al., 2024).

Evaluation and Reporting: The final stage of the activity includes assessing the results and the sustainability of the program. Evaluation is carried out using qualitative and quantitative methods through; Questionnaires before and after training to assess the increase in community knowledge and skills, Analysis of the increase in productivity and income of farmers/livestock breeders, Assessment of the effectiveness of technology (cost, production time, and product quality). The evaluation results are used for preparing activity reports and recommendations for the development of follow-up programs so that they can be

replicated in other villages (Choiriyah & Permatasari, 2024).

Result and Discussion

The implementation of a cashew peeling machine with a capacity of 100 kg/day has significantly increased production efficiency.



Figure 3. Training and implementation of cashew peeling machines

Monitoring results showed a decrease in the cashew nut damage rate from 40% to 10%, which means there was a 30% improvement in product quality. This finding aligns with the research of Setiawan & Pratama (2020), which stated that mechanization of the cashew processing process can reduce the nut damage rate by up to 35%. Cashew production increased from a baseline of 20 tons to 25 tons per season, reaching 62.5% of the 40% increase target. The program has successfully assisted partners in developing production Standard Operating Procedures (SOPs) based on SNI standards and providing guidance for P-IRT certification. Cashew products now feature attractive packaging under the brand "Kudiro," which has been legally registered.



Figure 4. Local brand cashew

Packaging using a sealing machine has extended the product's shelf life from 2 months to 6 months, while also enhancing its visual appeal to consumers.

According to Handayani & Susanto (2022), proper product and packaging standardization can increase the selling value of processed agricultural products by up to 45%. This is evidenced by the increase in the selling price of cashew products from IDR 16,000-20,000/kg (raw product) to IDR 180,000-200,000/kg (packaged product).



Figure 5. The cashew packaging process uses a local brand

Macadamia products now come in attractive packaging with the brand "Kudiro," which has been legally registered. Packaging using a sealing machine has extended the product's shelf life from 2 months to 6 months, while also enhancing its visual appeal to consumers.

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Based on the analysis of partner empowerment levels, there has been an improvement in partners' understanding of production and marketing aspects, from a scale of 2 (less understanding) to a scale of 4 (understanding). As many as 80% of Gapoktan members have been able to operate the pulping machine and drying oven independently, as well as understand the principles of proper packaging.

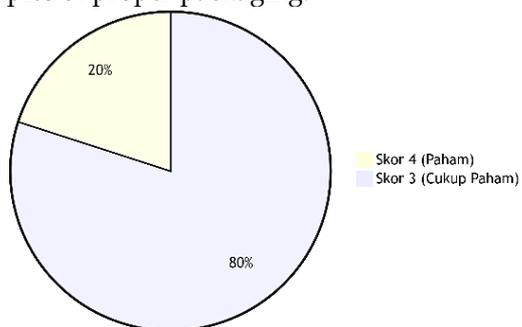


Figure 6. Farmers' understanding of cashew farming

The implementation of a 10 kg/hour capacity drying oven has reduced the drying time from 3-4 days (traditional sun drying) to just 6-8 hours. This time efficiency allows partners to process more products in a shorter period, while also maintaining product quality from dust and rain contamination.

The application of appropriate technology with the kacic machine and drying oven has transformed partners from raw material producers into producers of high value-added processed products. This transformation aligns with the concept of agricultural product downstreaming proposed by Wijayanto et al. (2023), stating that processing agricultural products can increase economic value up to tenfold.

Conclusion

Based on the analysis of the existing conditions, it can be concluded that cashew commodities in Kudi Village have significant agribusiness potential but have not been optimally utilized. Current production realization only reaches 20 tons from the ideal potential of 42 tons per planting season. The fundamental problem lies in the post-harvest processing, which still relies on manual methods, resulting in low efficiency, product quality, and economic added value. Most farmers still sell in bulk form at prices ranging from IDR 16,000-20,000 per kilogram, while processed products can sell for up to IDR 180,000-200,000 per kilogram. The proposed comprehensive solution includes mechanizing the processing operations through the introduction of automatic kacic technology and drying ovens, implementing a quality standardization system based on SNI, assisting in obtaining P-IRT certification, and developing digital marketing strategies. The implementation of this program can increase production capacity to over 100 kg per day, reduce product defects by 30%, and boost turnover by 30%, ultimately creating a competitive and sustainable cashew agribusiness ecosystem in Kudi Village.

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