

Synergy Between Academics and the Community in Increasing the Added Value of Local Food Products through Packaging Innovation: Duwet Polinema Catfish Nuggets

Eny Widiyowati^{1*}, Baroroh Lestari², Nurdjizah Nurdjizah³,
Diana Eka Poernamawati⁴, Achmad Zaini⁵, Becik Gati Anjari⁶

¹⁻⁶Department of Business Administration, Politeknik Negeri Malang, Indonesia

Email: ¹⁾ aqueni@yahoo.com, ²⁾ baroroh.lestari@polinema.ac.id, ³⁾ nurdjizahpolinema@gmail.com,

⁴⁾ dianapoltek@yahoo.com, ⁵⁾ zeinpoltek@gmail.com, ⁶⁾ gatianjari@gmail.com

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Abstract

Food product packaging plays a crucial role in determining market competitiveness, particularly for local food products in rural areas. Proper packaging not only preserves product quality but also significantly influences consumer purchasing decisions and product marketability. Despite the growing recognition of packaging importance, many small-scale food producers in Indonesia still face challenges in implementing standard packaging practices due to limited knowledge, resources, and access to modern packaging technology. This Community Service Program (PKM) was carried out by a team of lecturers from the Business Administration Department of the Malang State Polytechnic as an effort to increase the added value and competitiveness of the local food product “Duwet Polinema Catfish Nuggets” in Duwet Village, Tumpang District, Malang Regency. The main problems faced by the producer community are limited knowledge of product packaging and labeling, a lack of effective promotional strategies, and the unavailability of modern packaging equipment. The activities were carried out using a participatory approach through stages of socialization, technical training, promotional assistance, and the provision of vacuum sealer machine grants. The results of the activity showed an increase in the community's skills in packaging according to Good Manufacturing Practices (GMP) principles, an improvement in product quality through hygienic and aesthetic packaging, and a strengthening of digital promotion capabilities. The synergy between academics and the community proved to be effective in increasing the added value and competitiveness of local products based on fishery potential, while strengthening the community's economic independence in a sustainable manner.

Keywords: Community Empowerment, Competitiveness, Packaging Innovation, Local Products, Vacuum Sealer.

1. Introduction

Packaging is an important element in marketing strategy because it not only protects the product but also increases its selling value and quality perception in the eyes of consumers (Rundh, 2013). According to Rosalina et al. (2012), packaging plays a strategic role in increasing the added value of superior regional products through attractive and informative designs. Apriyanti (2018) emphasizes that professional packaging can increase consumer interest and trust in small business products. In addition, Yuliari & Riyadi (2021) argue that packaging design diversification can be an effective strategy to expand the market and increase the economic value of processed fish products.



The village of Duwet in Tumpang District, Malang Regency, has great potential in the field of freshwater fisheries, especially catfish farming. Its flagship processed product, Duwet Polinema Catfish Nuggets, is produced through collaboration between the community and academics from the Malang State Polytechnic. However, the product still faces several obstacles, including simple packaging using thin plastic without a vacuum system, product labels that do not meet BPOM standards, and limited promotion in the area surrounding the village. These conditions make the product less competitive than similar products on the modern market.

Several studies have shown the importance of innovation in packaging and labeling in increasing the competitiveness of food products. Tanjung & Maury (2019) mention that training in packaging local products can increase the economic value and durability of products. Patil et al. (2020) add that vacuum packaging technology has been proven effective in extending the shelf life of fish products by maintaining sensory quality and suppressing the growth of microorganisms. Given these challenges, particularly the absence of certified labeling and vacuum packaging technology, there was a critical gap between the product's inherent quality and its market readiness. Thus, this community service program was designed to bridge this gap through a real synergy between academics and the community, focusing on improving packaging skills, standard-compliant labeling, and digital promotion strategies to strengthen the competitiveness of Duwet Polinema Catfish Nuggets.

2. Literature Review

The theoretical study in this community service activity was developed to provide a conceptual basis for program implementation, particularly in relation to packaging innovation, packaging technology, labeling, and digital branding strategies. With a strong theoretical foundation, this activity is not only oriented towards technical practices, but also has an academic basis that can be scientifically justified.

2.1. Packaging Innovation and Product Added Value

Packaging has a strategic function as a protector, brand identity, and communication medium between producers and consumers (Rosalina et al., 2012). In the context of small and medium enterprises, packaging plays an important role in building consumer trust and strengthening product competitiveness (Apriyanti, 2018). Putri et al. (2023) added that attractive packaging design innovations can increase added value and expand market reach.

2.2. Vacuum Packaging Technology and Product Durability

Patil et al. (2020) explained that vacuum packaging is a simple but effective technology for extending the shelf life of fish products. By removing air from the packaging, the oxidation process can be suppressed, making it difficult for microorganisms to grow. Esteves et al. (2021) prove that vacuum-packed fish products retain their freshness, aroma, and texture longer without additional preservatives.

2.3. Product Labeling and Regulations

Proper labeling is a form of producer responsibility to consumers. Based on Government Regulation No. 69 of 1999 concerning Food Labels and Advertising, labels must include the composition, net weight, distribution permit, nutritional value, and expiration date. Shameer (2024) emphasized that labeling in accordance with regulations not only fulfills legal aspects but also increases consumer trust and safety.

3. Methods

The activity method uses a participatory approach, which allows the community to be actively involved from the planning stage to the evaluation stage. The program will be implemented for eight months (February–September 2025) in Duwet Village, Tumpang District, Malang Regency. The stages include the following activities:

3.1. Initial Socialization and Coordination

Conveying the objectives, benefits, and activity plans to the catfish nugget producer group.

3.2. Technical Training

The material covers packaging design, the use of vacuum sealers, the application of Good Manufacturing Practices (GMP) principles, and food labeling in accordance with Government Regulation No. 69/1999.

3.3. Production Equipment Grants

Vacuum sealer machines and packaging materials are provided to the business group as tools for applying the training outcomes.

3.4. Evaluation

Conducted through observation and questionnaires to measure improvements in skills, product quality, and activity effectiveness.

4. Results and Discussion

This section describes the results of the community service program implementation and discusses its relevance to previous theories and research findings. The results are categorized into two main aspects, namely changes in the technical capabilities of the community and increased product competitiveness through packaging innovation.

4.1. Implementation of Community Service Activities

4.1.1. Initial Socialization

The activity began with an outreach session for the Duwet Polinema Catfish Nugget business group. The community service team held participatory discussions to identify the main problems. The results showed that the biggest obstacles were in the areas of packaging, labelling, and promotion. At this stage, an explanation was also given about the training plan, target achievements, and benefits of the activity. The outreach session succeeded in building the community's commitment and enthusiasm to actively participate.

4.1.2. Technical Training

The training was conducted in two sessions: theory and practice. The theory session covered an introduction to the functions of packaging, the concept of value added, the principles of Good Manufacturing Practices (GMP), and food labelling requirements. In the practice session, participants were taught how to use a vacuum sealer, create informative label designs, and select appropriate packaging materials.



Figure 1. Front and Rear Views of the Catfish Nugget Packaging

4.1.3. Production Equipment Grant

To support the sustainability of the training outcomes, the team donated two vacuum sealer machines, thick plastic packaging materials, and professionally printed product labels. This grant increased production efficiency and capacity



Figure 2. Demonstration of Tool Usage



Figure 3. Packaging Results Using a Vacuum Machine



Figure 4. Final Packaging Results for Catfish Nuggets



Figure 5. Equipment Handover Activities

4.1.4. Activity Evaluation

The evaluation was conducted using pre- and post-activity questionnaires. The results showed significant improvements in various aspects such as knowledge, technical skills, and business management. The following table summarizes the results of the activity evaluation:

Table 1. Baseline Evaluation of the Production and Packaging Process of Duwet Polinema Catfish Nuggets

Type of Equipment	Activities	Results
Manual Packaging Equipment	Packaging products using ordinary plastic and tying them manually	<ol style="list-style-type: none"> 1. The packaging is easy to open and not airtight. 2. The product spoils quickly and does not last long. 3. The packaging appearance is unattractive and inconsistent.
Product Label (Manual)	Labeling is done with simple sticky notes.	<ol style="list-style-type: none"> 1. Product information is incomplete. 2. Labels come off easily and look unprofessional.

Product Storage	Stored without vacuum processing	<ol style="list-style-type: none"> 1. The product is easily contaminated by air and smell from the surrounding environment. 2. The product has a short shelf life.
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Table 2. Post-Activity Evaluation of the Production and Packaging Process of Duwet Polinema Catfish Nuggets

Type of Equipment	Activity	Result
Vacuum Sealer	Packaging products using high-quality thick plastic and a vacuum process	<ol style="list-style-type: none"> 1. Products become more durable and hygienic. 2. Packaging is tightly sealed and does not leak easily. 3. Product appearance is more attractive and professional.
Label	Labels are designed to be informative and aesthetically pleasing	<ol style="list-style-type: none"> 1. Labels contain complete information, including ingredients, distribution permits, and expiration dates. 2. Packaging is more informative and meets food labeling standards.
Storage System	Products are stored after the vacuum sealing process	<ol style="list-style-type: none"> 1. The aroma and quality of the products are preserved. 2. Significantly increased shelf life.

4.2. Discussion

This community service activity shows that a collaborative approach between academics and the community is very effective in improving the technical and managerial skills and quality awareness of small business owners in Duwet Village. The collaboration was not instructional in nature, but based on active participation. The community was involved from the problem identification stage, solution development, to the implementation and evaluation of activities. This approach encouraged a sense of ownership of the program and its results, and created an equal working relationship between the academic team and the community. This partnership model accelerates the process of innovation adoption and ensures the sustainability of the activities' results after the assistance period ends. This is in line with Sugiri (2020) view, which emphasizes the importance of synergistic collaboration between higher education institutions and the community as an effective strategy in building local economic independence.

The application of vacuum sealer technology has had a significant impact on improving the quality and durability of Duwet Polinema Catfish Nuggets. Before the activity, the products were packaged manually using ordinary plastic without an airtight system, making them prone to damage and rapid loss of freshness. After the use of vacuum technology, the products became more hygienic, protected from microbial contamination, and had a longer shelf life. These findings are in line with the results of research by Patil et al. (2020) and Esteves et al. (2021), which state that airtight packaging can inhibit oxidation and maintain the organoleptic characteristics of fish products, such as color, aroma, and texture. The application of this simple but relevant technology proves that innovation does not have to be expensive or complex to provide tangible benefits to the community.

Positive changes were also seen in the aesthetics and functionality of the packaging. During the design training, the community successfully created new packaging that was more attractive, informative, and professional. The previously plain packaging now looks more communicative with labels that include the composition, net weight, distribution permit, and

expiration date in accordance with the provisions of Government Regulation No. 69 of 1999 concerning Food Labels and Advertising. The resulting designs not only increase consumer confidence in product safety but also strengthen the image of local brands. This is in line with the opinion of Putri et al. (2023), who emphasize that packaging functions as a visual communication medium that can add value to products while building a competitive brand identity.

In addition to improvements in technical and visual aspects, this activity also fostered a new awareness among the community about the importance of maintaining cleanliness and work efficiency during the production process. Participants began to apply the principles of Good Manufacturing Practices (GMP), such as maintaining the cleanliness of tools, using gloves and masks, and arranging the layout of the production room to be hygienic. The intensive mentoring process helped the community understand that product quality is not only determined by raw materials, but also by processing and packaging methods that meet standards. This shows that training and mentoring not only serve as a means of technology transfer, but also as a process of internalizing values of quality and professionalism at work.

From a social perspective, this community service program shows a change in the community's attitude and mindset towards entrepreneurial activities. The consistent mentoring process has encouraged innovative spirit and mutual cooperation in developing joint ventures. The community, which was previously passive, is now more proactive in making decisions and managing production activities. Meanwhile, from an economic perspective, this activity has increased production process efficiency, improved product quality, and expanded the market, which ultimately has a positive impact on increasing household income.

Thus, this activity proves that the synergy between academics and the community is an effective approach in integrating scientific knowledge with local wisdom. The community not only gained technical skills, but through this collaboration also developed an awareness of the importance of innovation and quality in facing the challenges of the modern market. However, to ensure the long-term impact and scalability of this initiative, certain challenges must be acknowledged. The sustainability of the adopted practices relies on consistent access to packaging materials and the maintenance of equipment, which requires stable financial management. Furthermore, while the participatory model was highly effective in this context, replicating it on a larger scale or in different communities would necessitate adaptable strategies and potentially more resources for continuous, long-term mentoring. This program is a concrete example that community service based on the transfer of appropriate science and technology can be a driving force for strengthening a self-reliant and sustainable village economy.

5. Conclusion

This community service program successfully increased the added value and competitiveness of Duwet Polinema Catfish Nuggets through innovations in vacuum sealer-based packaging, regulatory-compliant labeling, and digital promotion strategies. Activities including outreach, training, mentoring, equipment grants, and evaluation significantly improved technical skills, quality awareness, and community marketing. The findings demonstrate that a participatory, science-and-technology-based approach is a potent catalyst for enhancing both the functional and perceived value of local products, with direct positive implications for household income and community self-reliance. Collaboration between academics and the community has proven to be an effective model for local economic

development based on regional resource potential and is replicable in other areas. To ensure the long-term sustainability of these outcomes, it is recommended that the community establish a more structured financial plan for the maintenance and renewal of packaging materials. Future initiatives could be strengthened by incorporating basic financial record-keeping training and exploring more cost-effective sourcing for raw materials. Ultimately, this successful partnership model should be systematically scaled and adapted to other villages with similar local product potential, and future programs could integrate additional innovations, such as e-commerce platform development or diversification of processed product variants, to further expand market reach and build resilient, sustainable local economies.

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