
Community Empowerment and Green Innovation: Enhancing Women's Capacity through Herbal Product Development in Rural Bali

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ABSTRACT: This study aims to empower the PKK women's group in Tihingan Village, Klungkung Regency, Bali, through training on the production of hygienic herbal drinks, attractive packaging design, and digital marketing strategies. The research adopts a descriptive qualitative approach with a Participatory Action Research (PAR) model, emphasizing active community participation. Data were collected through observation, interviews, documentation, and pre-test and post-test evaluations involving 15 PKK members, 21 university students, and three supervising lecturers.

The results show a significant improvement in participants' knowledge and skills in processing local herbal ingredients such as ginger, turmeric, lemongrass, and lemon into healthy beverage products. Participants successfully created three product variants (wedang ginger madu, serai lemon drink, and jamu turmeric acid) with hygienic processing standards and self-designed labels. Moreover, the introduction of digital marketing using social media (Instagram, TikTok, and WhatsApp Business) enhanced product visibility and branding capacity. The program also fostered women's self-confidence and strengthened local entrepreneurship, contributing to Sustainable Development Goals (SDG 3: Good Health and Well-being, SDG 5: Gender Equality, and SDG 12: Responsible Consumption and Production).

This community empowerment initiative demonstrates that integrating local wisdom, technological innovation, and participatory education can create sustainable social and economic transformation at the village level. The Tihingan case serves as a model for developing green, digital-based community enterprises that promote health, gender empowerment, and local economic resilience.

KEYWORDS: Community Empowerment; Herbal Drink Innovation; Packaging Design; Digital Marketing; Women Entrepreneurship; Sustainable Development

INTRODUCTION

Tihingan Village in Banjarangkan District, Klungkung Regency, Bali, is known as a center for traditional gamelan crafts that have been inherited from generation to generation. In addition to this cultural wealth, this village has natural resources in the form of large and fertile dry land, which has great potential for the development of herbal crops such as ginger, turmeric, lemongrass, lemon, and honey. These plants have health benefits and high economic value, but they have not been optimally utilized by the community. The lack of knowledge and skills in processing herbal ingredients into hygienic healthy beverage products with selling value is the main problem faced by the community, especially the PKK women's group in Tihingan Village [PA-KKN-PMM Lecturer Report, 2025].

This condition is strengthened by the limited understanding of processing techniques, production hygiene standards, attractive packaging design, and digital marketing strategies (Setini, 2022; Setini et al., 2024). In fact, economic opportunities from the herbal beverage sector are increasing in line with healthy lifestyle trends and increasing public awareness of the benefits of traditional medicinal plants (Bimantara & Raharjo, 2025). According to Taan and Rasjid (2024), the development of products based on local ingredients such as spices and functional plants can be a motor for the growth of the village's economy that is environmentally friendly and supports sustainable food innovation.

In addition to the economic aspect, herbal drinks also have high health value. Djaya et al. (2025) emphasized that herbal medicine formulations based on natural ingredients that are hygienically processed are able to increase the bioavailability of active compounds such as gingerol and curcumin which function as antioxidants and immunomodulators. Thus, the development of herbal drinks not only encourages the improvement of community welfare but also strengthens the health resilience of local communities.

To answer these problems, a team of lecturers and students of KKN-PMM Warmadewa University carried out the program "Empowerment of PKK Tihingan Village in Manufacturing Products, Attractive Packaging, and Digital Promotion of Hygienic and Environmentally Friendly Herbal Drinks." This program aims to provide comprehensive training to PKK members on herbal

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material processing, aesthetic packaging techniques, and digital promotion so that products are competitive in the modern market. The participatory approach used emphasizes collaboration between universities, village governments, and local communities, so that these activities are not only educational but also oriented towards sustainable economic empowerment (Setini et al., 2020).

This empowerment program also supports the achievement of the Sustainable Development Goals (SDGs), especially SDG 3 (Good Health), SDG 5 (Gender Equality), and SDG 12 (Responsible Consumption and Production). Through this activity, the community is expected to be able to increase entrepreneurial capacity, strengthen the family economy, and maintain the environment through the wise use of local resources. Thus, Tihingan Village can develop into a center for herbal product innovation based on Balinese local wisdom that is competitive and sustainable.

This service program departs from a number of problems faced by the people of Tihingan Village, especially PKK women's groups, in utilizing local potential in the form of herbal plants. Based on these conditions, the formulation of this research problem can be formulated as follows:

- 1) What is the level of knowledge and skills of PKK women in Tihingan Village in processing herbal plants into healthy and hygienic beverage products?
- 2) What are the effective training and mentoring strategies to improve production capabilities, packaging design, and digital promotion of herbal beverage products in Tihingan Village?
- 3) What is the impact of mentoring programs on economic empowerment, women's independence, and their contribution to the achievement of the Sustainable Development Goals (SDG 3, SDG 5, and SDG 12)?
- 4) How can collaboration between universities, village governments, and the community strengthen the sustainability of herbal product innovation programs based on local wisdom?

Research Objectives

The main purpose of this research and community service activity is to support the development of community economic capacity and independence through product innovation based on local resources. Specifically, this study aims to:

- 1) Improving the knowledge and skills of PKK women in processing herbal ingredients into hygienic, healthy, and selling value beverage products.
- 2) Developing the ability of PKK women to design attractive packaging and in accordance with local product marketing standards.
- 3) Train participants in the use of digital promotion strategies to expand market reach and strengthen the image of Tihingan Village's superior products.
- 4) Empowering village women as productive economic actors who play a role in sustainable development at the local level.
- 5) Supporting the achievement of the Sustainable Development Goals through the integration of health, economic, and environmental aspects in one community empowerment program.

LITERATURE REVIEW

1. The Concept of Herbal Medicine and Herbal Drinks as Functional Products

Herbal medicine or herbal drinks are part of Indonesia's cultural heritage that combines traditional knowledge with natural medicine practices. According to Andriati and Wahjudi (2025), more than half of the middle class in East Java still uses herbal medicine as an alternative to modern medicine because it is believed to be safe, economical, and based on local ingredients. In line with that, Djaya et al. (2025) emphasized that technological advances such as nanoencapsulation and probiotic fermentation are able to increase the bioactive effectiveness of herbal compounds such as curcumin and gingerol, thereby making herbal medicine more competitive in the global market.

The trend of functional food that prioritizes health values makes herbal drink products more relevant to modern lifestyles. Zhu et al. (2022) showed that fermentation of herbal plants with Lactic Acid Bacteria can enhance immunomodulatory and antioxidant effects, while expanding the potential of herbal products in a nutraceutical context. Thus, the development of herbal medicine based on technological innovation not only strengthens public health resilience, but also opens up new economic opportunities in the MSME sector.

2. Product and Packaging Innovation in MSME Empowerment

In the context of community economic empowerment, product and packaging innovation is an important element in increasing added value and competitiveness. Setini et al. (2020) stated that innovations that originate from social capital and knowledge sharing are able to encourage the creative performance of women entrepreneurs at the local level. Furthermore, Setini (2022) emphasized that green marketing can be achieved through environmentally friendly and customer-oriented product innovation.

Product packaging not only serves to protect the contents, but also as a visual communication tool that affects consumer perception. According to Han et al. (2025), the success of digital promotion depends on the alignment between packaging design, brand narrative, and online marketing strategy. Therefore, packaging design skills training and digital promotion for PKK women are the

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right strategy to increase the competitiveness of local herbal products in the digital economy era.

3. Women's Empowerment and the Role of the PKK in Community Development

The PKK (Family Empowerment and Welfare) organization has a strategic role in improving the quality of life and economic independence of women at the village level. Through training and capacity building programs, PKK becomes an agent of social transformation that supports the achievement of the Sustainable Development Goals (SDG 5 – Gender Equality and SDG 8 – Decent Work and Economic Growth). According to Taan and Rasjid (2024), innovations based on local potential such as herbal products can improve household welfare while strengthening village economic resilience.

Furthermore, Setini et al. (2025) highlight the importance of digital marketing strategies as a catalyst for the growth of modern MSMEs. The application of digital marketing on local products can expand market reach and increase brand awareness. In this context, digital promotion training for the Tihingan Village PKK is a strategic step to strengthen the capacity of women entrepreneurs based on local wisdom.

4. Linkages to Sustainable Development (SDGs)

The KKN-PMM program also has direct relevance to the Sustainable Development Goals (SDGs) agenda, especially SDG 3 (Good Health and Well-Being), SDG 5 (Gender Equality), and SDG 12 (Responsible Consumption and Production). The empowerment of PKK women through herbal medicine production training reflects the application of sustainable development principles that integrate social, economic, and environmental aspects. Thus, Tihingan Village can be used as a model of community-based empowerment oriented towards green product innovation and local economic resilience.

METHOD

This research uses a qualitative descriptive approach with the Participatory Action Research (PAR) model, because this activity emphasizes the active participation of the community in all stages of program implementation. This approach was chosen to provide space for collaboration between lecturers, students, and the community in finding solutions to social and economic problems faced by the PKK women's group in Tihingan Village. This model allows for a continuous process of social learning, in which society becomes not only an object, but also an active subject in empowerment activities (Setini et al., 2025).

The activity was carried out in Tihingan Village, Banjarangkan District, Klungkung Regency, Bali, which is an area with considerable local natural resource potential, especially in the cultivation of herbal plants such as turmeric, ginger, lemongrass, and lemon. This research and service program was carried out from August to September 2025 at the Tihingan Village Hall by involving 15 PKK members as the main participants, 21 KKN-PMM students of Warmadewa University as field implementers, and three supervisors as designers and supervisors of activities. In addition, village officials and health cadres also participated in activities as supporting partners in the implementation of the training.

Data was collected through observations, interviews, documentation, and short questionnaires. Observations were conducted to monitor participants' participation during the activity, while semi-structured interviews were used to gain participants' views and experiences of the benefits of training. Documentation in the form of photos, videos, and activity reports serves as data to support the analysis. In addition, simple questionnaires were carried out in the form of pre-tests and post-tests to measure the increase in participants' knowledge before and after participating in the training.

The stages of the activity include preparation, implementation, digital marketing, and evaluation. In the preparation stage, coordination was carried out with village officials to determine participants and the needs of training materials, as well as the preparation of educational modules on the benefits of herbal plants and the principles of production hygiene. The implementation phase focuses on education on the introduction of herbal plant types, demonstration of healthy beverage processing techniques, and training on making attractive packaging with labels according to PIRT standards. Furthermore, the digital marketing stage is carried out by introducing the use of social media such as Instagram, TikTok, and WhatsApp Business as a means of promoting local products. The last stage in the form of evaluation was carried out through joint reflection to assess the improvement of participants' abilities and the socio-economic impact resulting from the activity.

Data analysis was carried out in a qualitative descriptive manner with the stages of data reduction, data presentation, and conclusion drawn. Data reduction is carried out by selecting relevant information from observation and interview results, while data presentation is outlined in the form of narrative and visual documentation. Conclusions are then drawn based on the increase in knowledge, skills, and motivation of participants after participating in the program. To maintain the validity of the data, sources and methods are triangulated techniques, namely comparing the results of observations, interviews, and documentation (Djaya et al., 2025).

The success of the activity was measured based on several main indicators, including improving the skills of PKK women in processing herbal ingredients into hygienic beverage products, the ability to design attractive packaging, and the implementation of simple but effective digital promotion strategies. In addition, the formation of an initiative of small business groups based on herbal products is an indicator that this activity not only has a short-term impact, but also encourages the sustainability of the local economy

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based on the wisdom of the people of Tihingan Village.

RESULTS AND DISCUSSION

The Tihingan Village PKK Empowerment Program in Manufacturing Products, Attractive Packaging, and Digital Promotion of Hygienic and Environmentally Friendly Herbal Drinks is carried out as a form of implementing the Participatory Action Research (PAR) model which focuses on increasing the capacity of village women. The results of the activity showed a significant increase in the knowledge, skills, and motivation of participants to be entrepreneurs, as well as the formation of awareness of the importance of local product innovation based on herbal wisdom.

1) Program Implementation and Outcomes

The activity is carried out through four main stages, namely: (1) the preparation stage, (2) the stage of training and mentoring, (3) the marketing and digitization stage of products, and (4) the evaluation and follow-up stage.

1. Preparation Stage

The preparation stage begins with coordination between the KKN-PMM team, village officials, and PKK groups to determine participants, time, and needs for training materials. The lecturer team identified the potential of local ingredients available in the village area, such as ginger, turmeric, lemongrass, and honey, which will be used in the manufacture of herbal drinks. Furthermore, training modules and practice guides are prepared that contain information about the health benefits of herbal plants, hygiene principles, processing techniques, and examples of packaging design. This stage also includes the creation of evaluation instruments in the form of pre-tests and post-tests to measure the improvement of participants' knowledge.

2) Training and Mentoring Stage

Product Manufacturing

The training stage was carried out directly at the Tihingan Village Hall with demonstration methods, group practices, and interactive discussions. Participants were introduced to various types of local herbal plants and their health benefits, such as turmeric as an anti-inflammatory, ginger as a body warmer, and lemongrass to facilitate digestion (Djaya et al., 2025). Training is focused on:

- 1) Herbal ingredient processing techniques range from washing, boiling, filtering, to serving ready-to-consume herbal drinks.
- 2) Production hygiene standards, such as the use of gloves, sterile bottles, and hygienic storage.
- 3) Attractive packaging design with simple labels containing product names, composition, and health benefits.

Participants were divided into several small groups, each of which was accompanied by KKN-PMM students to directly practice the process of making products. Each group then presented the results of their products to get feedback from the supervisor team. As a result, the entire group managed to produce three variants of local herbal products with different tastes and packaging appearances.



Figure1. Innovation Process of Herbal Beverage Products (Jamu)

Product Marketing and Digitization

After the production training, the activity continued with an introduction session on digital promotions. Students introduce how to use social media as a marketing tool, such as Instagram, TikTok, and WhatsApp Business, as well as provide basic training in creating promotional content. Participants learn to take product photos with simple backgrounds, write attractive descriptions, and use local hashtags such as #HerbalTihingan and #ProdukBaliSehat.

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This step aims to introduce an effective but easy-to-apply digital marketing concept by micro business actors. The results of the mentoring showed that most of the participants were able to create group social media accounts and start uploading product promotional content. This activity is in accordance with the results of research by Setini et al. (2025) which states that digital marketing training is able to increase the visibility and competitiveness of MSMEs at the local level.

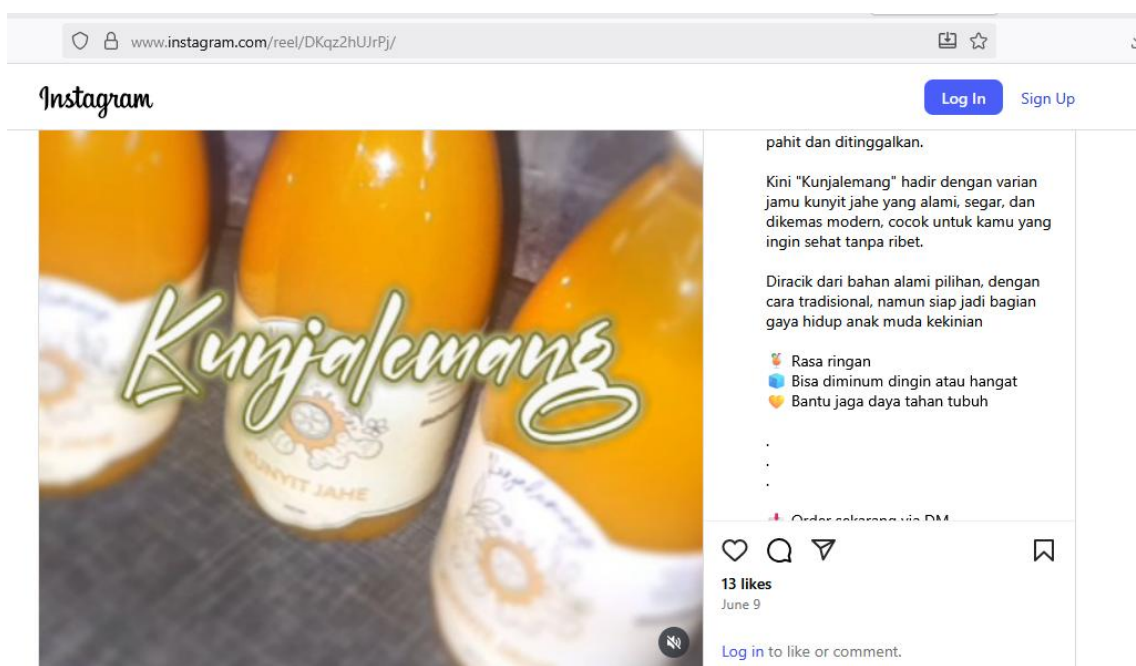


Figure 2. Digital Marketing Innovation of Eco-Friendly Products

Evaluation

The evaluation was carried out by comparing the results of the pre-test and post-test participants to assess the improvement in knowledge and skills. The results of the evaluation showed an average increase of 85% in participants' understanding of the processing and marketing process of herbal products. In addition, reflective discussions were held with the village government and PKK representatives to formulate a follow-up plan, including the establishment of a small business group under the auspices of the Tihingan PKK. The village government is committed to making herbal drink products resulting from this activity as a welcome drink in every official village event, thereby strengthening the sustainability value of the program. The supervisor also plans further assistance to assist in the management of PIRT permits and branding of local products.

Impact of Activity Implementation

The implementation of activities has a real impact in three aspects:

- 1) Aspects of Knowledge and Skills: Participants understand hygienic and creative herbal production techniques in packaging design.
- 2) Social and Economic Aspects: Increasing confidence of PKK women and opening up household-based entrepreneurial opportunities.
- 3) Sustainability Aspect: The establishment of collaboration between universities, village governments, and the community as a model of synergy for sustainable empowerment.

This activity proves that community empowerment through academic collaboration and participatory approaches can be a catalyst for socio-economic transformation at the village level, in line with the concept of Community-Based Development and the achievement of the Sustainable Development Goals (SDGs 3, 5, and 12).

CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Conclusion

The Tihingan Village PKK Empowerment Activities in Manufacturing Products, Attractive Packaging, and Digital Promotion of Hygienic and Environmentally Friendly Herbal Drinks have succeeded in achieving their goal of increasing the capacity, skills, and independence of village women through a participatory approach. The results of the study show that PKK women in Tihingan Village are able to process local herbal ingredients such as ginger, turmeric, lemongrass, and lemon into hygienic healthy drink

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products with selling value. In addition, packaging training and digital promotion activities have opened up new insights into the importance of innovation and technological adaptation in local product marketing.

The program has a real impact on three main dimensions: (1) the knowledge and skills aspect, where participants experience a significant increase in production and packaging capabilities; (2) socio-economic aspects, in the form of increasing confidence, solidarity, and entrepreneurial readiness; and (3) sustainability aspects, through the formation of collaborative networks between universities, village governments, and community groups. These results strengthen the theory of women's empowerment and social innovation (Setini et al., 2020; Han et al., 2025) who emphasize the importance of synergy between knowledge, creativity, and institutional support in creating sustainable change.

Thus, these activities not only contribute to improving people's welfare, but also support the achievement of the Sustainable Development Goals (SDG 3: Good Health, SDG 5: Gender Equality, and SDG 12: Responsible Consumption and Production). Tihingan Village now has the potential to develop as an innovative village model based on local wisdom and green economy, which combines aspects of health, environment, and digitalization in one integrated empowerment ecosystem.

Further Research Suggestions

1) Development of Production Scale and Business Legality

Further research needs to be focused on assistance in the product licensing process (PIRT, BPOM, or halal certification) as well as raw material supply chain management so that products can be marketed commercially and sustainably.

2) Study of the Effectiveness and Quality of Herbal Products

It is recommended to conduct laboratory studies to measure the levels of active substances (such as gingerol, curcumin, and sitral) as well as test the shelf life of the herbal products from the training, to ensure safety and consistency of quality.

3) Community-Based Digitalization

The next research can develop a PKK community-based digital marketplace to facilitate the promotion and distribution of local herbal products through an integrated online platform.

4) Long-Term Socio-Economic Impact Evaluation

Longitudinal studies are needed to assess the sustainability impact of the program on family welfare, women's participation, and village economic growth after the program is completed.

5) Model Replication to Other Villages

The Tihingan Village empowerment model can be used as a prototype to be applied in other villages in Bali or other areas that have similar local resource potential, with adaptation to the local socio-cultural context.

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