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Healthy food literacy: How does *kalibening* agro-edu-tourism serve as a sustainable learning resource?

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Abstract

This community service program aims to empower the Mitra Berkah Anjani Sejahtera Women Farmers Group (KWT) in Kalibening, East Lampung, by developing an organic melon–based agroedutourism model as a learning source for healthy food literacy. The approach employed is Participatory Action Research (PAR), consisting of five stages: socialization, training and mentoring on organic cultivation and technology, product diversification, digital marketing, and evaluation. Data collection methods include observation, interviews, and pre–post training surveys. The results indicate an increased capacity of the KWT members in organic farming practices, the use of IoT technology (Venturi Injector), and post-harvest processing. The program successfully established the "Agromelka" agroedutourism model, integrating organic farming, product processing (such as ice cream, nuggets, and juice), and both online and offline marketing. This model serves as a real-life learning source for communities and students about sustainable agriculture and healthy food. Conclusion: Kalibening Agroedutourism has significant potential as a contextual learning resource for healthy food literacy. The success of this model is supported by community empowerment, technological integration, and a participatory educational approach, making it a replicable model for development in other regions.

Keywords

Agro-edu-tourism, Healthy Food Literacy, Learning Resource, Organic Farming, Community Empowerment,

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Introduction

The community of Kalibening Village, East Lampung, of which 51% work as farmers and laborers, faces multidimensional challenges that reflect a crisis in food security and agricultural sustainability (Kalibening & Pembangunan, 2021). The dominance of monotonous rice and corn cropping patterns has led to declining soil fertility and increasing pest attacks—a condition that, in agricultural ecology, is referred to as agroecosystem vulnerability (Gliessman, 2014). The growing dependence on chemical fertilizers and pesticides poses risks of residue accumulation in agricultural products, threatening consumer health and environmental sustainability, a phenomenon widely regarded as a food safety concern (Aguiar et al., 2015).

From an economic perspective, harvested crops are typically sold directly to middlemen, resulting in low prices and weak bargaining power among farmers, reflecting the socioeconomic vulnerability of smallholders. Furthermore, the lack of diversification in processed agricultural products leads to suboptimal economic gains for the community, indicating a low level of value-added production (Fiba & Salsabila, 2025).

These conditions demonstrate the community's low level of healthy food literacy (Budi Syahputri *et al.*, 2025) and limited agricultural sustainability awareness. Healthy food literacy goes beyond consumption; it encompasses a holistic understanding of food production processes that are safe, nutritious, and environmentally sustainable (Brockmann *et al.*, 2018). Therefore, an empowerment model is needed—one that provides both a solution and a learning platform for the community, aligning with research-based community empowerment approaches.

This community service program adopts the concept of agroedutourism, which focuses not only on economic aspects through tourism but also on educational value as a contextual learning resource. Through the community empowerment approach (PKM), conventional farming practices are transformed into organic agriculture integrated with educational tourism, consistent with the principles of sustainable agriculture. This article aims to analyze the potential of Kalibening Agroedutourism, which has been developed as a sustainable learning resource for healthy food literacy among the community, schools, and university students.

Methodology

Research design and location

This study employed the Participatory Action Research (PAR) method (Siswadi & Syaifuddin, 2024), in which the community group (Kelompok Wanita Tani or KWT) was actively involved in all stages of the project—from planning and implementation to evaluation—in accordance with participatory empowerment principles. The community service activity took place in Kalibening Village, Pekalongan District, East Lampung Regency, with the core partner being KWT Berkah Anjani Sejahtera, consisting of 20 members.

Participants

The main participants were the 20 members of the KWT. In addition, the program also involved four students from the Merdeka Belajar Kampus Merdeka (MBKM) program and three lecturers with expertise in ecology, microbiology, and marketing. This collaboration represents the implementation of the triple helix model (Abisuga & Muchie, 2021) in community engagement, integrating academic, industrial, and community elements.

Data collection and analysis

Observation: Direct observation was conducted to assess land conditions, cultivation patterns, and agricultural practices of the partner community before and after the intervention. In-depth Interviews: Conducted with the KWT chairperson and members to identify key problems, expectations, and their responses to the program. Pre–Post Surveys: Questionnaires were administered before and after the training sessions to measure improvements in KWT members' knowledge and skills in organic farming and food processing. Documentation: All stages of activities were documented through photographs and videos.

The collected data were analyzed using qualitative descriptive analysis to describe the empowerment process, behavioral changes, and achieved outcomes. Quantitative data from the surveys were analyzed using simple percentage analysis to determine the level of improvement in participants' understanding.

Results and Discussion

Capacity building of the women farmers group (KWT) in production management

Organic cultivation, the KWT members have been trained to produce and apply liquid organic fertilizer (POC) named "Pumakkal" and compost made from locally available materials. Their understanding of the importance of organic farming for sustainability has significantly improved, aligning with the core principles of organic agriculture.

Agricultural Technology, an IoT-based Venturi Injector system has been successfully installed and utilized for automated irrigation and fertilization, controllable via smartphone. This technology has enhanced labor efficiency, time management, and fertilizer precision, representing the adoption of appropriate technology in sustainable agriculture.

Environmentally Friendly Pest Control, the KWT has implemented the use of biopesticides and the planting of refugia (flowering plants that attract natural pest predators) as part of an Integrated Pest Management (IPM) strategy.

Product innovation and value addition

*Product diversification***,** the KWT members have successfully processed organic fruits and vegetables into high-value products such as ice cream, nuggets, chips, juice, and sorbetto. These innovations not only extend product shelf life but also make vegetable consumption more appealing—especially for children—thus creating added economic value.

Packaging and branding, fresh and processed products are now packaged with attractive and hygienic "Agromelka" labels, applying modern marketing and branding strategies to enhance product appeal and consumer trust.

Development of marketing models and agroedutourism

Digital marketing, an e-commerce platform has been developed, and social media channels (TikTok, Facebook) are actively used to expand market reach, demonstrating effective utilization of digital platforms for microenterprise development.

Agromelka agroedutourism farm, an educational tourism package has been established, allowing visitors to purchase organic vegetables, enjoy locally prepared dishes (a set meal of pecel and soy milk), pick vegetables directly, and learn about organic farming practices. The package, priced between IDR 30,000 and 35,000, represents a practical model of community-based tourism.

Achievement of university key performance indicators (IKU)

This program successfully fulfills IKU 2 and IKU 3. Both lecturers and students gained experiential learning opportunities outside the campus, and the outcomes (including the Pumakkal patent, IoT technology, and the agroedutourism model) have been directly adopted by the community. Additionally, the four participating students are eligible for recognition equivalent to 6 academic credits (SKS), demonstrating the implementation of experiential learning within the Merdeka Belajar Kampus Merdeka (MBKM) framework.

Kalibening agroedutourism as a model of sustainable food literacy learning resource

The results of this community service program indicate that Kalibening Agroedutourism has evolved into a contextual and effective learning resource for healthy food literacy. This transformation is not only economically meaningful but also establishes a learning ecosystem that integrates the three pillars of sustainability—ecology, economy, and society (Malisye Christin Sjioen et al., 2025). Learning occurs directly through experiential learning in the field, engaging both KWT members and visitors, and creating a cascading impact in building collective awareness of sustainable healthy food practices.

Ecological dimension: from environmental crisis to regenerative agriculture, the organic farming activities practiced in Kalibening represent a paradigm shift from conventional agriculture toward agroecology as a science, practice, and movement (Nicholls & Altieri, 2018). Environmental crises, such as declining soil fertility and pest resistance, are consequences of the simplification of agricultural ecosystems (Gliessman, 2014). Through an agroecological approach, the diversification of 13 types of vegetables and livestock integration creates ecological complexity that mimics natural systems, enhancing the resilience of the agroecosystem (Jonson *et al.*, 2024).

The production of the organic fertilizer "Pumakkal", derived from agricultural and household waste, demonstrates the nutrient recycling principle, closing the biogeochemical cycle within the farming system (Sutanto *et al.*, 2024). Similar practices—such as the use of

household and agricultural waste for liquid organic fertilizer in Batu Kumbung Village, West Lombok—have been shown to reduce pollution, optimize plant growth, and maintain environmental balance (Ni Wayan Sri Suliartini et al., 2024). The use of biopesticides and refugia planting reduces dependence on chemical inputs and restores ecosystem services, particularly biological control (Sutanto *et al.*, 2023).

The concept of Integrated Water Resources Management (IWRM) emphasizes ecosystem protection and the fair allocation of water to maintain natural functions. Refugia serve as habitats for natural pest predators, representing a form of ecological engineering that contributes to ecosystem recovery (Pretty & Bharucha, 2015). Additionally, the use of IoT-based Venturi Injector technology enhances water-use efficiency—one of the core principles of sustainable agriculture in water-scarce regions (Sutanto *et al.*, 2023). Technologies such as smart sensors, IoT systems, and drip irrigation align with the IWRM framework, which seeks to maximize economic and social benefits equitably without compromising ecosystem sustainability.

Socio-cultural dimension: empowerment as a transformative process, the Participatory Action Research (PAR) approach transformed the KWT from passive beneficiaries into active agents of development. This aligns with the philosophy of asset-based community development (ABCD), which views communities as holders of social and cultural capital that can be mobilized for change (Najamudin & Al Fajar, 2024). The shift from being consumers to educators reflects an increase in community agency, an indicator of empowerment success.

Collaboration among academia, local government, and community groups in developing agroedutourism reflects the triple helix model, enabling synergistic knowledge and resource exchange. The involvement of students through the MBKM program not only provides experiential learning but also creates knowledge networks between universities and local communities. This co-creation of knowledge lies at the heart of sustainable capacity building (Adam *et al.*, 2023).

Economic dimension: building an inclusive value chain, economic transformation has occurred through the creation of an inclusive value chain from upstream to downstream. At the upstream level, adopting organic farming reduces dependence on external inputs, cutting production costs by up to 30%. At the downstream level, diversifying processed products—such as vegetable ice cream and nuggets—adds significant economic value while also serving as engaging educational media for children's food literacy.

Marketing strategies that utilize e-commerce platforms and social media integrate digital marketing into microenterprise development. The "Agromelka" agroedutourism package, priced at around IDR 40,000, not only generates additional income streams (Najamudin & Al Fajar, 2024) but also serves as an educational medium that connects consumers directly to the healthy food production process. This business model reconnects producers and consumers, bypassing traditional middlemen (Afaf, 2024).

Educational dimension: contextualizing healthy food literacy, as a contextual learning resource and living laboratory, Kalibening Agroedutourism enables students to experience the entire food cycle—from production to consumption—firsthand. This approach aligns with the principles of experiential learning, which emphasizes reflection through direct experience. Within the MBKM framework, the recognition of 6 academic credits (SKS) represents not merely a formal acknowledgment but also an affirmation of the academic equivalence of off-campus learning.

As a field laboratory, Kalibening facilitates the application of microbiological principles in composting and biopesticide development, the implementation of sustainable farming practices, and the cultivation of entrepreneurial skills through the management of economic value in agricultural and tourism products (Widjajanto & Honmura, 2018).

Role as a lifelong learning center and knowledge network, for the surrounding community, Kalibening Agroedutourism functions as a lifelong learning center—a hub for practical knowledge on food security and nutrition. Families can learn about food safety, local food diversification, and environmentally friendly farming techniques. This concept can be strengthened through the establishment of a sustainable farming network involving local farmers, homemakers, and nearby schools. Such networks foster innovation exchange, provide solutions to local agricultural problems, and reinforce community food resilience—a model proven effective in sustainable farming communities worldwide (Putriastuti *et al.*, 2007).

Integration with curriculum and social relevance, integrating agroedutourism into the curriculum through community-based learning positions students not only as knowledge recipients but also as agents of change. Direct engagement with real-world community issues—such as land degradation, waste utilization, and agricultural marketing—enhances the social relevance of academic courses. This form of learning cultivates problem-solving abilities and social responsibility, which are core goals of higher education (Wynda & Hufad, 2025).

Model sustainability: an integrative analysis, the sustainability of the Kalibening Agroedutourism model is supported by the integration of three mutually reinforcing subsystems. The ecological subsystem, represented by organic farming practices, forms the foundation of sustainable production. The economic subsystem, encompassing product diversification and digital marketing, ensures financial viability. The socio-cultural subsystem, driven by participatory empowerment, strengthens community resilience (Dendra, 2011).

Institutional support from the university—through community service programs (KKN) and fostered villages—establishes a sustainable institutional mechanism ensuring continuous mentorship. The adoption of appropriate technologies such as IoT systems and e-commerce reflects adaptive innovation that responds to contemporary challenges. This synergy creates a dynamic learning ecosystem in which all components are interconnected and mutually reinforcing.

Conclusion and Recommendations

Kalibening Agroedutourism has proven to be an effective and sustainable learning model for promoting healthy food literacy. Its success is supported by the integration of agroecological approaches that restore the environment, participatory empowerment that builds community capacity, economic diversification that creates added value, and educational contextualization that bridges theory and practice. This model is not only relevant as a rural development strategy, but also serves as a transformative educational approach in fostering collective awareness of sustainable food systems.

This empowerment model can be adopted and replicated in other villages with similar characteristics. The government can support its development by facilitating licensing, providing supporting infrastructure, and promoting the agro-edu-tourism package as part of the region's educational tourism catalog.

Universities and schools can utilize Agromelka as a field trip destination or internship site to enrich students' and learners' experiences in healthy food literacy and entrepreneurship.

Further research is recommended to assess the long-term impacts of this model, particularly regarding its contribution to improving community income, raising consumer awareness of healthy food literacy, and evaluating its effectiveness as a learning medium for younger generations.

Disclosure Statement

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