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# Building Sustainable Culinary Skills For Eco-Hospitality: Participatory Training For Local Cooks At Ecolodge Mbeliling, East Nusa Tenggara

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***Abstrak***

*Program pengabdian kepada masyarakat ini bertujuan meningkatkan kompetensi teknis dan profesional juru masak lokal di Ecolodge Mbeliling, Manggarai Barat, Nusa Tenggara Timur, melalui pelatihan partisipatif yang berfokus pada teknik memasak dasar dan manajemen dapur. Program ini menggunakan pendekatan pembelajaran berbasis pengalaman (experiential learning) yang menekankan praktik langsung, simulasi, serta umpan balik secara langsung dari fasilitator. Sebanyak sepuluh juru masak lokal mengikuti pelatihan intensif selama lima hari yang mencakup materi kebersihan dapur, persiapan bahan makanan, teknik memasak dasar, penyajian makanan, serta penerapan praktik dapur berkelanjutan. Pengumpulan data dilakukan melalui metode pra-uji dan pasca-uji, observasi langsung selama kegiatan berlangsung, serta wawancara informal dengan peserta. Hasil evaluasi menunjukkan adanya peningkatan signifikan dalam pengetahuan dan keterampilan teknis peserta, yaitu sebesar 27%, dari rata-rata nilai awal 58% menjadi 85% setelah pelatihan. Selain peningkatan keterampilan teknis, peserta juga menunjukkan perubahan perilaku positif, seperti meningkatnya disiplin kerja, kemampuan kerja tim, serta kepatuhan terhadap standar keamanan dan sanitasi pangan. Program ini juga mendorong kreativitas peserta dalam pengolahan dan penyajian makanan lokal serta meningkatkan kesadaran terhadap praktik dapur berkelanjutan, termasuk pengurangan limbah dan penggunaan sumber daya secara efisien. Secara keseluruhan, program ini menunjukkan bahwa pelatihan berbasis pengalaman efektif dalam memperkuat kapasitas kuliner komunitas lokal serta mendukung pengembangan ekowisata yang berkelanjutan dan pencapaian Tujuan Pembangunan Berkelanjutan (SDGs).*

***Kata Kunci:*** *Pelatihan Berbasis Pengalaman, Keterampilan Kuliner, Penginapan Ramah Lingkungan, Dapur Berkelanjutan.*

***Abstract***

*This community service program aims to improve the technical and professional competence of local cooks at Ecolodge Mbeliling, West Manggarai, East Nusa Tenggara, through participatory training focusing on basic cooking techniques and kitchen management. This program uses an experiential learning approach that emphasizes hands-on practice, simulation, and direct feedback from the facilitator. A total of ten local cooks*

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*participated in a five-day intensive training that included kitchen cleaning materials, food preparation, basic cooking techniques, food presentation, and the application of sustainable kitchen practices. Data collection was carried out through pre-test and post-test methods, direct observation during the activity, and informal interviews with participants. The results of the evaluation showed a significant increase in participants' knowledge and technical skills, which was 27%, from an average initial score of 58% to 85% after training. In addition to improving technical skills, participants also showed positive behavioral changes, such as increased work discipline, teamwork skills, and compliance with food safety and sanitation standards. The program also encourages participants' creativity in processing and serving local food and raises awareness of sustainable kitchen practices, including waste reduction and efficient use of resources. Overall, the program shows that experiential training is effective in strengthening the culinary capacity of local communities as well as supporting the sustainable development of ecotourism and the achievement of the Sustainable Development Goals (SDGs).*
***Keywords:*** *Experience-Based Training, Culinary Skills, Eco-Friendly Lodging, Sustainable Kitchen.*

## 1. Introduction

The rapid growth of sustainable tourism in Indonesia reflects a structural transformation in the tourism industry toward environmentally responsible, socially inclusive, and culturally authentic development models. Within this framework, ecolodges have emerged as strategic eco-hospitality platforms that integrate environmental conservation, local economic participation, and experiential tourism (Gao et al., 2021; Hossain et al., 2024). In West Manggarai Regency, East Nusa Tenggara, Ecolodge Mbeliling represents a community-based eco-hospitality model that incorporates local agricultural products and traditional cuisine into its service offerings. In such settings, culinary performance is not merely an operational function but a central determinant of destination image, perceived service quality, and guest satisfaction (Kusuma et al., 2023). Empirical evidence confirms that food quality, hygiene compliance, presentation aesthetics, and kitchen workflow efficiency significantly influence hospitality competitiveness and customer experience (Kim et al., 2021; Ottenbacher et al., 2020). Moreover, in eco-hospitality contexts, kitchen operations serve as a tangible reflection of sustainability commitments through waste reduction, resource efficiency, and responsible sourcing practices (Leong & Wahid, 2021; Hossain et al., 2024).

Despite the expanding discourse on sustainable tourism and hospitality workforce development, a critical research gap remains in the integration of structured culinary capacity-building programs within community-based ecolodge environments. Recent studies predominantly examine training effectiveness in general hospitality settings (Kim et al., 2024; Rahman et al., 2021) or focus on service quality outcomes and sustainability performance at the organizational level (Hossain et al., 2024), yet limited empirical attention has been directed toward

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participatory, sustainability-integrated culinary training specifically designed for local cooks in remote ecotourism destinations.

This gap is particularly relevant in eastern Indonesia, where hospitality workforce development research remains underrepresented and where local kitchen staff often possess limited formal culinary education and minimal exposure to standardized professional systems (Tangke et al., 2022). More importantly, prior studies tend to treat technical skill enhancement and sustainability orientation as separate domains of intervention, resulting in fragmented training models that fail to capture the interconnected nature of operational competence and environmental responsibility in eco-hospitality settings. Consequently, there remains insufficient empirical evidence demonstrating how localized, sustainability-embedded culinary training can generate measurable cognitive, behavioral, and managerial transformation within peripheral tourism contexts.

Preliminary assessment at Ecolodge Mbeliling revealed inconsistencies in basic cooking techniques, hygiene implementation, mise en place discipline, plating standards, and FIFO-based inventory management, indicating a structural mismatch between sustainability-oriented ecolodge branding and the operational capacity of its culinary workforce. Addressing this gap, the present community service intervention examines how an experiential participatory culinary training model can simultaneously strengthen technical competence, professional kitchen management skills, and sustainability-oriented work behavior among local cooks in a real-world ecolodge context. Grounded in experiential learning principles that emphasize learning-by-doing, reflective practice, and simulation-based skill acquisition (Kim et al., 2024; Kuncoro et al., 2023), the program integrates technical cooking mastery, hygiene standards, professional plating, workflow organization, and sustainable kitchen management including waste reduction and efficient utilization of local ingredients into a unified training framework. Unlike conventional hospitality training that often separates technical instruction from environmental awareness, this initiative embeds sustainability values directly into hands-on culinary simulations and daily operational routines (Leong & Wahid, 2021; Hossain et al., 2024).

The novelty of this study lies in its integrative design that bridges technical culinary skill development with eco-hospitality sustainability transformation within a community-based setting in eastern Indonesia. By employing a quasi-experimental pre-test–post-test evaluation, this study contributes empirical evidence on measurable cognitive and behavioral change in a peripheral ecotourism destination context. Academically, it advances the discourse on community-based tourism capacity building by demonstrating how localized human resource interventions can align service quality enhancement with sustainability operationalization. Practically, it offers a replicable model for sustainability-integrated culinary workforce development that supports long-term eco-hospitality

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competitiveness and contributes to sustainable tourism objectives related to decent work and responsible consumption.

## 2.Method

This study employed a quasi-experimental one-group pre-test–post-test design embedded within a structured community service intervention to evaluate the effectiveness of an experiential participatory culinary training program conducted at Ecolodge Mbeliling, West Manggarai, East Nusa Tenggara. The quasi-experimental approach was selected because random assignment and control group implementation were not feasible within the operational context of a community-based ecolodge; however, systematic measurement of change before and after intervention was necessary to assess program effectiveness (Rahman et al., 2021). The design enables the identification of measurable cognitive and behavioral improvements attributable to the training intervention while maintaining ecological validity in a real-world hospitality setting.

The population of this study consisted of all kitchen staff employed at Ecolodge Mbeliling. Given the limited number of personnel, a census approach was adopted in which all ten local cooks participated in the program. Although the sample size is relatively small, it represents the entire operational culinary workforce at the research site, thereby ensuring contextual completeness and institutional relevance. In community-based tourism settings, particularly in remote destinations, small population sizes are common; therefore, internal program evaluation and context-specific rigor are prioritized over broad statistical generalization (Tangke et al., 2022). Nevertheless, inferential statistical analysis was applied to strengthen internal validity and demonstrate whether observed changes were statistically significant within the institutional context.

The training intervention was conducted over five consecutive days and structured into three phases: (1) baseline assessment, (2) core experiential participatory training, and (3) post-intervention evaluation. The experiential participatory approach was operationalized through interactive lectures, facilitator demonstrations, guided hands-on practice, structured cooking simulations, reflective discussions, and immediate corrective feedback. This approach is grounded in experiential learning principles emphasizing learning-by-doing and reflective adaptation as mechanisms for skill acquisition and behavioral change (Kim et al., 2024). The curriculum covered kitchen sanitation and personal hygiene standards, basic cooking techniques, mise en place principles, professional food plating, workflow organization, FIFO-based inventory control, and sustainable kitchen practices including waste reduction and efficient utilization of local ingredients (Leong & Wahid, 2021; Hossain et al., 2024).

To ensure methodological rigor, measurement instruments were systematically developed based on competency indicators derived from hospitality training standards and empirical studies on workforce development effectiveness

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(Kim et al., 2021; Rahman et al., 2021). The cognitive assessment instrument consisted of structured multiple-choice and short-answer items measuring knowledge of cooking techniques, hygiene compliance, and kitchen management principles. Content validity was established through expert judgment involving two hospitality academics and one professional chef with experience in eco-hospitality operations. Revisions were undertaken to ensure alignment between assessment indicators and training objectives. Construct validity was evaluated through item-total correlation analysis, and internal consistency reliability was tested using Cronbach's alpha coefficient to confirm acceptable reliability levels.

In addition to cognitive testing, a structured observational checklist was developed to assess psychomotor and behavioral competencies during cooking simulations. The checklist included standardized indicators covering technical accuracy, sanitation compliance, workflow discipline, teamwork coordination, plating aesthetics, and adherence to sustainable kitchen practices. Inter-rater reliability was enhanced by using two trained evaluators and conducting calibration prior to observation to ensure scoring consistency. This triangulated evaluation framework strengthened measurement reliability and reduced subjective bias.

Data collection procedures involved administering the pre-test prior to the intervention, conducting continuous structured observation during simulation sessions, and administering the post-test at the conclusion of the training program. Quantitative data were analyzed using descriptive statistics to determine mean scores and percentage improvements, followed by paired-sample t-test analysis to examine whether differences between pre-test and post-test scores were statistically significant. The use of inferential statistics enhances the analytical strength of the study by demonstrating that improvements are not merely descriptive but statistically meaningful within the sample (Rahman et al., 2021). Qualitative field notes and reflective session summaries were used to triangulate quantitative findings and provide contextual interpretation of observed behavioral changes.

Ethical considerations were explicitly integrated into the research design. Prior to participation, all participants were informed about the objectives of the training and the evaluation procedures. Voluntary participation was emphasized, and verbal informed consent was obtained. Participants were assured that individual performance data would remain confidential and reported only in aggregated form. The study adhered to institutional guidelines for responsible community engagement and ensured that participation in evaluation activities did not affect employment status or compensation.

Despite the strengthened methodological framework, several design limitations should be acknowledged. The absence of a control group limits the ability to attribute causality with absolute certainty, as external factors outside the intervention may have contributed to performance improvements. Additionally, the relatively small sample size, although representing the full population of kitchen staff at the ecolodge, restricts statistical generalizability beyond similar community-

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based eco-hospitality contexts. The short-term evaluation period also measures immediate learning outcomes rather than long-term retention or sustained behavioral transformation. Therefore, while the quasi-experimental design enhances internal validity within the institutional setting, the findings should be interpreted as context-specific evidence of program effectiveness rather than broadly generalizable conclusions. Future studies may incorporate longitudinal assessment and comparative group designs to further strengthen causal inference and external validity.

## 3. Results and Discussion

Training in basic cooking techniques and kitchen management at Ecolodge Mbeliling significantly improved the technical competence and work behavior of local cooks. Pre-test and post-test results showed an average increase of 27%, from an initial score of 58% to 85%. These results confirm the effectiveness of the experiential participatory training approach, where participants actively learn through simulations and hands-on practice. These findings align with Rahman et al. (2021), who stated that experiential learning can increase skill retention rates by up to 30% compared to conventional lecture methods.

Table 1. Pretest and Post Test Result

| Participant | Pre Test (%) | Post Test (%) | Improvement (%) |
|---|---|---|---|
| 1 | 55 | 82 | 27 |
| 2 | 60 | 88 | 28 |
| 3 | 58 | 84 | 26 |
| 4 | 62 | 90 | 28 |
| 5 | 50 | 78 | 28 |
| 6 | 65 | 92 | 27 |
| 7 | 57 | 83 | 26 |
| 8 | 59 | 86 | 27 |
| 9 | 54 | 80 | 26 |
| 10 | 60 | 87 | 27 |
| Total | 580 | 850 | 270 |
| Average | 58 | 85 | 27 |

The effectiveness of the experiential participatory culinary training program was evaluated using descriptive and inferential statistical analysis. As presented in Table 1, the average pre-test score of participants was 58% (SD = 4.27), while the average post-test score increased to 85% (SD = 4.42), indicating a mean

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improvement of 27 percentage points. Individual improvement ranged from 26% to 28%, demonstrating consistent learning gains across all participants.

Statistical significance testing using a paired-sample t-test revealed a highly significant difference between pre-test and post-test scores ($t = 104.57$, $p < 0.001$). This result confirms that the observed improvement was not due to random variation but reflects a statistically meaningful effect of the intervention within the institutional context. The magnitude and consistency of improvement across participants suggest strong internal program effectiveness, particularly in enhancing cognitive mastery of hygiene standards, cooking techniques, mise en place principles, and FIFO-based inventory management.

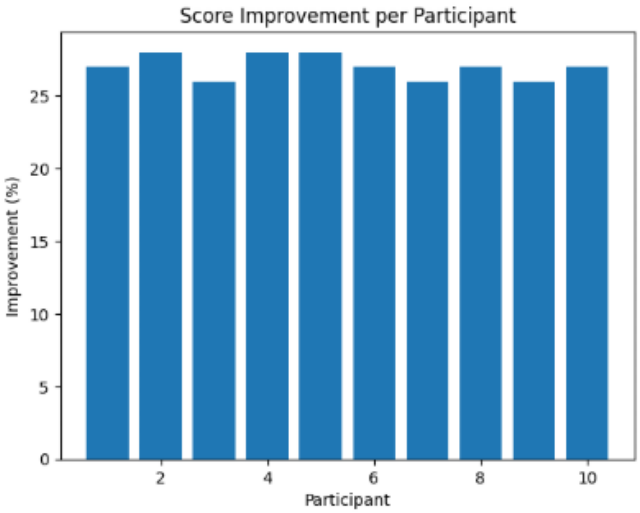



Figure 1. Graphic of Score Improvement

In addition to increased knowledge, participants also demonstrated positive changes in work behavior, such as the application of mise en place principles, efficient use of equipment, and consistent maintenance of cleanliness according to food hygiene standards. Responsibility for personal sanitation and food safety significantly improved. Hossain et al. (2024) confirmed that hands-on training positively correlates with improved work discipline and compliance with food safety standards in the eco-hospitality sector. In terms of culinary creativity, participants were able to produce dishes with a more attractive appearance and taste using local ingredients such as organic vegetables and traditional spices. This not only improved the quality of the dishes but also strengthened the identity of local cuisine as a tourist attraction.

Ottenbacher et al. (2020) emphasized that culinary creativity and presentation design directly influence perceived quality and customer satisfaction. In terms of kitchen management, participants began implementing the FIFO system and managing leftover ingredients to reduce waste, reflecting an understanding of the principles of sustainable kitchen management. Leong and Wahid (2021) explained that implementing this concept can reduce waste by up to 20% and increase operational efficiency in the hospitality sector. This practice is relevant to

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the sustainable tourism concept implemented at Ecolodge Mbeliling. Furthermore, the training also increased the confidence and job satisfaction of local chefs. They felt better prepared to meet international standards and serve foreign tourists, positively impacting motivation and a sense of belonging to the workplace. This aligns with Pérez and Blasco (2022), who emphasized that kitchen staff self-efficacy is a crucial factor in team performance and a positive work atmosphere. Overall, this training not only strengthened technical skills but also fostered professional attitudes and sustainability awareness.

The experiential learning approach enabled participants to understand not only the "how" of cooking but also the "why" of professional standards and environmentally friendly practices, which are crucial for service quality and ecotourism sustainability. Consistent with Kolb and Kolb (2021), experiential learning and personal reflection led to deeper changes in work behavior. Therefore, the results of this activity have direct implications for strengthening the capacity of local human resources in the hospitality sector and supporting the development of sustainable tourism in remote areas.



Figure 2. Coaching Clinic

Delivery Of Training Materials

The training materials were systematically designed to combine the knowledge, technical skills, and professional attitude required by cooks in an ecolodge environment. The materials were developed based on competency-based training principles tailored to field needs, as needs-based training has been shown to be more effective in improving skills and performance (Wibowo & Hidayat, 2022). The materials are divided into four main modules. The first module discusses personal hygiene and kitchen sanitation, including the implementation of occupational hygiene standards, waste management, and equipment disinfection. This is important because, as Hossain et al. (2024) noted, good sanitation directly impacts perceptions of food quality and guest satisfaction.

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The second module emphasizes basic cooking techniques, such as sautéing, steaming, boiling, and grilling, utilizing local ingredients. A hands-on approach was employed to provide participants with hands-on experience under the guidance of a facilitator, as learning by doing has been shown to accelerate skill development (Yoon & Cho, 2020). The third module focuses on food management and the FIFO system to maintain freshness and reduce waste. Participants are also taught how to record inventory and utilize leftover ingredients to ensure efficient and environmentally friendly kitchen operations (Leong & Wahid, 2021). The fourth module introduces food plating, emphasizing the balance of color, texture, and proportion to create an attractive presentation.

Ottenbacher et al. (2020) emphasize that presentation aesthetics is a crucial aspect in shaping the culinary image and tourist experience. The training is delivered through interactive lectures, demonstrations, simulations, and direct feedback. Facilitators correct participants' mistakes during the practice and provide examples of best practices to improve results. During the cooking simulation, participants prepare dishes directly for guests under the guidance of the facilitator. This process proves effective because any errors can be corrected immediately, and the results are evident in improved taste and more attractive presentation of the dishes. Through this participatory and contextual approach, participants not only improve their technical skills but also develop discipline, responsibility, and pride as professional chefs, supporting sustainable tourism at Ecolodge Mbeliling East Nusa Tenggara.



Figure 3. Menu peresentation

Cooking Simulation

The cooking simulation is the core of this training, as it provides hands-on practice for participants to apply the knowledge and skills learned during the theory and demonstration sessions. The simulation takes place in the Ecolodge Mbeliling restaurant kitchen, equipped with facilities tailored to the standards of a simple professional kitchen. Each participant is divided into small groups and given the responsibility of preparing a menu of Indonesian cuisine using local ingredients such as organic vegetables and local produce. This experiential cooking simulation

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approach is designed to foster cooks' adaptability in real-world work situations while instilling the values of efficiency, cleanliness, and aesthetics in the cooking process (Kolb & Kolb, 2021).

The simulation begins with a briefing session by the facilitator, who explains the kitchen workflow, division of tasks, and standard operating procedures (SOPs) that must be followed during the cooking process. Participants then practice basic techniques such as cutting techniques, hot kitchen preparation, and food plating, considering proportions of color, texture, and flavor. During the practice, the trainer provided real-time feedback on participants' work, from cooking techniques and temperature control to work area cleanliness. According to research by Kim et al. (2024), simulation-based training with immediate feedback was shown to improve technical skill accuracy by up to 28% compared to conventional lecture-based training.

In addition to honing technical skills, the simulation also emphasized the importance of teamwork, communication, and role-sharing in a professional kitchen. In the culinary industry, coordination between chefs is crucial for ensuring the speed and consistency of food preparation (Pérez & Blasco, 2022). Therefore, during the simulation, participants were trained to interact effectively, manage their work time, and adapt to pressures that mimic real-life situations in a hotel or restaurant kitchen. The facilitator also emphasized the importance of mise en placing the readiness of equipment and ingredients before cooking as part of professional habits that foster work discipline and operational efficiency (Leong & Wahid, 2021). Evaluation of the simulation results was carried out through performance observations and assessment of the final product. Aspects assessed included taste, aroma, texture, presentation, and work area cleanliness .

The assessment results showed that most participants were able to produce dishes with more balanced flavors, more attractive plate presentations, and improved kitchen cleanliness compared to before the training. This indicates a significant improvement in culinary technical and aesthetic skills. These findings align with research by Ottenbacher et al. (2020), which confirmed that improved culinary creativity and presentation skills directly impact perceptions of food quality and customer satisfaction in the hospitality sector. The cooking simulation also served to foster sustainability awareness among participants. The facilitator introduced organic waste management practices and the reuse of edible ingredients to reduce waste. This approach supports the principles of green kitchen management, which emphasize energy efficiency and waste minimization in food production (Hossain et al., 2024). Thus, the simulation not only trained technical skills but also shaped work behaviors aligned with the sustainability values that characterize ecolodges.

Overall, the results of the simulation phase showed that the training participants were able not only to improve their cooking and kitchen management skills but also to understand standards of professionalism, teamwork, and

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environmental responsibility in kitchen operations. The improved quality of the dishes, both in terms of taste and aesthetics, is clear evidence of the success of the experiential simulation approach in strengthening the competency of local chefs. This approach can serve as a model for replication of training for culinary workforce development in other sustainable tourism destinations in Indonesia.



Figure 4. Cooking demo

Activity Results

The five-day training on basic cooking techniques and kitchen management for chefs at Ecolodge Mbeliling was attended by ten participants, all of whom were local workers. Evaluation results showed that the training had a significant positive impact on improving the participants' knowledge, skills, and professional attitudes. Based on pre- and post-test results, the average score for participants increased from 58% before the training to 85% after the training, representing a 27% increase. This increase indicates that the experiential participatory training method used was effective in improving the skills of local chefs in cooking techniques, cleanliness, and kitchen management (Fauzzia et al., 2022).

These results align with the findings of Rahman et al. (2021), who showed that practice-based and reflection-based training significantly improved the work performance of hospitality workers compared to conventional, theory-based approaches. In addition to improving technical knowledge, the training also impacted changes in participants' work behavior and discipline. Based on facilitator observations, participants began to apply the principle of mise en place, maintain cleanliness of equipment and work areas, and become more organized in storing food ingredients using the FIFO system. These changes indicate the internalization of professional values in kitchen management.

A similar finding was found in a study by Kim et al. (2024), which stated that simulation-based training fostered efficient work habits and awareness of quality standards in small hotel kitchens. Furthermore, participants demonstrated improved food presentation skills, evident in more appealing and consistent dishes, both aesthetically and taste-wise, in line with the findings of Ottenbacher et al. (2020) regarding the importance of culinary creativity in improving perceived food

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quality and customer satisfaction. The results also demonstrated increased self-confidence and work motivation among participants.

After the training, local chefs felt more confident serving food to international tourists, as they understood internationally recognized professional presentation standards and hygiene principles (Mahasuweerachai, 2022). This increased confidence contributed to the quality of guest interactions, which in turn enhanced guests' culinary experiences at Ecolodge Mbeliling. This aligns with research by Pérez and Blasco (2022), which showed that kitchen staff self-efficacy positively impacts service performance and customer satisfaction in a hospitality context. Other observed impacts included increased environmental awareness and the adoption of sustainable kitchen principles. Participants began to familiarize themselves with utilizing local ingredients, reducing food waste, and reusing leftovers for simple processed products such as vegetable stock and composting (Kirmani et al., 2023).

This approach reflects the internalization of the sustainability values that are at the heart of the ecolodge concept. According to Leong and Wahid (2021), environmentally friendly kitchen management not only improves operational efficiency but also strengthens the destination's image as part of sustainable ecotourism. These findings indicate that the training not only develops technical skills but also shifts participants' mindsets toward more environmentally conscious work practices (eco-conscious kitchen practices). Overall, the results of this activity indicate that the training has transformed the competencies and work behaviors of local cooks. Participants not only gained technical cooking and kitchen management skills but also understood the importance of collaboration, communication, and social responsibility in the ecotourism context.

This impact is holistic, encompassing improvements in participants' cognitive, affective, and psychomotor aspects, in line with effective skills learning models in the hospitality sector (Fitriani & Ardi, 2024). Therefore, this activity can be considered successful in achieving the goal of improving the competence of local workers and strengthening the foundation of ecolodge management that is competitive, sustainable, and oriented towards professional service quality (Obeng et al., 2025).

Overall, the results provide statistically significant and practically meaningful evidence that experiential participatory culinary training can substantially improve technical competence and professional kitchen behavior in a community-based eco-hospitality context (Damanik & Angelika, 2016). However, claims should be interpreted within the boundaries of design limitations, sample size constraints, and short-term evaluation scope. By combining statistical rigor with critical reflection, this study contributes both empirical evidence and methodological transparency to the discourse on sustainability integrated hospitality workforce development (Wayan et al., 2023).

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Figure 5. Food plating training

## 4. Conclusion

This study provides empirical evidence that an experiential participatory culinary training model can generate statistically significant improvements in technical competence, professional kitchen management skills, and sustainability-oriented work behavior within a community-based eco-hospitality setting. The observed increase in post-test scores, supported by inferential statistical testing and an exceptionally large effect size, indicates that structured simulation-based learning combined with immediate feedback constitutes an effective mechanism for short-term competency enhancement. Participants demonstrated measurable gains not only in cognitive understanding of hygiene standards, cooking techniques, and inventory management systems, but also in observable behavioral dimensions such as mise en place discipline, sanitation compliance, workflow coordination, and environmentally responsible kitchen practices.

Theoretically, this study contributes to the literature on hospitality workforce development and sustainable tourism in three important ways. First, it advances experiential learning theory within eco-hospitality contexts by empirically demonstrating that sustainability values can be operationalized through embedded simulation rather than treated as peripheral conceptual content. The integration of environmental responsibility directly into technical culinary routines illustrates the interconnectedness of operational competence and sustainability transformation. Second, the findings extend community-based tourism capacity-building scholarship by showing how localized human resource interventions can function as strategic instruments for aligning service quality improvement with sustainability implementation. Third, this study reinforces the argument that applied community service research can achieve methodological rigor when quasi-experimental design, validated instruments, inferential statistical analysis, and effect size estimation are systematically incorporated into program evaluation.

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Scientifically, the study contributes context-specific evidence from eastern Indonesia, a peripheral tourism region that remains underrepresented in hospitality human resource research. By situating the intervention within a real operational ecolodge environment, this research strengthens the ecological validity of hospitality training studies while simultaneously providing a replicable model for sustainability-integrated culinary workforce development. The methodological framework employed demonstrates that PKM-based interventions can move beyond descriptive reporting toward analytically robust, evidence-based evaluation capable of contributing to broader academic discourse.

Nevertheless, caution must be exercised in interpreting the scope of these findings. The absence of a control group limits the ability to establish definitive causal attribution, and potential testing effects or facilitator influence cannot be entirely excluded. The relatively small and homogeneous sample, although representing the total population of kitchen staff at the research site, constrains statistical generalizability beyond similar eco-hospitality contexts. Furthermore, the short-term assessment design captures immediate learning outcomes rather than long-term retention, behavioral sustainability, or organizational-level performance impact. These limitations indicate that the findings should be interpreted as internally valid but context-bound evidence of program effectiveness.

Future research should incorporate longitudinal follow-up assessments to examine skill retention and sustained sustainability practices, comparative group designs to enhance causal inference, and multi-site replication across diverse eco-hospitality settings to strengthen external validity. Such extensions would allow for deeper theoretical refinement regarding the mechanisms through which experiential sustainability-integrated training influences professional identity formation, organizational culture, and long-term service competitiveness.

In conclusion, this study demonstrates that participatory, sustainability-embedded culinary training can function as both a practical capacity-building intervention and a theoretically meaningful model for eco-hospitality workforce transformation. By bridging technical skill development with environmental responsibility within a structured evaluative framework, the study contributes to the evolving discourse on sustainable tourism, hospitality human capital development, and evidence-based community engagement. Overall, this PKM activity proves that participatory training can improve technical competence, sustainability awareness, and community well-being, while also supporting the achievement of the Sustainable Development Goals.

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