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OPTIMIZING THE ROLE OF FAMILY EMPOWERMENT AND WELFARE CADRES THROUGH FOOD PRODUCT INNOVATION AND NUTRITIONAL LITERACY IN PENGGILINGAN URBAN SUBURBS, CAKUNG, EAST JAKARTA

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ABSTRACT

In Indonesia, Kelompok Pemberdayaan dan Kesejahteraan Keluarga (PKK), or Family Empowerment and Welfare cadres, play a crucial role as grassroots agents in disseminating health- and livelihood-related knowledge to the wider community. This community service program aimed to optimize the role of PKK cadres in Penggilingan Urban Village, Cakung, East Jakarta, through integrated training on food product development. The community service program was conducted from July to December 2025, involving twenty PKK cadres through seminars, hands-on workshops, and a benchmarking field visit to Rumah Tempe Indonesia. Program effectiveness was evaluated using pre- and post-tests at each major activity. The results showed consistent improvements in post-test scores across all sessions. The post-test scores were higher than the pre-test scores across all topics, indicating an overall improvement. For instance, Food Hygiene and Safety increased from 4.42 to 4.84, Profit-Smart Kitchen from 4.39 to 4.62, Hypertension from 3.71 to 3.93, Food Safety and Packaging from 3.39 to 4.36, and Food Additives from 4.38 to 4.50. However, statistically significant increases ($p < 0.05$) were only observed in the Food Hygiene and Safety ($p = 0.011$) and Food Safety and Packaging ($p = 0.007$) topics, while the other topics showed non-significant gains. Overall, these findings indicate that experiential learning approaches combining theoretical instruction and practical application are effective in improving PKK cadres' capacity in food product development-related skills.

Keywords: PKK cadres; nutrition literacy; experiential learning; community empowerment; food product development

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ABSTRAK

Di Indonesia, kader Pemberdayaan dan Kesejahteraan Keluarga (PKK) memiliki peran penting sebagai agen dalam diseminasi pengetahuan terkait kesehatan dan penghidupan kepada masyarakat lebih luas Pemberdayaan kader PKK melalui pembekalan ilmu pangan dan pengetahuan gizi akan memberikan manfaat bagi masyarakat. Program pengabdian kepada masyarakat ini bertujuan untuk mengoptimalkan peran kader PKK di

Kelurahan Penggilingan, Jakarta Timur, melalui pelatihan terintegrasi yang mencakup pengembangan produk pangan. Program dilaksanakan pada periode Juli hingga Desember 2025 dengan melibatkan 20 kader PKK melalui kegiatan seminar, lokakarya praktik, serta kunjungan pembelajaran ke Rumah Tempe Indonesia. Evaluasi efektivitas program dilakukan menggunakan pre-test dan post-test pada setiap kegiatan utama. Hasil evaluasi menunjukkan adanya peningkatan skor post-test secara konsisten pada seluruh sesi, dengan peningkatan yang signifikan terutama pada materi kebersihan, keamanan pangan, dan pengemasan. Skor post-test lebih tinggi dibandingkan dengan pre-test pada seluruh topik, yang menunjukkan adanya peningkatan secara keseluruhan; sebagai contoh, Food Hygiene and Safety meningkat dari 4,42 menjadi 4,84, Profit-Smart Kitchen dari 4,39 menjadi 4,62, Hypertension dari 3,71 menjadi 3,93, Food Safety and Packaging dari 3,39 menjadi 4,36, serta Food Additives dari 4,38 menjadi 4,50. Peningkatan yang signifikan secara statistik ($p < 0,05$) hanya terdapat pada topik terkait Food Hygiene and Safety ($p = 0,011$) dan Food Safety and Packaging ($p = 0,007$). Secara keseluruhan, program ini menunjukkan bahwa pendekatan pembelajaran berbasis pengalaman yang mengintegrasikan teori dan praktik efektif dalam meningkatkan kapasitas kader PKK untuk mengembangkan produk pangan

***Kata Kunci**: Kader PKK; literasi gizi; pembelajaran berbasis pengalaman; pemberdayaan masyarakat; pengembangan produk pangan*

INTRODUCTION

In Indonesia, the role of Family Empowerment and Welfare organization (*Pemberdayaan Kesejahteraan Keluarga* or PKK) has been an integral part of community empowerment at the municipal level. It serves as a focal point for community development, especially for mothers, through various social activities covering aspects such as health, economic empowerment, social well-being, and environmental awareness (Hamid et al., 2018; Ruswaji & Chodariyanti, 2020). However, a critical analysis of these studies reveals differences in both approach and effectiveness. Hamid et al. (2018) highlight that PKK empowerment programs often face structural limitations, particularly due to top-down training approaches, lack of alignment with local needs, and insufficient entrepreneurial mindset development, which result in suboptimal knowledge transfer and limited sustainability of outcomes. In contrast, Setiawati et al., (2023) demonstrate a more participatory and context-based empowerment model through food production training using banana-based products. The training is conducted by emphasizing practical implementation, continuous mentoring, and utilization of local time and resources, which leads to higher community engagement and tangible outputs such as the development of banana chips product that can be sold by the local community in Bantul area, Yogyakarta. Therefore, while both studies confirm the strategic role of PKK in community empowerment, the effectiveness of such programs is strongly influenced by the implementation approach, where participatory and need-based interventions tend to produce more sustainable and impactful outcomes.

According to data from the Ministry of Internal Affairs, in Jakarta alone, approximately 76,114 individuals are actively involved as PKK cadres (Pemprov Jakarta, 2022). Some of the main roles of PKK cadres include improving the economic and health well-being of local communities through health-related programs and economic empowerment initiatives, particularly entrepreneurship-based activities. There have been several government initiatives to empower the PKK cadres through

entrepreneurship-based activities. However, the programs were mostly still focused on economic training without integrating food science and nutritional literacy simultaneously, resulting in limited product sustainability.

Considering the pivotal role of PKK cadres in community empowerment, especially in economic and health aspects, equipping them with appropriate and applicable knowledge is essential. One important type of knowledge that can be disseminated to the community through PKK cadres is related to food and nutrition. Knowledge on food product development for entrepreneurial purposes, as well as understanding the nutritional value of food products, represents practical and relevant information that can be easily transferred and applied towards a wider community. Although developing and selling food products is already a common practice, a lack of understanding of the scientific principles behind food processing often results in products of lower quality and shorter shelf life. Therefore, improving knowledge related to proper food product development, particularly from quality and safety perspectives, can enhance the overall value of food products and potentially increase their economic profitability for the community.

Increasing awareness of the nutritional value of food products is also a key factor in improving the overall community health status. According to information released by the Government of Jakarta, in 2022, the prevalence of hypertension in Jakarta reached approximately 10.17%, while about 32.04% of the population was classified as obese. More concerning, a survey conducted in the same year reported that approximately 14.8% of infants were affected by stunting. These health issues could potentially be reduced through improved public awareness and understanding of balanced nutrition and healthier food choices (Pemprov Jakarta, 2022).

Therefore, considering these two main issues (limited knowledge of food product development and insufficient nutritional literacy), this community service program aimed to address both issues through collaboration with PKK cadres from Penggilingan Municipality. About 20 participants that were part of the PKK cadres from Penggilingan Municipality participated in this program. The community service activities conducted from July 2025 to December 2025 consisted of seminars, training sessions, and hands-on workshops related to food product innovation and nutritional awareness.

METHOD

Program Overview

Overall, the present community service program consisted of one field visit and three seminars and workshop sessions about food and nutrition. Twenty participants who are members of the PKK cadres were divided into five groups (four people in each group). Each group was tasked with generating a food product idea that could be further developed and actualized during the course of the present community service program.

The PKK cadres involved in the present community service program were mostly housewives from the Penggilingan municipality area. They already had some experience in food-related preparations, such as making cookies for Idul Fitri, catering wedding services, and selling snacks and beverages through e-commerce.

Visitation to Rumah Tempe Indonesia

The visitation to Rumah Tempe Indonesia (RTI) was aimed to enrich the PKK cadres' knowledge on how to produce food products with high quality and safety standards, as well as on how to establish small- to medium-scale food businesses. The activity was conducted (09/08/2025) in Bogor. Pre- and post-tests were administered to measure whether there was an increase in participants' understanding before and after the activity.

First Training and Workshop

In the first training and workshop session, PKK cadres participated in two seminar sessions and one workshop activity. The first seminar discussed the stages of food product development, while the second seminar focused on the importance of food processing. During the workshop session, PKK cadres learned how to prepare pasta fortified with okara (tofu by-product) and cream soup made from tempeh and mushrooms as alternative options for complementary feeding (MPASI). During this session, PKK cadres began to generate food product ideas, which were planned to be tested and produced in the second training and workshop session. The activities were conducted on 13/09/2025.

Second Training and Workshop

The second training and workshop were conducted on 1/11/2025. In the second training and workshop, the PKK cadres learned the financial aspects of developing a food product. Fundamental knowledge on how to calculate the Cost of Goods Sold (COGS), margin calculation, as well as product propositions, was taught.

Besides learning the financial aspects of developing food products, the PKK cadres also learned about the importance of managing the usage of salt when developing food products. The PKK cadres need to understand the importance of managing the usage of salt because, oftentimes, people tend to use high amounts of salt in their food products. From a health point of view, high salt content in food could increase the risk of non-communicable diseases such as hypertension.

In the second workshop, the PKK cadres were allowed to actualize the food product idea they had already developed from the first workshop session. The developed products in the second workshop were then evaluated by the i3L University Food Technology faculty members on what improvements could be implemented in the third workshop to improve the quality of the developed food products.

Third Training and Workshop

The third training and workshop were conducted on 06/12/2025. The training and workshop mostly discussed food safety and food additive applications in food products. The topics covered in the third training and workshop were how to produce a safe food product, what information needs to be available in the food label, what a food additive is, and how to wisely apply food additives in food products.

Understanding those aspects would be very beneficial for the PKK cadres as they learned how to improve the safety, quality, and shelf-life of the food products that they already developed. During the workshop session, the PKK cadres learned and tried to apply some food additives that can improve the quality as well as the shelf-life of their developed products.

The third training and workshops also marked the end of the community service program. To further support the PKK cadres in developing their food products, a list of home-based food processing equipment was given to the Urban Suburbs so that the equipment can be further utilized by the PKK cadres community even after the community service program ended.

Data Analysis

The pre- and post-test scores of the participants were collected and analyzed using SPSS statistical software. Normality testing indicated that the differences between pre- and post-test scores were not normally distributed. Therefore, the Wilcoxon signed-rank test was applied to compare the two related samples from the same participants. The Wilcoxon signed-rank test was selected because it is the most appropriate statistical method for analyzing paired (dependent) data that are not normally distributed. The pre- and post-test scores in this program were obtained from the same participants, meaning the observations are related (paired samples). Before selecting the test, a normality test was conducted and

showed that the differences between pre-test and post-test scores were not normally distributed, which makes parametric t-tests, such as paired t-tests, unsuitable, as they assume normality of the data. Therefore, the Wilcoxon was used as a non-parametric alternative as it does not require the assumption of normal distribution. Statistical significance was determined based on the p-value obtained from the Wilcoxon test, specifically the Asymp. Sig. (2-tailed) value reported in SPSS output, with $p < 0.05$ considered to indicate a significant difference between pre- and post-test scores.

RESULT & DISCUSSION

Visitation to Rumah Tempe Indonesia

RTI was founded on 06/08/2012. Since its establishment, RTI has been consistent in becoming a role model for tempeh producers, especially in promoting high-quality and safe tempeh. In addition to producing fresh tempeh, RTI has also produced various kinds of tempeh-based products, namely tempeh nuggets and tempeh chips.

Considering the credentials of RTI as a well-established small to medium-scale company, RTI was a suitable place for a benchmarking process for the PKK cadres to learn. The RTI visitation was conducted on 09/08/2025 and started at 9:00 AM. Mr. Bela Putra Perdana from RTI welcomed with a brief introduction to RTI and explained the history of RTI, along with how to establish a small- to medium-scale company. After that, the PKK cadres conducted a factory visit, starting from the storage, through the fermentation, drying, and packing rooms.

After conducting the factory visit, a discussion session was held between the PKK cadres and Mr. Bela Putra Perdana from RTI. During the discussion session, PKK cadres asked various questions related to tempeh production and food business and received tips and tricks on how to develop a small to medium-sized company. Finally, the visitation concluded at 12:00 PM.

Figure 1. PKK cadres are involved in the yeast preparation for tempeh production
(Source: Author, 2025)

The visit to Rumah Tempe Indonesia was expected to inspire the participants regarding the successful business story of small enterprises that produce traditional Indonesian food products, which can reach the global market. Through the integration of technology and high food safety standards, Rumah Tempe Indonesia can produce a high-quality tempe not only for export, but also to develop other tempe-based brands and innovative Tempe products.

First Training and Workshop

The first seminar of the first training and workshop session was delivered by Ms. Hanny Angrainy, one of the faculty staff from the Food Technology Department, i3L University. Ms. Hanny already had an extensive background in product development in various food industries in Indonesia. She highlighted the important steps in developing a food product, namely: how to conduct a basic market analysis, sensory evaluation of a food product, and food packaging examples. The second seminar was delivered by Mr. Kenneth Francis Wibisono, one of the faculty staff from the Food Technology Department, i3L University. Mr. Kenneth shared his expertise about the importance of food processing in improving the shelf-life and safety of foodstuffs. He highlighted the safety of the food processing. Each seminar was conducted within a

60-minute timeframe and adapted an interactive two-way discussion to encourage active participation and effective knowledge sharing from theoretical and practical perspectives.

Figure 2. Materials presented by Mr. Kenneth on the importance of food processing
(Source: Author, 2025)

After the seminar session concluded, the PKK cadres were ushered to the i3L Pilot Plant for conducting a workshop session. In the workshop session, each group was given a set of materials for making two products (okara pasta and cream soup tempe and mushroom). Okara itself is a byproduct of tofu production. Based on previous studies, okara is a considerable source of fibre and protein. Hence, it is a good component for food fortification (Kamble & Rani, 2020). Noodles and pasta are wheat flour-based products that are considered staple, versatile, and comfort foods in Indonesia. They are often regarded as an alternative source of carbohydrates to replace rice (Lesa et al., 2024). Therefore, pasta was selected as the fortification medium due to its wide availability and high consumption.

The second menu that the PKK cadres had to make was cream soup using tempe and mushrooms. Some of the PKK cadres are also working as *Posyandu* cadres in *Penggilingan* municipality. Every week, these PKK cadres meet with Mothers with babies under two and three years old (*baduta* and *batita*). Providing an adequate amount of nutrition, especially protein, is essential for the optimal growth of toddlers. Cream soup tempe and mushroom is an alternative option for a complementary feeding food menu as it contains a high level of protein and is easy to access for most Indonesian people.

After the workshop session concluded, each group of PKK cadres was tasked to develop a food product idea that can be trialed for the second training and workshop session.

Second Training and Workshop

The second training was held on 1/11/2025. This session focused on the financial and nutritional aspects of food product development. A pre- and post-test was conducted for each session. The first seminar was delivered by Ms. Rosita Widjojo from the International Business Management Department, i3L University. She highlighted the importance of calculating the cost of goods sold (COGS), how to calculate the selling price, and the profit margin.

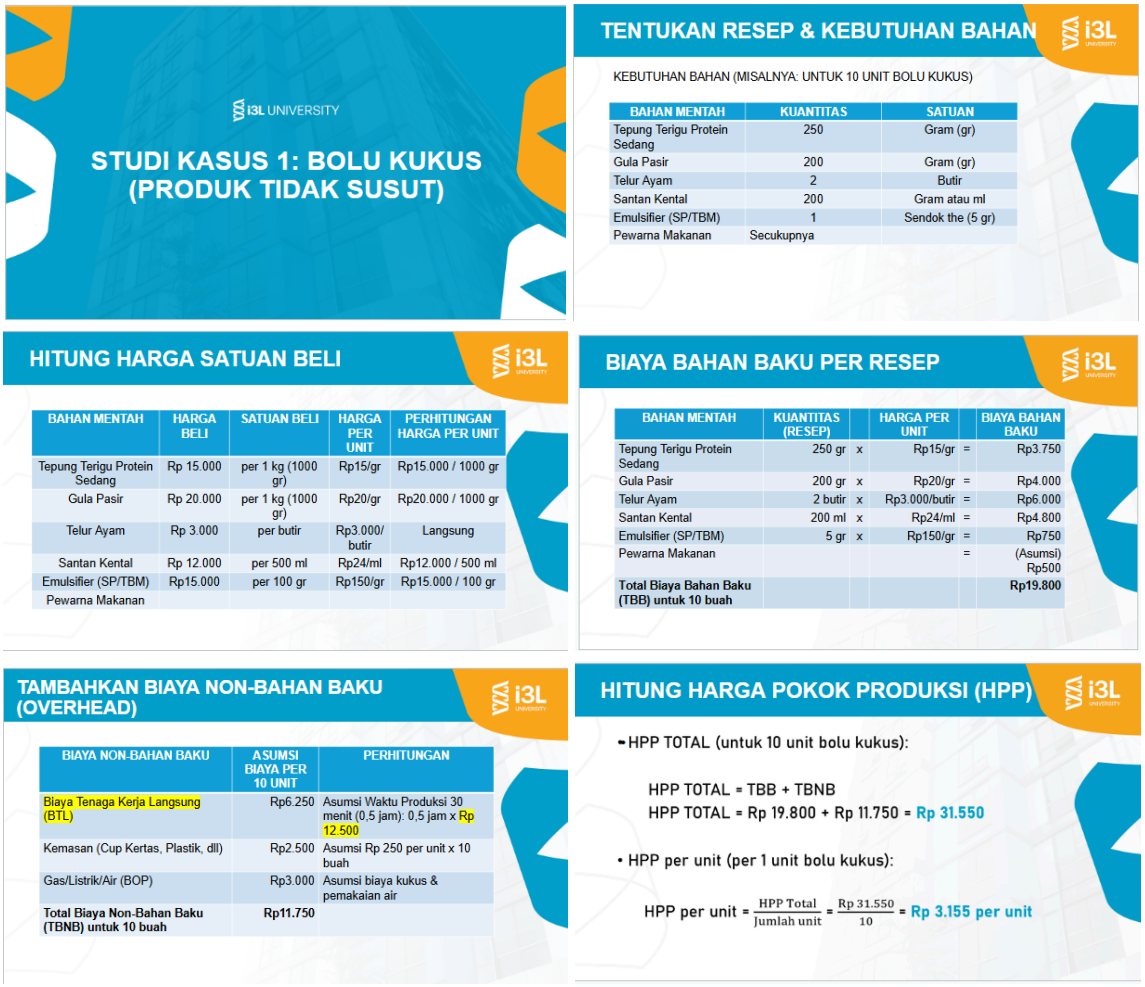

Figure 3. Materials presented by Ms. Rosita Widjojo on the importance of profit calculation
(Source: Author, 2025)

The second seminar session was presented by Ms. Widya Indriani from the Food Science and Nutrition Department. This session emphasizes the general knowledge of nutrition and a healthy lifestyle, including the principle of balanced dietary intake as a part of family lifestyle. Following the seminar, a short break was taken before the workshop session.

Before the workshop, the PKK cadres had been grouped into five groups, with each group consisting of 3-5 people. Each group developed one type of product that had been discussed previously as part of a task from the first training session. The products were *stik keju* (cheese stick), *keripik singkong balado* (spicy cassava chips), *rempeyek* (Indonesian peanut cracker), *bolu kukus ketan hitam* (steamed black glutinous rice cake), and mini brownies. The activity was conducted in the Food Development laboratory facility. Additionally, the lecturers helped to evaluate and provided constructive feedback regarding how to improve the food products from a food quality and safety perspective.

Figure 4. *Stik Keju* made by PKK cadres
(Source: Author, 2025)

By the end of the second training and workshop, the PKK cadres were able to calculate and estimate the price of the products they planned to commercialize, as well as identify and define the key processing steps of their product ideas. In addition, they successfully transformed home recipes into standardized product formulations, ensuring consistent quality in the final products and improving the overall readiness of the products for commercialization.

Third Training and Workshop

The third training and workshop was conducted on 06/12/2025. The first session was led by Mr. Ananditya Nugraha, focusing on the food safety aspect of a product and the suitability of packaging. This session discussed food safety and how to choose appropriate packaging depending on the product, including its function. The second seminar topic was the utilization of food additives to improve the quality and shelf life of the product, which Ms. Desak Putu Ariska Pradnya Dewi delivered. In this session, Ms. Ariska mentioned the types and functions of food additives, the applicable regulations in Indonesia, and their application in food products.

As a follow-up action to the previous seminar, specific food additives were assigned based on each product, and their application was demonstrated by the students to the PKK cadres. The demonstration focused on the proper use, function, and maximum permitted levels of each additive. The food additives applied include: TBHQ for *rempeyek*, *singkong balado*, and *stik keju*; sodium benzoate for mini brownies; potassium sorbate in combination with citric acid for *bolu kukus ketan hitam,* and *keripik singkong balado*.

The products were made, with one being the control and the other being added with food additives. Tert-butylhydroquinone (TBHQ) is a synthetic phenolic antioxidant used to stabilize frying oils and instant food products by scavenging free radicals, thereby extending product freshness, and limiting lipid oxidation.

Sodium benzoate (SB) is a widely used preservative derived from benzoic acid. It is highly soluble in water and exhibits effective antifungal and antibacterial activity (Hejazi et al., 2024). Therefore, sodium benzoate is suitable for mini brownies as it effectively controls mold and yeast growth in high-moisture baked products. (Mika et al., 2023). The application of TBHQ was used for fried products, including *rempeyek*, *singkong balado*, and *stik keju*.

Potassium sorbate (PS) is a food preservative that has low toxicity, high effectiveness, and solubility, as well as stability, which is widely used to inhibit the growth of molds and bacteria in food products (Xiao et al., 2024). Meanwhile, citric acid is a naturally occurring weak organic acid found in citrus fruits, and it is widely used in food and beverages as a flavoring agent, preservative, acidulant, and pH regulator (Sweis & Cressey, 2018). The combination of potassium sorbate with citric acid was applied for *bolu kukus ketan hitam* and *keripik singkong balado* due to their synergistic preservation effect. Citric acid helps to lower the pH to enhance the antimicrobial activity of potassium sorbate, thereby improving microbial inhibition and extending product shelf life (Musyoka et al., 2018).

Through the third training and workshop, the participants were able to determine the suitable food packaging and food additives for different types of food. Additionally, they gained hands-on experience in incorporating food additives into food products they planned to commercialize, as well as evaluating the Acceptable Daily Intake (ADI) of these additives in accordance with Indonesian regulations. However, during the practical session, minor variations in procedure standardization were observed among several groups due to differences in the group's internal coordination. However, these variations did not affect the overall quality of the product and remain in line with expectations.

Handover of Home-based Food Processing Equipment

The third training and workshop marked the end of the community service program. To further support the PKK cadres' activity, a list of home-based food processing equipment, such as a blender, pasta maker, oven, and oil separator, was given to the Penggilingan Urban Suburbs.

Figure 5. Handover of home-based food processing equipment to PKK cadres from Penggilingan Municipality
(Source: Author, 2025)

The handover of home-based food processing equipment was expected to encourage PKK cadres to improve their quality of life in Penggilingan Urban Suburbs, Cakung, East Jakarta, by implementing the knowledge and skills gained throughout the training and workshop sessions. With the support of appropriate equipment, they are better equipped to produce food products more efficiently and consistently. Furthermore, the cadres were expected to enhance their potential income by applying proper profit calculations and developing marketable products. The product quality can also be continuously improved through the packaging, extended shelf life, and overall product consistency.

Pre- and Post-Test Evaluation

To evaluate the effectiveness of knowledge transfer throughout the community service program, pre- and post-tests were done at every major activity, including the field RTI visitation and all workshop sessions. The application of pre- and post-test evaluation is a widely accepted method in community-based educational programs, as it enables the direct measurement of changes in participants' knowledge before and after an intervention (Dewi et al., 2025). This approach is particularly appropriate for adult learning contexts, such as PKK cadres empowerment programs, where participants may possess diverse educational backgrounds and prior experiences.

Pre-tests were conducted before each session to assess participants' baseline understanding of the topic being delivered, while post-tests were conducted immediately after each session to measure learning outcomes and knowledge improvement. By comparing pre- and post-test scores, the effectiveness of each educational activity in improving participants' comprehension could be systematically evaluated. Additionally, this method allows facilitators to identify which topics were well understood and which require further reinforcement in future programs (Indriani et al., 2024).

Table 1. Statistical analysis using the Wilcoxon signed-rank test

Topics	Pre-Test	Post-Test	P-value
Food Hygiene and Safety in Tempeh Production	4.42 ± 0.50^{a}	4.84 ± 0.37^{b}	0.011
Profit-Smart Kitchen Recipe: A No-Loss Profit Calculator	4.39 ± 0.98^{a}	4.62 ± 0.98^{a}	0.625
Hypertension: Diet and Lifestyle	3.71 ± 0.95^{a}	3.93 ± 0.68^{a}	0.145
Food Safety and Food Packaging	3.39 ± 0.85^{a}	4.36 ± 0.79^{b}	0.007
Responsible Use of Food Additives in Food Products	4.38 ± 0.97^{a}	4.50 ± 0.84^{a}	0.249

(Source: Author, 2025)

**Different superscript letters (a, b, c) within the same column indicate significant differences ($p < 0.05$) according to the Wilcoxon signed-rank test (Asymp. Sig., 2-tailed). Each nominal has been rounded up to the nearest second decimal place.*

Table 1 presents the statistical analysis results of the Wilcoxon signed-rank test comparing pre-test and post-test scores for all educational topics. A significant increase was observed for Food Hygiene and Safety in Tempeh Production ($p = 0.011$) and Food Safety and Food Packaging ($p = 0.007$), as

indicated by different superscript letters. In contrast, Profit-Smart Kitchen Recipe: A No-Loss Profit Calculator (p = 0.625), Hypertension: Diet and Lifestyle (p = 0.145), and Responsible Use of Food Additives in Food Products (p = 0.249) showed no significant differences between pre-test and post-test scores. Overall, mean values for all topics increased from pre-test to post-test, indicating a general improvement in participants' scores after the learning session.

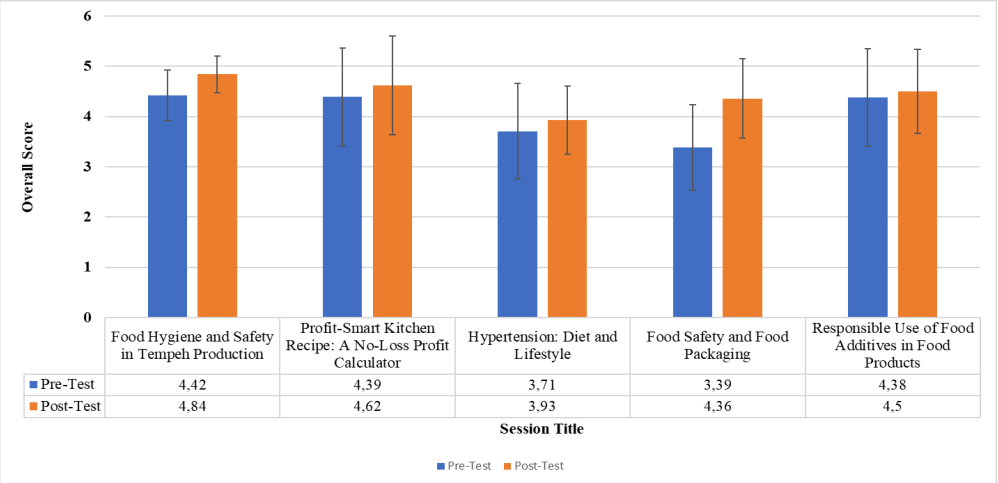

Figure 6. Bar chart of the analysis of the pre-test and post-test
(Source: Author, 2025)

Figure 6 provides a clearer visual comparison of the changes in scores across each educational topic, highlighting both the magnitude of improvement and the statistical relevance of those changes. The chart shows more pronounced increases in Food Hygiene and Safety in Tempeh Production (from 4.42 to 4.84) and Food Safety and Food Packaging (from 3.39 to 4.36), which is consistent with their significant differences observed in the analysis ($p < 0.05$). In contrast, although slight increases are visible in Profit-Smart Kitchen Recipe: A No-Loss Profit Calculator (4.39 to 4.62), Hypertension: Diet and Lifestyle (3.71 to 3.93), and Responsible Use of Food Additives in Food Products (4.38 to 4.50), the relatively small gaps between the bars reflect the absence of statistically significant changes ($p > 0.05$). Furthermore, the error bars illustrate the variability within each topic, indicating that some sessions had more consistent participant responses than others.

The observed improvement in participants' knowledge can be interpreted through the lens of adult learning theory from the study conducted by Cummine et al. (2023), which emphasizes that adults learn more effectively through experiential, problem-based, and context-relevant approaches, with positive outcomes by approximately 20-30% improvement compared to the traditional lecture-based learning method. The combination of seminars, hands-on workshops, and field visits in this program aligns with these principles, as participants were actively engaged in applying knowledge rather than passively receiving information. This experiential learning process likely contributed to the increased understanding reflected in the post-test scores.

The results showed that overall post-test scores increased across all sessions, showing an improvement in participants' knowledge. During the visitation to RTI, which focused on food hygiene and safety in tempeh production, a statistically significant increase in participants' scores was observed ($p = 0.011$). This suggests that experiential learning through

direct observation of standardized food production processes, combined with interactive discussion, was highly effective in enhancing participants' understanding of food safety principles.

In the first training and workshop session, which introduced food product development stages and the importance of food processing, post-test scores showed an upward trend compared to pre-test results. Although the difference was not statistically significant ($p>0.05$), the improvement indicates that participants gained essential foundational knowledge. This outcome is reasonable, as the topics introduced were relatively new and served as a basis for more advanced discussions and hands-on applications in the next sessions.

For the second training session and subsequent meetings, the pre- and post-test results also showed a positive trend, with post-test scores consistently higher than pre-test scores across all topics delivered. Although not all sessions resulted in significant differences in the statistical data, the observed increases indicate that participants experienced meaningful knowledge improvement. The insignificance in the statistical data in certain topics may be attributed to the relatively high baseline knowledge among PKK cadres, particularly for themes that are routinely discussed in PKK and Posyandu activities, such as basic nutrition and household food practices (Rahmawati & Dewi Sartika, 2020). Nevertheless, these sessions played an important role in reinforcing and contextualizing existing knowledge within the framework of food product development and community-based entrepreneurship. On the other hand, topics that are more technical and are less familiar to the PKK cadres, such as food hygiene and safety, packaging selection, and preservation strategies, showed clearer and, in some sessions, statistically significant improvements, proving the effectiveness of the experiential learning and practical demonstrations

Overall, the results of this community service program demonstrate that a structured combination of seminars, hands-on workshops, field visitation, and continuous evaluation through pre- and post-tests can effectively enhance the knowledge and capacity of PKK cadres in food product development, food safety, nutrition, and small-scale entrepreneurship. The consistent improvement in post-test scores across all activities indicates that the educational interventions were successful in strengthening participants' understanding, with experiential learning approaches proving particularly effective for technical topics. By empowering PKK cadres with scientifically grounded yet practical knowledge, this program not only improved individual competencies but also strengthened the cadres' potential role as agents of change within their communities. Moreover, this program contributes to sustainable community empowerment by supporting safer food production practices, improved nutritional awareness, and the development of economically viable food products that can positively impact household health and livelihoods.

CONCLUSION

This community service program demonstrated that an integrated approach combining seminars, hands-on workshops, field visitation, and systematic evaluation through pre- and post-tests effectively enhanced the knowledge and competencies of PKK cadres in food product development, food safety, nutrition, and small-scale entrepreneurship. The consistent improvement in post-test scores across all activities indicates that the educational interventions were successful, particularly when experiential learning and practical demonstrations were applied to technical topics. A minor limitation observed during the program was variation in procedural standardization among groups, which was

mainly influenced by differences in internal coordination during practical sessions. Although this did not directly affect the overall quality of the products produced, it highlights the importance of group dynamics in hands-on community training activities.

Therefore, future programs are recommended to consider grouping participants based on prior familiarity or shared interests to improve coordination and ensure more uniform implementation. By addressing this aspect, similar initiatives can further optimize learning effectiveness and strengthen the role of PKK cadres as agents of change in promoting safe food practices, improved nutritional awareness, and sustainable community-based food entrepreneurship.

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