JPMD: Jurnal Pengabdian kepada Masyarakat Desa
Volume 7, Number 2, August 2026
e-ISSN: 2745-5947
https://ejournal.iaifa.ac.id/index.php/jpmd

Accepted:	Revised:	Published:
Jun 2026	July 2026	August 2026

Kirkpatrick-Based Evaluation of Agricultural Extension in Black Sapote Gummy Candy Making Training at Karangmojo Fruit Village

Gandis Pramudya Wardani[1], Epsi Euriga[2], Adi Prayoga[3]
Email: epsieuriga@gmail.com[2]

Politeknik Pembangunan Pertanian Yogyakarta Magelang, Indonesia

Abstract

The gummy candy training using *blacksapote* fruit is part of a community empowerment strategy to support the Kampung Buah horticultural program in Karangmojo Hamlet, Sleman. This activity aims to improve the knowledge, attitude, and technical skills of members of the Women's Farmer Group (KWT) Tunas Harapan in processing *blacksapote* into high-value products. The method used is direct demonstration and hands-on practice, supported by PowerPoint, leaflets, and real materials. Evaluation was conducted using Kirkpatrick's four-level model and the Wilcoxon Signed Rank Test. The results showed improvements in knowledge (31.2%), attitude (13.9%), and skills (90.5%). The Wilcoxon test revealed a significant difference ($p < 0.05$) in all aspects. Therefore, this training proved effective in increasing the capacity of female farmers in horticultural product processing and serves as a potential model for local-based community empowerment.

Keywords: Agricultural Extension; Community Empowerment; Blacksapote; Gummy Candy; Kirkpatrick Evaluation.

Introduction

Fruit Village (Kampung Buah) is one of the strategic programs initiated by the Ministry of Agriculture to promote the development of area-based horticultural commodities. In Karangmojo, Kalasan, Sleman, this program is implemented through the cultivation of black sapote, a tropical fruit known for its high nutritional value but relatively low popularity among the general public. Black sapote possesses significant potential as a flagship commodity due to its

unique characteristics and its suitability for tropical climates, such as the Yogyakarta region.

Despite its agronomic advantages, the potential of black sapote has not been fully utilized by the farming community. A primary challenge is the lack of innovation in processed products. Currently, harvests are generally sold as fresh fruit, which suffers from a short shelf life and limited market value. This situation is further exacerbated by the farmers' minimal skills and knowledge regarding agricultural processing, resulting in a lack of added value for black sapote products.

To address these issues, community empowerment efforts are required, focusing on increasing farmer capacity through an innovation-based extension approach. A relevant and applicable form of agricultural extension is training in black sapote gummy candy production. Confectionery products like gummy candies are favored by various demographics, are easy to package, possess a stable shelf life, and have broad market potential—both for household consumption and as tourist souvenirs (Hidayati et al., 2023). This product innovation is expected to increase the economic value of black sapote while creating new business opportunities, particularly for housewives and village youth.

Beyond serving as a solution to the low economic value of fresh fruit, this training also functions as an educational medium to introduce horticultural diversification methods to the village community. By providing technical knowledge, recipes, and guidance on packaging and marketing, this activity not only enhances individual skills but also strengthens the collective capacity to manage communal enterprises. This is crucial, as the success of any empowerment program relies heavily on active participation and a sense of community ownership toward the introduced innovations.

Furthermore, this extension-based training plays a vital role in fostering a local entrepreneurial mindset. Through an applicable and market-oriented approach, the program encourages farmers and members of Women Farmers' Groups (KWT) to transition from being mere raw material producers to becoming key players in the agricultural value chain. Along with the increasing demand for unique and healthy local products, innovations such as black sapote gummy candy have significant potential to evolve into sustainable enterprises that contribute tangibly to community welfare.

Methods

The agricultural extension activity was conducted on Monday, May 19, 2025, at the Karangmojo Hamlet Hall, Tamanmartani Village, Kalasan Subdistrict, Sleman Regency, Special Region of Yogyakarta. The target participants for this activity were 24 members of the Tunas Harapan Women Farmers' Group (KWT). The extension material included comprehensive information on processing black sapote into gummy candies, delivered through an applicable and interactive approach.

The method employed in this extension was a combination of method demonstration and hands-on practice, which is an effective approach for transferring knowledge and technical skills. In this method, the facilitators demonstrated the step-by-step process of making black sapote gummy candies, which was immediately followed by participants practicing the techniques themselves. The media used in the session included PowerPoint presentations, leaflets, and tangible materials such as black sapote fruit, as well as the necessary tools and ingredients for candy production. This combination of media aimed to enhance participants' understanding and foster active engagement.

Data were collected using pre-test and post-test questionnaires to evaluate improvements in participants' knowledge, attitudes, and skills. Furthermore, the evaluation was conducted using Kirkpatrick's four-level model, which includes: reaction (participant satisfaction), learning (changes in knowledge/attitude), behavior (practical application), and results (long-term impact on the farming enterprise). For quantitative analysis of the pre-test and post-test data, the Wilcoxon Signed-Rank Test was utilized, as the data were on an ordinal scale and followed a non-parametric distribution. This test aimed to identify significant differences in participants' outcomes before and after the extension. The results of this analysis served as the basis for assessing the program's effectiveness and determining the future direction of development activities.

Results

The evaluation of the black sapote gummy candy production training was conducted to determine the program's effectiveness in enhancing participants' knowledge, attitudes, and skills. The Level 1 Evaluation (Reaction) was implemented to measure participant satisfaction regarding the training session. This evaluation utilized a questionnaire instrument based on a 1–4 Likert scale,

consisting of seven statements covering training materials, methods, facilitators, and scheduling.

Most participants responded within the "Agree" and "Strongly Agree" categories, particularly regarding indicators such as "The material presented was easy to understand" and "The training was conducted according to the scheduled time." These findings indicate that the training was well-received by the participants in terms of technical implementation.

Table 1. Results of Reaction Evaluation toward the Extension Program

Variable	Score
The training material for black sapote gummy candy production is easy to understand.	3.5
This training increased my knowledge regarding black sapote processing.	3.6
The extension methods used were highly effective in helping me understand the material.	3.5
The instructors/facilitators delivered the material clearly and communicatively.	3.6
The training duration was appropriate (neither too long nor too short).	3.5
I feel confident in attempting to make gummy candies independently at home.	3.4
This training provides practical benefits that I can apply to my farming business.	3.4
Total Score	**24.4**
Category	**Strongly Agree**

Table 1 presents the evaluation results of the participants regarding the black sapote-based gummy candy production training across various aspects, including material comprehension, knowledge enhancement, extension methods, instructor quality, training duration, participant confidence, and benefits to farming enterprises. The average scores for each statement range from 3.4 to 3.6,

with a total cumulative score of 24.4. Based on the scoring range utilized, this total falls into the "Strongly Agree" category, indicating that participants provided highly positive feedback regarding the training they attended.

Specifically, aspects such as the increase in knowledge regarding black sapote processing and the delivery of material by the extension agents received the highest scores (3.6), signifying that the training successfully broadened the participants' insights and was well-delivered by the instructors. Meanwhile, slightly lower scores (3.4) for the indicators of self-confidence and direct benefits to farming enterprises suggest that although the training was perceived as beneficial, some participants may still require further assistance or mentoring to feel fully confident in practicing the training results independently. Overall, these data indicate that the training met participant expectations and succeeded in delivering the material effectively.

Figure 1. Completion of Pre-test and Post-test Questionnaires

Table 2. Results of Pre-test and Post-test Learning Evaluation

No	Indicator	Results					
		Knowledge				Attitude	
		Score	%	Score	%	Score	%
1	Pre-test	143	55.0	612	76.5	-	-
2	Post-test	224	86.2	723	90.4	362	90.5

3	Increase	81	31.2	111	13.9	362	90.5

Table 2 illustrates the learning evaluation results of the participants in the black sapote gummy candy production training, measured through three primary indicators: knowledge, attitude, and skills. A comparison between pre-test and post-test scores reveals a significant increase across all three indicators. In the knowledge indicator, scores rose from 143 (55%) during the pre-test to 224 (86.2%) in the post-test, representing an increase of 81 points or 31.2%. This demonstrates that the training effectively enhanced participants' understanding of processing black sapote into value-added products.

The attitude indicator also showed improvement, increasing from a score of 612 (76.5%) to 723 (90.4%), an increase of 111 points or 13.9%. This upward trend reflects a positive shift in the participants' perspectives and enthusiasm regarding the utilization of black sapote. Meanwhile, the skills indicator reached a score of 362 with a high percentage of 90.5%, indicating that the majority of participants successfully mastered the techniques for making gummy candies following the training.

Table 3. Wilcoxon Statistical Test Results

No	Wilcoxon Pre-test and Post-test	Sig. (2-tailed)
1	Knowledge	.000
2	Attitude	.000
3	Skills	.000

Table 3 presents the results of the Wilcoxon statistical test regarding the differences between pre-test and post-test scores across three aspects: knowledge, attitude, and skills of the training participants. The significance value (Sig. 2-tailed) for all three aspects is 0.000, which is well below the 0.05 significance level. This indicates that there is a significant difference between the scores before and after the training. In other words, the black sapote gummy candy production training successfully and significantly improved the participants' knowledge, attitudes, and skills. These findings reinforce the effectiveness of the extension activities that were implemented.

Table 4. Results of Extension Effectiveness and Behavioral Change Effectiveness

No	Variable	Pengetahuan	Sikap	Keterampilan
1	Pre-test	7.15	30.6	0
2	Post-test	11.2	36.15	18.1
3	Skor Maksimal	12	40	20
4	Target peningkatan (c-a)	4.85	9.4	20
5	Kejadian perilaku (b-a)	4.05	5.55	18.1
6	Efektivitas penyuluhan (e/c)	33.75%	13.90%	90.50%
7	Efektivitas perubahan perilaku (e/d)	83.50%	59.00%	90.50%

Table 4 explains the categories of extension effectiveness and behavioral change effectiveness in the black sapote gummy candy production training. According to Suharti et al. (2023), these can be classified based on the following criteria: effective (≥ 66%), moderately effective (33.33%–66.66%), and less effective (≤ 33.33%). Based on the data in the Effectiveness table, the extension effectiveness in increasing participants' knowledge stands at 33.75%, which falls into the moderately effective category. Meanwhile, the effectiveness in the attitude aspect is only 13.9%, which is categorized as less effective. Conversely, the extension effectiveness in improving skills reached 90.5%, categorized as effective. This indicates that the direct-practice extension method significantly assisted participants in mastering the technical skills of gummy candy production, although it was not yet fully optimal in significantly influencing participants' knowledge and attitudes.

The effectiveness of behavioral change also shows that the knowledge behavior change stands at 83.5%, which is in the effective category, indicating that participants were able to significantly increase their understanding after the training. In the attitude aspect, behavioral change was recorded at 59.0%, falling into the moderately effective category. This means that although there was an improvement in participants' attitudes, there is still room for improvement, particularly regarding the internalization of values and motivation from the training. For skills, the effectiveness of behavioral change was recorded at 90.5%

and categorized as effective, showing that participants' skills increased substantially due to the hands-on practical training.

Discussion

The training for black sapote gummy candy production in Karangmojo Hamlet is an integral part of the area-based horticultural commodity development strategy, which aims to increase the added value of local agricultural products. This activity was designed to address the issues surrounding the low economic value of black sapote, which, until now, has predominantly been marketed in its fresh form. Given its short shelf life and limited market demand, processing the fruit into products such as gummy candies represents a strategic step toward diversifying agricultural output and expanding market reach (Hidayati et al., 2023).

Furthermore, this training serves as a concrete implementation of a participation-based extension approach. This approach positions farmers as the primary agents of change and encourages their active involvement throughout every stage of the activity. This is consistent with the perspective of Supriyadi and Astuti (2021), who state that the success of extension programs is heavily influenced by the participation of the target community and the existence of two-way communication between extension agents and participants.

Figure 2. Implementation of Black Sapote Gummy Candy Production Training

Figure 3. Implementation of Black Sapote Gummy Candy Production Training

In the implementation of these activities, the methods employed were method demonstration and hands-on practice. These methods were selected as they are considered the most effective for conveying technical skills to participants. Consistent with research by Pramono et al. (2020), the demonstration method allows participants to not only understand the theory but also experience the product manufacturing process firsthand, thereby significantly improving practical abilities. The training provided to the members of the Tunas Harapan Women Farmers' Group (KWT) proved to provide a concrete and applicable learning experience.

The evaluation of the activities was conducted using Kirkpatrick's four-level approach: reaction, learning, behavior, and results. The reaction-level evaluation results indicated that participants had a high level of satisfaction with the training. The average evaluation scores ranged from 3.4 to 3.6 on a maximum scale of 4.0, with a total score of 24.4. The highest scores were found in the aspects of material delivery by the extension agents and the increase in participants' knowledge. This indicates that the extension service was able to create a comfortable, communicative learning environment that met the participants' needs (Astari et al., 2023).

At the learning level, pre-test and post-test results showed significant improvements in three main areas: knowledge, attitude, and skills. Knowledge

increased by 31.2%, attitude by 13.9%, and skills by 90.5%. These findings are supported by statistical analysis using the Wilcoxon Signed-Rank Test, which showed significance values ($p < 0.05$) across all three aspects. This signifies that the changes occurring after the training were not merely coincidental but were the result of effective extension intervention (Rahmawati & Hartati, 2022).

The high effectiveness in the skills aspect is inseparable from the use of hands-on practice methods. According to Handayani et al. (2021), practice-based learning is more capable of forming sustainable new skills, especially if followed by feedback and reinforcement sessions. In this training, participants did not only attempt to make gummy candies but were also trained to understand common mistakes and how to correct them, ensuring the acquired skills are more durable.

However, the extension effectiveness in the attitude aspect only reached 13.9%, falling into the less effective category. Although an increase occurred, changes in attitude require more time as they involve psychological, social, and environmental factors. This aligns with the study by Setiawan et al. (2021), which emphasizes that attitude changes require continuous reinforcement; a single training session is insufficient.

Another aspect showing encouraging results is the effectiveness of participants' behavioral change. The data indicate that behavioral change in the skills and knowledge aspects stood at 90.5% and 83.5%, respectively, both categorized as effective. Meanwhile, behavioral change in attitude reached 59%, which is considered moderately effective. According to research by Putri et al. (2020), high behavioral change in skills is usually related to direct experience in relevant and enjoyable activities.

This activity also demonstrates the importance of social and institutional support in ensuring the sustainability of training outcomes. The active involvement of KWT management, support from agricultural extension officers, and adequate facilities supported the successful implementation of the program. Furthermore, the atmosphere of kinship and the spirit of mutual cooperation (*gotong royong*) created during the activities further strengthened the impact of the extension on the participants. A study by Wahyuni & Nurhalimah (2022) states that the success of community training is heavily influenced by group dynamics and collective motivation.

From the perspective of program sustainability, this training opens opportunities for the development of small business units based on local

processed products. If followed up with training in packaging, digital marketing, and business management, the target group can develop black sapote products into a flagship village commodity. This is in accordance with the research results of Oktaviani and Sari (2023), which mention that innovation based on local resources has great potential if accompanied by the strengthening of business networks and local policy support.

Figure 4. Black Sapote Gummy Candy Products

In conclusion, the black sapote gummy candy production training serves not only as a means of enhancing individual capacity but also as an instrument for village economic empowerment. This program can be replicated in other regions possessing similar potential for local commodities. Collaboration between local governments, higher education institutions, and farmer groups is the key to realizing sustainable, innovation-based horticultural product development at the village level.

Conclusion

The black sapote gummy candy production training conducted in Karangmojo Hamlet has successfully served as an effective extension medium for enhancing the capacity of the Tunas Harapan Women Farmers' Group (KWT) members. Through a demonstration and hands-on practice approach, participants not only acquired new knowledge but also experienced a significant

improvement in technical skills for processing black sapote into value-added products. The evaluation based on Kirkpatrick's model demonstrates that the training provided a positive impact across all levels, particularly in the skills aspect, which achieved the highest effectiveness score.

Data analysis from pre-tests and post-tests, verified using the Wilcoxon Signed-Rank Test, indicates significant improvements in participants' knowledge, attitudes, and skills following the training. Although the extension's effectiveness in shaping attitudes is categorized as moderate, the overall behavioral changes among participants show a positive trend, signifying the program's success in driving the adoption of innovation at the community level.

In conclusion, this training not only provides a solution to the low economic value of black sapote fruit but also opens opportunities for developing local agribusinesses based on processed products. Further follow-up is required in the form of continuous mentoring, marketing training, and market access to ensure that the results of this training can continue to grow and provide a sustainable impact on the welfare of farmers and the village community. This program can serve as a practical model for empowerment based on local potential that is directly oriented toward improving the community's economy.

Acknowledgements

The authors would like to express their gratitude to the Department of Agriculture and Food of Sleman Regency for providing moral and technical support in the implementation of this extension activity. Special thanks are also extended to the Head of Karangmojo Hamlet and all members of the Tunas Harapan Women Farmers' Group (KWT) for their active participation throughout the black sapote gummy candy production training.

We also appreciate the role of the field extension officers and student assistants who helped in the preparation, implementation, and evaluation process. Furthermore, we would like to thank the Politeknik Pembangunan Pertanian Yogyakarta Magelang for the facilities and the opportunity provided to support this community service activity. We hope that this initiative provides long-term benefits to the community and serves as a model for the sustainable development of local agricultural product innovation.

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