



# Improving fried chicken quality through the introduction of enzyme technology

Cahyo Indarto<sup>1</sup>, Raden Arief Firmansyah<sup>1</sup>, Wahyu Prihanta<sup>2</sup>

<sup>1</sup>Department of Agricultural Industrial Technology, Faculty of Agriculture, Universitas Trunojoyo  
Jl. Raya Telang, PO BOX 02 Bangkalan, East Java, 69162, Indonesia

<sup>2</sup>Department of Biology Education, Faculty of Teacher Training and Education, Universitas Muhammadiyah Malang  
Jl. Raya Tlogomas No. 246, Malang, East Java, 65144, Indonesia

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## ABSTRACT

Undirect efforts have been made by Gadungan village's government at Puncu sub-district, Kediri regency, to surpass the stunting level through entrepreneurship. Its purpose is to elevate the financial level of the community. The form of enterprise development is fried chicken production managed by Pokwan "ASKARA." However, the quality of fried chicken is low, and it is difficult to compete with other competitors in the same business type. The event about introducing an enzyme technology was held to elevate the quality of fried chicken. Besides increasing product quality, enzyme technology was safe for human beings. This event was held in three main steps: introduction of enzyme technology, practice making fried chicken products using enzyme technology, and evaluation event. The evaluation process used the Kirkpatrick model at three levels: reaction, learning and behavior level. The result showed that evaluation of all level obtained more than 4.00, and more than 80 percent of respondents strongly agreed and agreed to each item in questioner. The results also showed that this event succeeded in motivating the participant to use enzyme technology for fried chicken production, which produces crispy and crunchy fried chicken that is also safe.

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## 1. INTRODUCTION

According to data from the National Population and Family Planning Agency of East Java Province, the prevalence of stunting in Kediri Regency has reached 14.1 percent, or approximately 10,600 toddlers experiencing stunting. One of the villages with the highest number of stunting cases is Gadungan Village, with 114 cases (Zuraidah et al., 2022). The government's efforts to reduce stunting are carried out through two approaches. The first is direct intervention, such as providing additional nutritious food and milk through routine activities at integrated healthcare centers (Posyandu). The second is indirect intervention, aimed at increasing community income through entrepreneurship development programs (Natasha et al., 2024). In terms of indirect interventions, the Gadungan Village government collaborates with Trunojoyo Madura University through discussions on improving product quality to be more effective, efficient, health-safe, and competitive in the market (Arief, 2023).

One community group receiving indirect support for stunting reduction through business development is the "ASKARA" women group. "ASKARA" consists of 15 housewives and teenagers located in Gadungan Village, Puncu District. Their current business includes producing emping mlinjo and processed chicken products. The production of emping mlinjo averages 120 kg per month, with a threefold increase during the Eid Al-Fitr. Fried chicken, on the other hand, is produced on a smaller scale, mostly upon orders from the village government for event consumption and occasionally for food festivals in Kediri. Based on an initial business assessment, the fried chicken product was prioritized for improvement due to its low quality and to support the Kediri Regency government's program of providing healthy food to combat stunting.

The main issue with the fried chicken's low quality is the group's dependency on using sodium bicarbonate (baking soda) in the batter mixture to achieve crispiness. While this approach has not yielded the desired results, long-term use of baking soda can pose health risks, such as hypertension (Dianita et al., 2023) and digestive disorders (Haghi et al., 2022). This is particularly concerning as most consumers of the product are children and teenagers.

The research team from the Department of Agricultural Industrial Technology at Trunojoyo Madura University has been developing enzyme technology for application in food products. Enzyme technology has been successfully applied to processed meat products such as meatballs (Nazilah et al., 2023) and sausages (Akalil et al., 2023), improving texture by 39 percent and 23.4 percent, respectively, compared to products without enzyme additives. It has also been used in the production of *Keripik Gadung* (Dwi et al., 2023), where the addition of amylase and pectin enzymes softened the texture by up to 38 percent. This technology has been disseminated to communities in Gumulan Village, Jombang (Indarto et al., 2024), for use in tofu, shrimp, and chicken products. Based on these studies, enzyme use offers benefits such as enhanced flavor and texture in products. Enzyme technology is also health-safe, as it is derived from plants (Wening & Herdyastuti, 2021) and animals (Zaharudin et al., 2021). Therefore, this program aims to introduce enzyme technology for the production of fried chicken in the "ASKARA" group to produce crispier products. Furthermore, using enzymes can replace baking soda as a tenderizing agent, making the chicken both healthier and tender (Sahilah et al., 2016; Saranya et al., 2016).

## 2. METHODS

The target audience for this community engagement activity was the "ASKARA" women's group in Gadungan Village, Puncu District, Kediri Regency. This group comprises 15 members, primarily housewives and small-scale food entrepreneurs specializing in products such as emping crackers and fried chicken. The community service activities were conducted from August to October 2024. The implementation was divided into three stages, first introduction to enzyme technology through presentations and question-and-answer sessions in August 15, 2024. Second, practical training in fried chicken production using enzyme technology in September 12, 2024. Third, evaluation of the activities using questionnaires September 12 and October 12, 2024. These three stages were sequential and illustrated with details elaborated in the sub-sections in Figure 1.

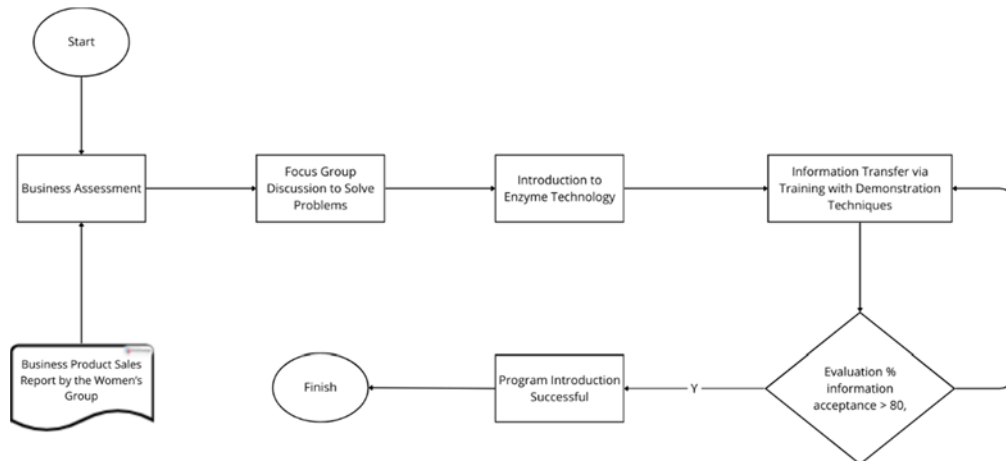
### Introduction to Enzyme Technology

In this initial stage, the introduction of enzyme technology was conducted using a lecture-based learning model. This method focused on transferring information from the facilitators to the participants (Zeng et al., 2020). The purpose was to familiarize participants with new technology for fried chicken production. The facilitators introduced enzyme technology to improve the quality and safety of fried

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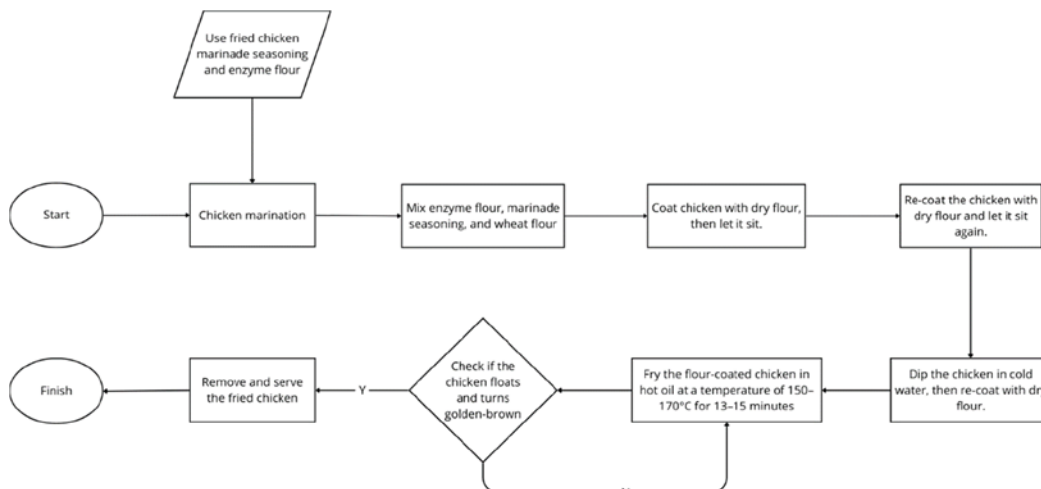
chicken products. In addition to explaining the definition and benefits of enzyme technology, participants were also allowed to taste fried chicken prepared using enzymes. The timeline for the subsequent stages of the program was also presented to encourage participants to stay engaged throughout the program.



**Figure 1.** Activities of the community engagement program on the introduction of enzyme technology for the “ASKARA” women’s group

### Practical Training in Fried Chicken Production Using Enzyme Technology

The practical training was conducted using a demonstration technique. The program leader, who is also the enzyme technology inventor, demonstrated the steps of applying enzyme technology, from preparing raw chicken to producing ready-to-serve fried chicken. Afterward, participants practiced under the facilitators’ guidance to reinforce the knowledge imparted during the demonstration. Figure 2 illustrates the stages of producing fried chicken using enzyme technology. To facilitate implementation, a module on producing enzyme-aided fried chicken was distributed to each participant, along with supporting materials such as cooking oil, flour, and enzyme powder.



**Figure 2.** Stages of fried chicken production using enzyme technology

## Evaluation Design

The activity evaluation was carried out based on the Kirkpatrick evaluation model. This evaluation model has been successfully used to assess various types of training and education (Alsalamah & Callinan, 2021). The model consists of four levels: reaction, learning, habituation, and results. In this community service activity, three levels were used: reaction, learning, and habituation. The instrument used to measure these levels was a questionnaire provided to each participant after the practice session of making the product was completed.

**Table 1.** Statements in the training evaluation questionnaire instrument

Reaction Level		
Response to the Resource Person	Response to the Training Activities	Response to the Training Environment
<ul style="list-style-type: none"> <li>- The trainer delivered the material in an easy and effective language.</li> <li>- The trainer prepared the demonstration material well and in line with the activity objectives.</li> <li>- The trainer successfully delivered the training material, enabling participants to meet the activity objectives.</li> <li>- The trainer provided opportunities for discussion and questions.</li> <li>- The trainer was skilled in using the equipment provided for the training activities.</li> </ul>	<ul style="list-style-type: none"> <li>- The training schedule was suitable for me.</li> <li>- The training topic is relevant to my job.</li> <li>- The training activities combined theory and practice.</li> <li>- The training topic provided practical and up-to-date information.</li> <li>- The audio equipment support was effective.</li> <li>- The duration of the training activities was appropriate and sufficient.</li> <li>- The training program is related to the training I need and my daily tasks.</li> <li>- I feel that this training will help me develop myself and my business.</li> </ul>	<ul style="list-style-type: none"> <li>- The training room was comfortable, and the seating arrangement was suitable for participating in the training.</li> <li>- The method of material delivery matched the training conditions.</li> <li>- The services provided were adequate.</li> </ul>
Learning Level	Habituation Level (Open-ended Question)	
<ul style="list-style-type: none"> <li>- I gained additional knowledge and information after attending the training.</li> <li>- Through the training activities, I received practical information that I did not know before.</li> <li>- The training program provided an opportunity to exchange information among participants.</li> <li>- The training program motivated me and made me interested in pursuing a business.</li> </ul>	<ul style="list-style-type: none"> <li>- The training activities helped me produce tastier fried chicken.</li> <li>- The previous training inspired me to improve my cooking skills.</li> <li>- The training activities made me aware of the use of safe ingredients for cooking.</li> <li>- The previous training inspired me to start a fried chicken business and its variants.</li> <li>- I believe that previous training has influenced my cooking habits, particularly in the use of supporting ingredients.</li> </ul>	

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The program evaluation questionnaire was designed by modifying the work of [Alsalamah & Callinan \(2021\)](#), using three measurement dimensions at the reaction level: responses to the resource person, responses to the delivery of material, and responses to the training environment. At the learning level, it only measured the perceived impact on the knowledge and learning gained by the participants. The statements in the questionnaire instrument were presented in Table 1. Each statement was scored on a scale from 1 to 5, where 1 referred to strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 referred to strongly agree. The data obtained was then tested for reliability, and the mean and standard deviation were calculated for each statement at the reaction and learning levels. The success indicator of this evaluation was set if the mean score for each statement at the reaction and learning levels was above 4, and more than 70 percent of respondents provided scores of 4 or 5. The evaluation at these two levels was conducted after the fried chicken production practice on September 12, 2024.

At the habituation level, the evaluation was conducted using a questionnaire consisting of both open and closed questions ([Alsalamah & Callinan, 2021](#)). The list of open-ended questions for this level's evaluation was also presented in Table 1. The evaluation at this habituation level was conducted one month after the fried chicken production practice using enzyme technology in October 12, 2024. The goal was to measure changes in the participants' habits after attending the training session on the implementation of enzyme technology.

### 3. RESULTS AND DISCUSSION

#### Results

The results are based on the three stages of the community engagement activities: the introduction of enzyme technology, the practical session for fried chicken production, and the evaluation.

#### Introduction to enzyme technology

During this stage, participants were provided with knowledge about enzyme technology, including its definition, applications in food production, and the advantages of using enzymes over baking soda in fried chicken production. The participants were also introduced to modern cooking equipment that could enhance the quality of fried chicken and increase its market value. The materials were delivered through lectures and discussions, supported by presentation media. Participants were allowed to interact directly with the facilitators during the discussions. Figure 3 shows the activities of introducing enzyme technology to the members of "ASKARA".



**Figure 3.** Presentation of enzyme technology during the introduction activity

### Practical training in fried chicken production

The practical session lasted for three hours and was divided into two activities: live cooking demonstrations by the facilitators and hands-on practice by participants. During the session, participants learned not only how to prepare raw materials but also how to use cooking tools such as deep fryers. They were taught how to measure the optimal temperature for frying chicken and determine the proper frying duration to achieve a crispy texture and golden-brown color.



Figure 4. Demonstration of fried chicken production using enzyme technology

### Evaluation of the introduction and practical training activities

#### Respondent characteristics

A total of 13 respondents participated in the evaluation, all of whom were members of the "ASKARA" group. The characteristics of the respondents are presented in Table 2.

Table 2. Respondent characteristics in the introduction and fried chicken production activity

Variables	Amount	Percentage
Age		
Less than 25 years	1	8
25-29 years	1	8
30-34 years	2	15
35-39 years	2	15
More than 40 years	7	54
Education		
Primary level	0	0
Secondary level	8	67
Higher education	4	33
Cooking Experience		
Less than 5 years	4	33
5-9 years	1	8
10-14 years	1	8
More than 15 years	6	50

#### Data analysis of questionnaire results

The reliability test of the questionnaire data is presented in Table 3, with a total Cronbach's alpha value of 0.8, indicating that the questionnaire data is categorized as acceptable. For the statements, the Cronbach's alpha values ranged from 0.6 to 0.8. A Cronbach's alpha value > 0.6 indicates that the questionnaire instrument used is reliable for repeated use (Yani et al., 2018).

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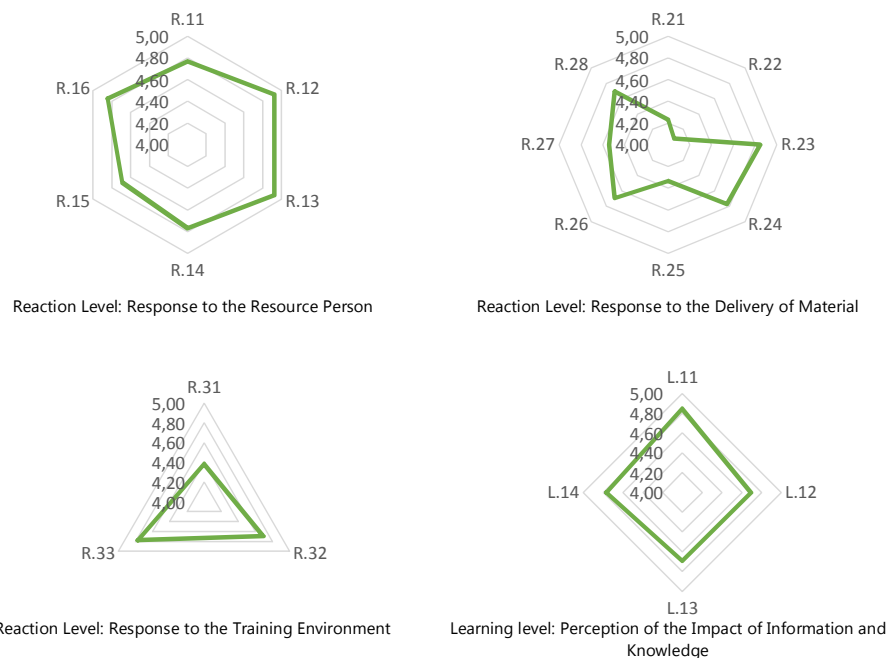
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**Table 3.** Reliability test of questionnaire data

Level	Items	Number of Questions	Cronbach's Alpha	Cronbach's Alpha for Questionnaire Data
Reaction	Response to the resource person	6	0.9	0.8
	Response to the training activities	8	0.6	
	Response to the training environment	3	0.9	
Learning	Perception of knowledge impact	4	0.7	
Habituation	Perception of training impact on habitual changes	5	0.8	

The mean results of the questionnaire for training evaluation using the Kirkpatrick model with two levels are illustrated in Figure 5. The description of the questionnaire results shows that participants were satisfied with the implementation of the training and the knowledge provided, as indicated by the mean scores across all levels of the Kirkpatrick evaluation model being above 4.00. The cumulative frequency of the evaluation scores for each level is presented in Figures 6, 7, and 8. The data on the cumulative frequency of evaluation scores shows that more than 80 percent of respondents strongly agreed or agreed with each statement item in the training evaluation questionnaire.

Figure 9 illustrates a summary of interview responses from the training participants about the positive changes after receiving the fried chicken production training with enzyme technology. The interview results show that more than 70 percent of participants experienced positive impacts from the introduction of enzyme technology in fried chicken production. The positive impacts reported by the participants can be categorized into two areas: positive changes in knowledge regarding the use of safe raw materials and knowledge of cooking techniques that result in crispy fried chicken with a golden-brown color.



**Figure 5.** Descriptive data from the questionnaire results for the two levels of training evaluation

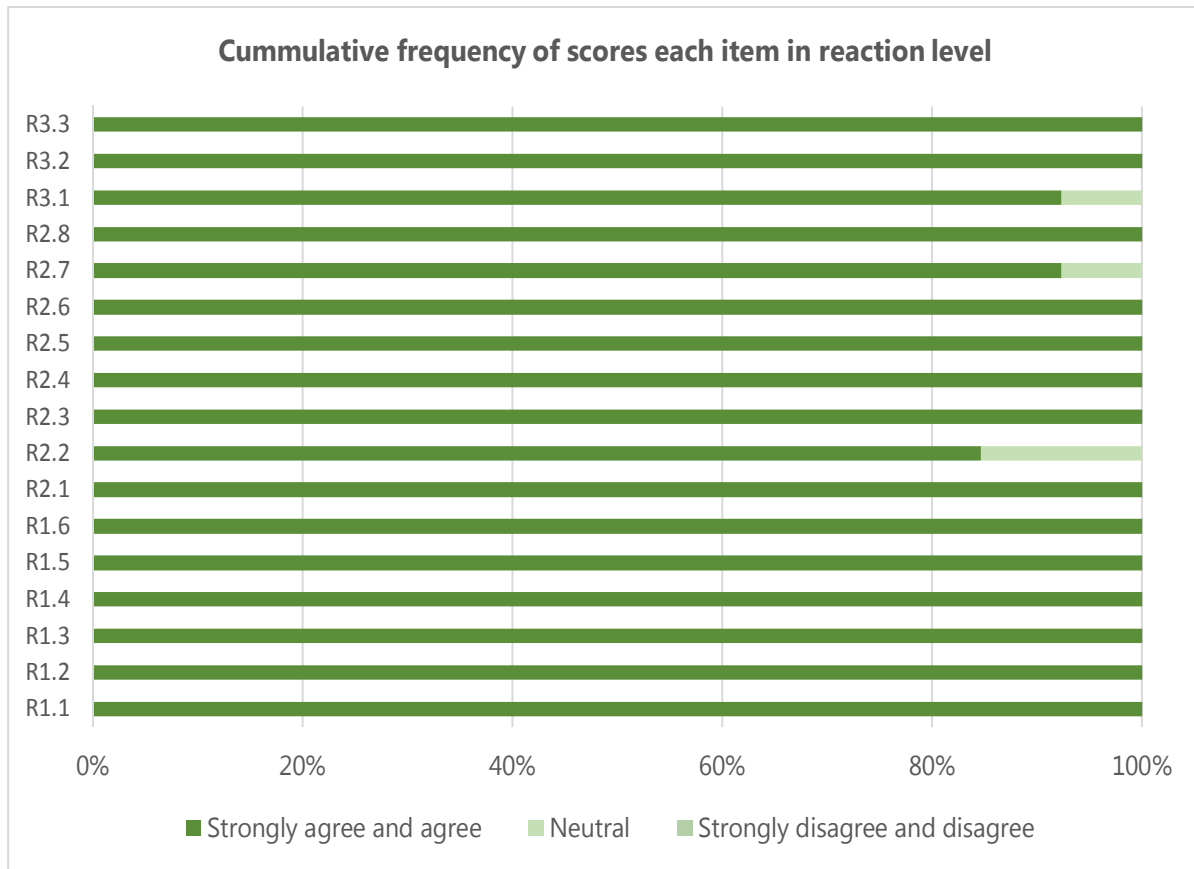


Figure 6. Cumulative frequencies of evaluation scores for the reaction level

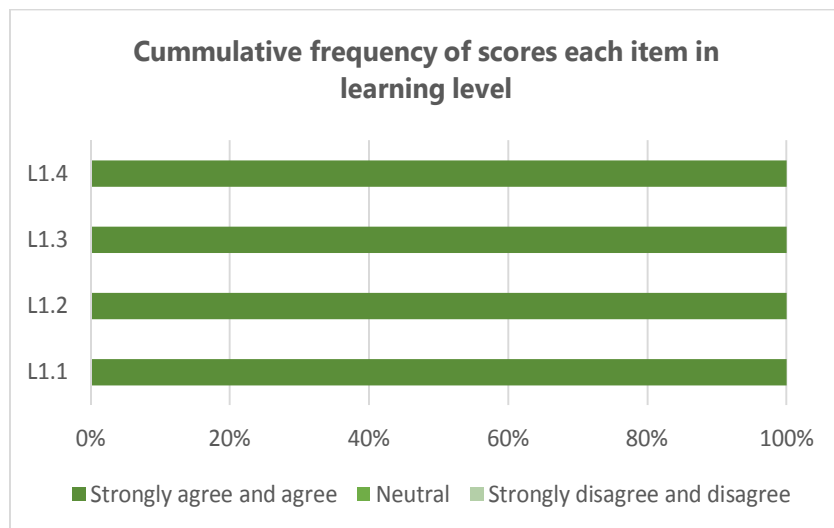


Figure 7. Cumulative frequencies of evaluation scores for the learning level



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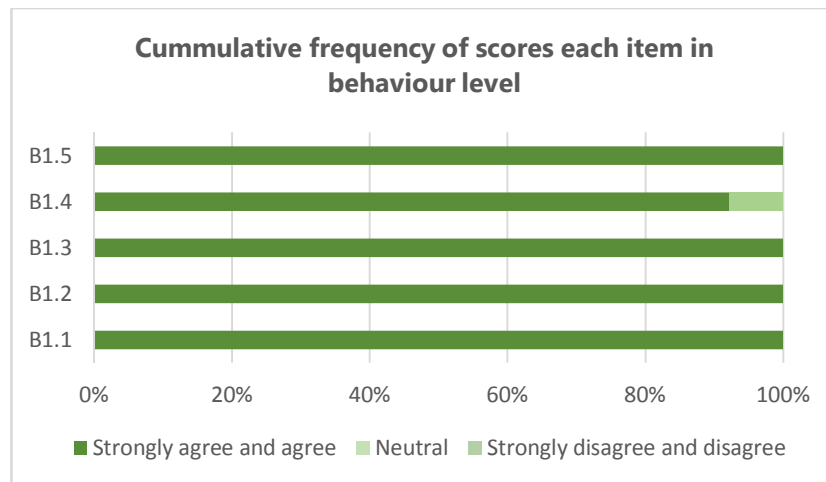


Figure 8. Cummulative frequency of evaluation scores for the habituation level

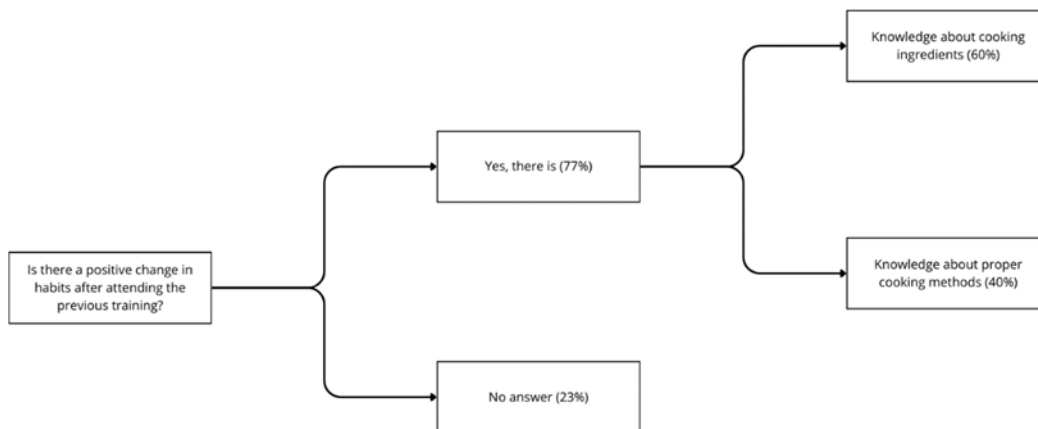


Figure 9. Mapping of participants' responses to open-ended questions for the behavior level

## Discussion

The community service activity on the introduction of enzyme technology for fried chicken products received enthusiastic responses from members of the "ASKARA" group, as evidenced by attendance at two activities: the introduction to enzyme technology and the practical session on producing fried chicken using enzyme technology. The attendance of group members for both activities reached more than 80 percent of the total registered members of the group. The enthusiasm of the participants can be seen as a rationale for continuing the community service through the adoption of production equipment technology that can help increase efficiency and effectiveness in producing fried chicken for a wider market. Additionally, the community service theme focused on the design and development of a marketing strategy for the fried chicken produced by the "ASKARA" group.

Based on the respondent characteristics data, participants who attended were in the productive age range of 15-64 years (Ramadhan et al., 2022), with 50 percent of respondents having over 15 years of cooking experience. This result indicates that the theme of the community service was in line with the needs of many respondents, and this finding aligns with the average scores showing values above 4.00, with 80 percent of respondents strongly agreeing or agreeing. Based on the reaction level to the

resource person, all respondents agreed that the resource person successfully engaged the participants (100 percent), and the knowledge shared was well received. This result, when correlated with the learning level regarding the perception of the impact on learning and knowledge, shows a positive correlation, as demonstrated by an average score for the learning level above 4.00, with 100 percent of respondents strongly agreeing or agreeing with that statement. This correlation indicates that the resource person's effective communication had a positive impact on the learning and knowledge of the participants (Mahadi, 2021). This phenomenon supports the findings of Mulyadi (2019), which state that training participants' understanding is influenced by the competence of the resource person in delivering the material. Ultimately, the positive impact on learning and knowledge successfully motivated the participants to start a fried chicken business using enzyme technology, as evidenced by 100 percent of respondents strongly agreeing or agreeing with item statement R2.8, which states, "I believe this training will help me develop myself and start a business," and item statement L1.4, which states, "The training program motivated me and made me interested in starting a business."

These results could also serve as a rationale for the development of the community service activity with a follow-up theme on scaling up the fried chicken business and production using enzyme technology. However, improvements in the reaction level concerning training delivery and training environment need to be made, particularly regarding the provision of audio equipment during the training and the comfort of the training space, including seating arrangements. These two statements had the lowest average scores among all statements in each dimension of the reaction level. The lack of a conducive training environment could hinder the participants' ability to absorb information, resulting in a lower level of understanding of the material (Bahtiyar et al., 2022).

The evaluation results for the habituation level of participants one month after the activity showed positive outcomes, illustrated in Figures 8 and 9. All participants reported changes in their habits after the introduction of enzyme technology. These changes in habits could increase public awareness of producing, generating, and consuming food that is both sensorially high-quality and safe for health. These results reinforce the findings of Razak et al. (2020), who state that awareness of healthy living can start from the immediate environment, and this awareness increases cognitive abilities.

Based on the evaluation results from the three observed levels, the introduction activity has provided benefits for addressing stunting issues in Gadungan Village through potential economic improvements for families by enhancing the quality of fried chicken products, making them crispier and more competitive in the market, as well as increasing public awareness of providing and consuming healthy food. From a technological impact perspective, this activity has been successfully implemented, but from an autonomy perspective, the introduced enzyme technology has not yet supported the self-sufficiency of raw materials, as the developed enzyme technology is classified as advanced technology. Therefore, cooperation has been established in the form of a partnership between the institution and the "ASKARA" group.

#### **4. CONCLUSION AND RECOMMENDATIONS**

The community service activity through the enzyme technology introduction program for fried chicken products for the "ASKARA" group in Gadungan Village, Puncu District, Kediri Regency was successfully implemented through two stages: the introduction of enzyme technology and the practical session on making fried chicken products using enzyme technology. The enthusiasm of the participants was proven by the attendance of more than 80 percent of the group members and the results from the questionnaire, which indicated that all participants were motivated to start a fried chicken business using

enzyme technology. However, improvements in the implementation of the community service activity should be considered to maximize the success of the training program.

This enzyme technology introduction program can be followed up with additional activities to strengthen the fried chicken business in the "ASKARA" group, including: (1) Training programs on the use of modern cooking technology in the production process of fried chicken using enzyme technology to optimize the quality of the resulting products; (2) Training programs on the development of frozen fried chicken products to expand market reach and extend the shelf life of fried chicken products; (3) Training programs on marketing fried chicken and frozen fried chicken products using social media platforms and social messaging.

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