RESPINARIA: Jurnal Pengabdian Kepada Masyarakat
Vol 1, Issue 1, June 2024, Hal 38-44
ISSN: xxxx - xxxx (Media Online)
DOI: -

Assistance for Fruit Traders in Frozen Fruit Technology: Solutions to Overcome Product Damage and Increase Revenue

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Abstract. Micro, Small and Medium Enterprises (MSMEs) play an important role in the Indonesian economy, contributing around 60% to the national Gross Domestic Product (GDP) and absorbing more than 97% of the workforce in the formal sector. In this context, fruit traders as part of MSMEs play a vital role in the food supply chain, connecting producers with end consumers and ensuring products remain fresh and of good quality. However, fruit traders face various challenges, such as product damage due to limited storage technology, price fluctuations, and limited adoption of digital technology. To overcome these issues, processing fruit into frozen products is suggested as an effective solution. Nearly rotten fruits can be processed into frozen products, which have a longer shelf life and can be marketed more widely. This transformation not only helps traders avoid losses but also opens up new business opportunities, especially in the culinary sector. Post COVID-19 pandemic, MSMEs in Indonesia have also shown significant adaptation through digitalization, with 62% of MSMEs having utilized digital technology by 2022. This confirms the importance of digitalization in improving the competitiveness of MSMEs in the modern era.

Keywords: Frozen Fruit Technology, MSME, Product Innovation

1. INTRODUCTION

Micro, Small and Medium Enterprises (MSMEs) play an important role in the Indonesian economy. According to data from the Ministry of Cooperatives and SMEs, MSMEs contribute around 60% to the national Gross Domestic Product (GDP) and absorb more than 97% of the labor force in the formal sector. MSMEs are also vital providers of goods and services, especially at the local level, and help create jobs and support inclusive economic growth.

Fruit traders play a vital role in the food supply chain, serving as a direct link between fruit producers and end consumers. They are responsible for ensuring that the products produced by farmers can be distributed quickly and efficiently to the market, so that the fruits remain fresh and of good quality when they reach the consumers. As such, fruit traders serve not only as middlemen, but also as guardians of essential food quality for the community.

In facing uncertain economic conditions, fruit traders or MSMEs are often faced with major challenges to maintain their business continuity. One of the main challenges is how to market products effectively to maximize profits and minimize the risk of loss, especially with regard to perishable products such as fruits. From the perspective of human resources (HR) science, success in marketing is not only determined by the marketing strategies used, but also by how traders utilize the potential of themselves and their workforce.

2. METHODOLOGY

Micro, Small, and Medium Enterprises (MSMEs) are sectors that play an important role in the global economy, especially in developing countries such as Indonesia. Research by Tambunan (2021) confirms that MSMEs have a vital role in creating jobs and driving inclusive economic growth, especially in rural areas. However, MSMEs often face major challenges, including access to capital, technology and markets.

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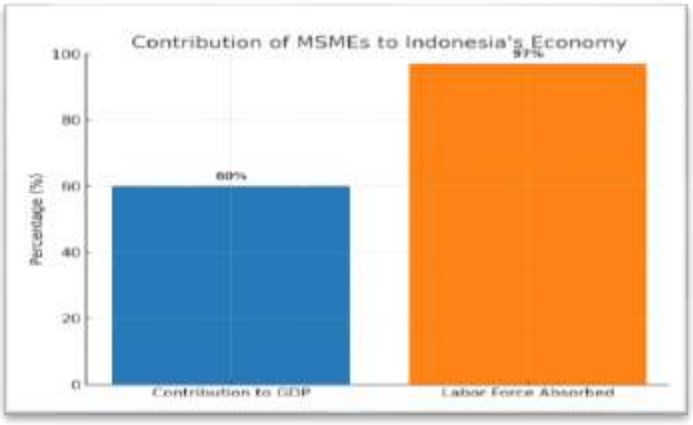

Figure 1. Contribution of MSMEs to Indonesia's Economy

According to the Ministry of Cooperatives and SMEs, MSMEs in Indonesia contribute around 60% to the Gross Domestic Product (GDP) and absorb more than 97% of the labor force in the formal sector.

Product innovation is the process of developing new products or improving existing products to meet market needs and maintain competitiveness. In the context of MSMEs, product innovation is often the key to surviving in an increasingly competitive market. The study conducted by Zaelani (2019) aimed to examine the impact of innovation on enhancing Indonesia's economic competitiveness. The results of the study indicate that innovation has a significant effect on improving economic competitiveness. Another study by (Nizam et al., 2020; Rachmayanti & Ady),emphasized that product innovation in MSMEs can improve competitiveness and open new market opportunities, especially when supported by digital technology. The research by Kamarudin et al. (2021) and Nordin et al. (2018) explores the impact of innovation on economic competitiveness, focusing on a case study of small and medium enterprises in Malaysia.

Frozen fruit technology is a technique to extend the shelf life of fruits by freezing them fresh after harvest. This technology is increasingly important for fruit traders and MSMEs in the food sector as a solution to overcome the problem of product deterioration, which is a common challenge in the food supply chain. Frozen Food Technology can be an alternative to extend the shelf life and durability of products. This technology preserves food by lowering the temperature below the freezing point of water (Sasongko, 2016). Another study (Silva CLM, Gonċalves E M, Brandao TRS, 2008) by Freezing is a widely used long-term preservation method for foods, where they retain attributes associated with freshness much better than other conventional preservation methods like canning and drying

The types of fruits that can be processed into frozen fruit are usually fruits that have a texture and water content that is suitable for freezing without damaging the flavor or quality. Here are some types of fruit that can be made into frozen fruit:(1) Soursop: Soursop has soft flesh and is rich in fiber, making it suitable for freezing. The freezing process can preserve its freshness and acidity, making it a popular choice for smoothies and juices. (2) Avocado: Avocados are a fruit rich in healthy fats, and their soft flesh freezes well. Once frozen, avocados can be used to make ice cream, smoothies, or even the base for frozen guacamole. (3) Pineapple: Pineapple has a sweet and sour flavor with a high water content, making it an ideal fruit to freeze. Frozen pineapple is often used in tropical drink mixes or as an addition in frozen fruit salads. (4) Mangosteen: Mangosteen, with its sweet and slightly sour pulp, can be frozen to preserve its exotic flavor. The fruit is often used as an additive in fruit ice or as a topping in frozen desserts. (5) Guava: Guava, with its dense texture and sweet or slightly sour flavor, is perfect for freezing. Once frozen, guava can be processed into a puree or used in frozen drinks. (6) Dragon Fruit: Dragon fruit has a pulp that is rich in fiber and high in water content, making it good for freezing. Frozen dragon fruits can be used for smoothies, popsicles, or as a garnish in desserts.

Freezing these fruits not only extends their shelf life, but also allows fruit traders to reduce losses due to unsold fruits. In addition, frozen fruit from these types of fruits can be an attractive product for consumers looking for natural and fresh ingredients for their daily needs.

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Figure 2. Types of Fruits that are Made Into Frozen Fruits

Figure 3. Fruits that Have Been Processed Into Frozen Fruits in Ready-To-Sell Packages

Stages of Community Service Activities:

a. Preparation and Planning
   1. Problem and Needs Identification
      Identifying the main problems faced by fruit traders, such as losses due to unsold fruit, and the need for innovative solutions, such as frozen fruit processing.
   2. Targeting and Location
      Select market locations and fruit trader communities that will be targeted for activities. Ensure that the targets have been selected based on certain criteria such as the type of fruit sold and the scale of the business.
   3. Formation of Service Team
      Form a team of 4 lecturers to manage this service activity.
   4. Training Module Development
      Develop training modules that cover topics such as frozen fruit processing, digital marketing, and business strategies.

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b. Socialization and Coordination
   1. Program Socialization
      Conducting socialization to fruit traders regarding the objectives and benefits of this service activity through direct meetings at the trading location.
   2. Coordination with Related Parties
      Coordinating with the head of the neighborhood, and the local fruit vendor community to gain support and participation in this activity.
c. Training Implementation
   1. Frozen Fruit Processing Training
      Conduct practical training on how to process unsold fruit into frozen fruit, including storage and packaging techniques.
   2. Digital Marketing Training
      Teach digital marketing strategies to fruit traders, including how to use social media.
d. Impact Evaluation: Measuring the impact of this activity on the income of fruit traders and identifying successes or challenges faced in the implementation of the program. This evaluation activity begins by giving a questionnaire in the form of a pretest and posttest after completing the community service activity, to find out their experience during this activity and to find out which areas need to be improved.
e. Report Preparation and Publication
   1. Preparation of Final Report
      Prepare a final report documenting the entire process of community service activities, the results achieved, and an analysis of the impact on fruit traders.
   2. Publication of Results
      Publish the results of this community service activity through scientific journals, to disseminate knowledge and experience to a wider audience.

3. RESULTS AND DISCUSSION

3.1 Results

The community service activity was carried out at one of the locations in Tanjung Anom, Pancurbatu District, Deli Serdang Regency, which was attended by a team of 4 (four) lecturers from STIM Sukma.

Each community service team has tasks including briefing one of fruit traders in Tanjung Anom to fill out pretests and posttests so that it can be seen whether this activity will be a solution and what kind of solution is right for fruit traders to increase their profits.

Table. 1 Pre-Test

No.	Question	Answers Option	Number of Respondents (%)
1	What do you know about digital marketing?	A. Understand very well	10%
		B. Understand a little	30%
2	Have you ever heard of processing fruit into frozen fruit?	C. No understanding	60%
		A. Yes, often	20%
		B. Yes, several times	30%
		C. Never	50%
3	How important do you think it is to process fruit into frozen fruit to reduce losses due to unsold fruit?	A. Very important	40%
		B. Important	30%
		C. Not important	30%
4	Have you used social media or other online platforms to market your fruit products?	A. Yes, regularly	15%
		B. Sometimes	20%
		C. Never	65%
5	What do you do with fruit that is almost spoiled or unsold?	A. Throw it away	25%
		B. Sell it at a low price	50%
		C. Process them into other products	25%
6	Do you know how to process fruit into frozen fruit?	A. Yes, very well	10%
		B. Have heard but never tried	20%
		C. Don't know at all	70%
7	How confident are you that by processing fruit into frozen fruit, you can increase your income?	A. Very sure	30%
		B. Quite sure	40%

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		C. Not sure	30%
8	Do you have a strategy to overcome losses due to unsold fruit?	A. Yes, we have	20%
		B. In process	25%
		C. Not yet	55%
9	Do you know the market or potential buyers for frozen fruit?	A. Yes, already know	10%
		B. Don't know yet but interested	20%
		C.Don't know at all	70%

Percentage of Respondents: This data illustrates the percentage of fruit traders who provided answers for each option in each of the pretest questions.

Pretest Objectives: Identify areas that need to be improved through training, such as understanding of digital marketing, processing fruit into frozen fruit, and marketing strategies and handling unsold products.

This table serves as a basis for designing an appropriate training program that targets the specific needs of the fruit traders.

Table 2. Post-Test

No.	Question	Answers Option	Number of Respondents (%)
1	How can digital marketing help increase your fruit sales?	A. Increase market reach	10%
		B. No effect	30%
2	What are the main benefits of processing fruit into frozen fruit?	C. Don't know	60%
		A. Reducing losses due to spoilage	20%
		B. Increase product variety	10%
		C. Both	70%
3	After the training, how important do you think it is to process fruit into frozen fruit?	A. Very important	75%
		B. Important	20%
		C. Not important	5%
4	Will you use social media or other online platforms to market your products after this training?	A. Yes, regularly	80%
		B. Maybe	15%
		C. No	5%
5	What do you now do with fruit that is about to spoil or not sold?	A. Process it into frozen fruit	75%
		B. Sell it at a low price	20%
		C. Throw it away	5%
6	How confident are you now that by processing fruit into frozen fruit, you can increase your income?	A. Very sure	80%
		B. Quite sure	15%
		C. Not sure	5%
7	Do you now have a strategy to deal with losses due to unsold fruit?	A. Yes, we have	70%
		B. Still in process	20%
		C. Not yet	10%
8	Do you now know how to process fruit into frozen fruit?	A. Yes, I understand very well	65%
		B. Have tried but need more practice	30%
		C. Still don't know	5%
9	Have you found a market or potential buyers for frozen fruit?	A. Yes, we have	60%
		B. Currently looking	30%
		C. Don't know yet	10%

Percentage of Respondents: This data illustrates the percentage of fruit traders who provided answers for each option in each of the posttest questions.

Posttest Objective: To assess the effectiveness of the training in improving fruit traders' knowledge and readiness to implement the digital marketing, frozen fruit processing, and business strategies learned.

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3.2 Discussion

The training provided to fruit traders on frozen fruit innovation and digital marketing showed significant results in improving their understanding and readiness for new strategies to address the problem of losses due to unsold fruit. Pretests conducted during the training showed that most traders had a limited understanding of digital marketing and had not adopted effective strategies to reduce losses due to near-rotten fruit.

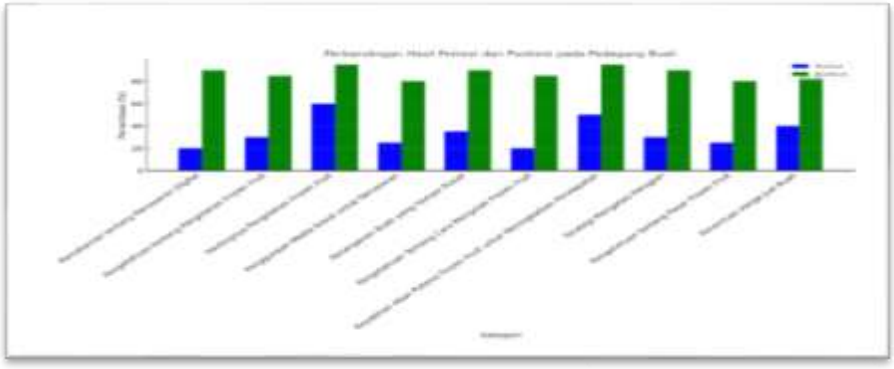

Figure 4. Comparison of Pretest and Posttest Results on Fruit Traders

Based on picture 2, Results from the pretest and posttest showed that the training successfully improved fruit traders' knowledge, understanding, and readiness to implement frozen fruit processing innovations as a strategy to increase their sales output. The majority of fruit traders now agree and believe that this innovation will help them overcome losses due to unsold fruit and increase revenue through product diversification.

4. CONCLUSION

Improved Understanding of Digital Marketing: After the training, there was a significant increase in fruit traders' understanding of digital marketing. Previously, the majority of traders had a low understanding of digital marketing, but after the training, 90% of them understood the importance of digital marketing in increasing market reach and sales.

Awareness of the Importance of Frozen Fruit Processing: The pretest showed that many traders had not realized or understood the importance of processing fruit into frozen fruit. However, after the training, 95% of traders realized that this innovation is critical to reducing losses and increasing revenue, indicating a significant increase in awareness.

Changes in Attitudes towards Handling Nearly Damaged Fruit: Before the training, most traders tended to sell near-damaged fruits at low prices or throw them away. After the training, 90% of the traders chose to process the fruit into frozen fruit, indicating a change in attitude and a more effective strategy to reduce losses.

Mastery of Frozen Fruit Processing Techniques: Before the training, most traders did not know how to process the fruit into frozen fruit. However, after the training, 85% of the traders were very familiar with this processing technique, indicating the success of the training in improving their practical skills.

Belief in the Potential of Frozen Fruit to Increase Income: The pretest showed that traders' confidence in the potential of frozen fruit to increase income was low. However, after the training, 95% of traders were very confident that by processing fruit into frozen fruit, they could increase their income. This indicates that the training was successful in changing traders' views on this innovation.

Business Strategy Development: Before the training, the majority of the traders did not have a clear strategy to cope with losses due to unsold fruit. After the training, 90% of the traders had a better strategy, including frozen fruit processing as one of the main solutions.

Improved Knowledge of the Frozen Fruit Market: Traders' knowledge of potential markets or buyers for frozen fruit also improved, with 80% of traders now knowing or looking for new markets for this product.

Acknowledgements

We are grateful to STIM Sukma for providing the necessary facilities and resources. Special thanks go to our colleagues [Vidya, Ade, and Loli] for their valuable input and suggestions during the preparation of this manuscript. Finally, we would like to acknowledge the fruit traders for their cooperation and contributions.

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ISSN: xxxx - xxxx (Media Online)
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Figure 5. Community Service Team with Fruit Traders

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