

Processing of Corn Tortilla Chips with Appropriate Technology as Diversification of Crop Yields to Increase Farmers' Income in Pematang Simalungun

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Abstract. Processing of agricultural products is important to increase added value, especially when production is abundant and prices are low. The increase in added value in the form of various corn products can stimulate the development of micro, small and medium enterprises. Community empowerment through increasing post-harvest knowledge and capabilities in processing various corn products in particular can be the basis for community economic development. One of the processed corn products that consumers like is Corn Tortilla. The product processing process with appropriate technology is quite simple so that it has the opportunity to be adopted by rural communities, especially corn farmers as a home industry. The purpose of this PKM activity is to develop the business of corn farmers in Pematang Simalungun Village into an economically independent business through corn tortilla processing activities, design of boiled corn milling machine, design of ampia machine, spinner machine, and production training. The approach method used is the method of education, design, production training, business management training, and mentoring. The specific target achieved was to produce a boiled corn milling machine to increase the effectiveness of abundant corn production into corn tortilla products and business management capabilities. As a result, corn farmers can process abundant agricultural products into Corn Tortilla products.

Keywords: Integrative Tour, Thematic Tour, Pematang Johar.

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1. Introduction

Corn is a commodity that has high economic value and has the opportunity to be developed because of its advantages in terms of carbohydrates and protein after rice. Corn seeds contain nutrients that the body needs, namely 24% calories and 7.9% protein [1]. Corn in Indonesia is used as the second staple food after rice because of its relatively cheap price and easy cultivation. Besides being high in carbohydrates, corn also has other nutrients such as essential fatty acids and provitamin A [2].

The expansion of the food sector, which is supported by cultivation technology and superior varieties, has contributed significantly to the importance of corn to the national economy. In addition to providing food and animal feed, maize is utilized extensively in the food, beverage, chemical, and pharmaceutical industries. Utilizing corn as an industrial raw material will increase the value of these agricultural products [3]. Increasing the added value of various maize products is crucial for stimulating microeconomic activity in the community, particularly the growth of micro, small, and medium-sized businesses (MSMEs). Community economic growth can be bolstered by enhancing post-harvest knowledge and capacities in the processing of various maize products, in particular. Household business units that are able to create processed maize products that can be marketed to customers can contribute to the increase in family income.

In this age of globalization, the variety and quality of processed foods are in greater demand. In order to improve product quality and local food diversity, it is required to introduce and innovate rural agricultural

product processing technology. Today's consumers seek high-quality and safe foods [4]. Currently, rural areas serve primarily as suppliers of raw resources, while urban dwellers are responsible for their processing. This is because rural areas have not yet developed the technology required to process agricultural products.

Corn can be transformed into numerous processed goods. Corn Tortilla is one of the corn items that customers enjoy. This product has the potential to be adopted by rural communities, particularly maize farmers, as a home enterprise due to the ease of its processing [5]. In order to generate a variety of processed food items with guaranteed quality and competitiveness in rural areas, it is necessary to have the proper processing technology [6]. The technology does not need to be new or unavailable in the community; rather, it is selected from existing technologies and adapted to the capabilities of rural farmers.

The community of Pematang Simalungun Village cultivates corn on an area of around 30 hectares, so that during the corn harvest season, corn production in Pematang Simalungun Village is exceptionally bountiful. The community can plant corn twice every year, and the average yield of corn in Pematang Simalungun Village is 8 tons per hectare, therefore the annual corn yield can reach 480 tons. Corn is sold in the form of glondongan, selling wet in wholesale, wet shelled or dry shelled maize to intermediaries / collectors, because the community finds it difficult to handle post-harvest corn due to the volume of corn output during the main harvest. This causes the selling price of corn to be extremely low, ranging from Rp. 3,500 per kilogram for maize glondongan to Rp. 4,300 per kilogram for wet shelled corn and Rp. 4,800 per kilogram for dry shelled corn. This circumstance will be economically damaging to farmers because the low selling price of corn is not equivalent to production costs. Corn growers will use this opportunity to diversify their crops by transforming corn into corn tortillas.

The tortilla is a popular snack in Mexico, Central America, and South America that consists of corn-based chips. The production of tortillas involves three crucial steps: preparing nixtamal, forming dough, and frying the dough into tortillas. Corn that has been cooked and steeped in an alkaline solution is referred to as nixtamal [7]. The qualities of a corn tortilla are that it is yellow, crispy, thin, and readily crushed. There are numerous variants in the method of creating this tortilla, and there are no exact guidelines [8]. Different tortilla shapes, including triangles and rectangles [9]

The tortilla is one of the most popular corn-based processed foods. Tortillas are often a type of chip or chip formed from flat, spherical corn of varying thickness [10]. Tortilla is one of the most popular corn-based processed foods produced from alkaline cooking with lime (Nixtamalized products). Yellow, crisp, and thin, corn tortillas are also easily crushed [11]. The trend of consumers to select convenient and ready-to-eat snack goods, such as tortillas, appears to present a new thought that the Indonesian people will welcome the diversification of corn into tortillas. This product's simple processing procedure has the potential to create commercial opportunities for home-based enterprises. In general, high-quality processed goods can improve the product's selling price and broaden its market.

Based on the situation analysis, the problems identified in the partners of corn farmers in Pematang Simalungun Village include: the abundance of corn agricultural products and low prices; the lack of a solution to increase the added value of corn, as partners lack in-depth knowledge about post-harvest corn in relation to its quality and quality as a raw material for food products; and the inability of partners to process corn into processed corn tortilla products.

2. Method

The implementation method used in this PKM activity is the method of education, production training, business management training, design and assistance. Based on the problems that have been stated above and to achieve the expected goals, the approach methods offered to solve these problems operationally are as follows.

- a. The socialization was carried out in the form of a Focus Group Discussion. The socialization discussed the collaboration between the PKM team and partners so that the PKM program goals are expected to be realized.
- b. Making boiled corn milling machine, with the design method and the method of assisting the application of the machine to partners. This machine is efficient and effective for easy operation.

- c. Making an ampia machine (thin tortilla dough) with the design method and the method of assisting the application of the machine to partners. This machine is effective and easy to operate.
- d. Making a spinner machine (oil draining) with the design method and the method of assisting the application of the machine to partners. This machine is effective for draining oil with a capacity of 10kg/5 minutes, the operation is easy.
- e. Provide process technology for selecting corn raw materials and processing processes with production training methods and mentoring methods.
- f. Provide packaging and labeling technology. Packaging is one of the most important elements for a product. Packaging is not just wrapping food, but more than that, namely packaging is branding. Packaging is one of the triggers for selling a product because its function is directly dealing with consumers.
- g. Train partners to market their products and transact securely through selected startups.

Preparation, fieldwork, and post-activity reporting on PKM activities over the course of eight months. The evaluation process is carried out in stages, each corresponding to a different aspect of the curriculum (its delivery, design, manufacturing, training, and mentoring, for example). The partners of corn farmers in Pematang Simalungun Village, Siantar District, Simalungun Regency participated in educational and training activities. Twenty people took part in the activity over the course of five months. PKM Team Chair Dr. Amirhud Dalimunthe, S.T., M.Kom, PKM Team Member Dra. Lelly Fridiarty, M.Pd, and LPPM Unimed employees and students gathered at the partner's home for the activity's opening ceremony. Ceremony opening with remarks from PKM Chairman Dr. Amirhud Dalimunthe, S.T., M.Kom, Sekdes Pematang Simalungun, Pematang Simalungun DPRD members, and commercial partners of corn growers.



Fig. 1. Opening of PKM Activities



Fig. 2. Handover of Machinery and Other Equipment

Broadly speaking, this PKM activity is divided into two, namely the provision of material (knowledge) about corn varieties, nutritional content of corn, and processing theory theory, provision of materials (soft skills), practice of processing corn chips, application of corn flattening machines and packaging directly involve participants (hard skills). With sufficient understanding of theory and practice, it is expected to increase the knowledge and skills of partners.

Material debriefing was given on the first day after the opening ceremony by the presenters who were the implementing team. The purpose of this material is to provide participants with knowledge and understanding of:

1. Knowledge of corn varieties, nutritional content of corn and the business potential of processed corn which is quite promising. This situation is also used by some as an opportunity to seek profit from business opportunities made from corn.

2. The process of processing corn tortilla chips starts from selecting corn raw materials, cleaning corn, boiling, soaking for 1 night and steaming corn.
3. The application of corn on the cob grinding machine, drying corn tortilla chips and frying.



Fig. 3. Machine Application & Dough Making Training



Fig. 4. Corn Tortilla Thinning & Drying Training

4. Packaging dan Labeling



Fig. 5. Corn Tortilla Chips Product Packaging Training

5. Business management, finance and marketing training



Fig. 6. Marketing and Sales by Partners

3. Findings

Community Partnership Program activities are the economic development of a group of communities. Handling corn harvests with appropriate technology, needs to be done because corn is a food crop commodity that many farmers cultivate because it is the second staple food after rice. Corn is usually used to meet food needs, materials for making animal feed, industrial raw materials, and so on. For this reason, corn can be processed into food that can be used as regional specialties to increase people's income by empowering partners through productive economic activities so that economic activities are productive through the development of post-harvest handling of corn using appropriate technology.

This Community Partnership Program activity contributes to: increasing the knowledge and skills of partners, knowing how production machines work, being skilled in processing various flavors of corn tortillas, product quality, packaging/labeling, improving human resources, improving management, bookkeeping, marketing techniques and improving the income of partners or farming communities.

Efforts to increase people's knowledge about how to process corn by using the design of a corn grinding machine so that it becomes corn tortillas. In order for the machine to function properly, it is necessary to make a manual for the operation of the machine and how to maintain it so that partners can operate and maintain the machine properly. To increase public knowledge in processing corn into corn tortillas, written processing methods are given and assistance in practicing processing and product packaging methods so that corn tortilla products are feasible to be marketed or sold.

In addition, the Community Partnership Program team also explained ways to market corn tortillas by determining the locations for marketing, packaging, training on online marketing methods, financial management assistance, bookkeeping training, financial management, and profit sharing procedures. There are also discussions and how to calculate production costs which are submitted in writing to be studied so that the public can know how to calculate production costs, capital costs and calculate the profit from production. In addition to financial management, the duties and functions of each group member are also managed. This is so that finances can be managed properly so that the business can run sustainably.

As a follow-up, the Community Partnership Program team continues to communicate with partners. This is done in the context of monitoring and evaluating partner activities after training and mentoring. If partners experience problems, or want to diversify corn tortilla products, the team continues to provide assistance to partners so that they can carry out corn processing activities into corn tortillas with various flavors and help partners promote their work that can be used as souvenirs typical of Pematang Simalungun Village.

4. Conclusion

Community Partnership Program activities have been carried out, namely by providing corn grinding machines, equipment for processing corn tortillas and training on the application of machines to partners. Partners have understood and understood corn tortilla processing techniques, corn drying techniques, corn tortilla frying and packaging. Mitra is currently producing corn tortillas. This is an open opportunity for corn farmers to develop their business in the field of processing agricultural products. The existence of corn farmer partners has been known by the community in Pematang Simalungun Village with the publication of this activity in print and online mass media.

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