

The Partnership Model for Women Farmers by Processing Mangosteen Skin Waste as a Functional Food Substitute

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Abstract.

Mangosteen fruit is a leading commodity from Barengkok Village, Leuwiliang sub-district, Bogor, as well as a commodity capable of penetrating exports. The environmental problem that arises during the harvest season and from fruit that does not pass export is the waste of its skin, so it is necessary to make use of it so that it has economic value for the community. This study examines a community partnership model through community empowerment in the use of mangosteen peel waste as a substitute for functional food. This study is based on the Women Farmers Group with a descriptive qualitative approach, demonstrations and training on the development of functional food processed products and assistance. The results of the study show that people's understanding and insights have increased from 50% who don't know to 100% of participants who know and understand how to use mangosteen peel into food processing, partners are able to independently produce processed products based on mangosteen peel flour with a turnover of 16 jars per month. Technological innovation in processing mangosteen peel into food, motivates people to become new entrepreneurs, because the product is unique and healthy and has a selling value. This partnership program provides solutions to address the environment and create additional income for the community.

Keywords: *Community empowerment, mangosteen peel waste, innovation, substitute, IPTEK, functional food.*

I. INTRODUCTION

The main potential of Barengkok Village, Leuwiliang Subdistrict, Bogor Regency is the unique natural and cultural resources that will be directed to become a Central Growth Village (DPP) based on the 2005 Bapeda master plan. and Vanilla. Barengkok Village has commodities that are able to compete and deserve to be seeded, namely in addition to durian fruit, the superior fruit of Barengkok Village is mangosteen. This mangosteen is a prima donna fruit from Bogor district which has contributed to the national mangosteen export. Until now there has been no accurate data on how many mangosteen trees are in Barengkok Village, but the mangosteen fruit from Barengkok Village has been able to penetrate exports to several Asian countries.

The results of research by Reny Andriyanty and Linar Humaira, 2017, show that the mangosteen fruit production from Leuwiliang District which passes the export is 40-50% and the rest is sold in the local market, this is because the quality of the

mangosteen fruit is not up to standard quality that has been determined [1]. The mangosteen cultivated in Barengkok Village is only harvested and sold in primary form, and what is enjoyed from the mangosteen fruit is only the fruit, while the skin is removed, even though the mangosteen rind is known to have many health benefits. However, people generally do not know how to take advantage of the hidden potential of the mangosteen rind.

Mangosteen fruit is a plant that produces quite a large byproduct of waste that ranges from 70-75% of the mangosteen fruit harvest in the form of the skin, while the pulp is only 10-15% and the seeds are 15-20%. For this reason, it is necessary to optimize efforts in utilizing mangosteen peel as a secondary product so that it can provide added value for farmers. To increase the added value of the mangosteen fruit, there have been innovations in the processing of mangosteen products both from its fresh fruit processing and from the mangosteen rind. Mangosteen fruit contains calories and high water content. From several studies, mangostin compounds are compounds that are commonly found in mangosteen rind which are very beneficial for health [4].

Currently, processed products that can be made from mangosteen peel include mangosteen peel juice, mangosteen peel tea, mangosteen rind stew, and the most popular today is capsules containing mangosteen peel extract for medicinal purposes. Mangosteen peel contains several secondary metabolites which are very beneficial because of the xanthone and tannin content. Xanthones are natural chemical substances that are classified as polyphenolic compounds and are very beneficial for health, namely as antioxidants, antidiabetic, anticancer, antiproliferative, anti-inflammatory, aromatase inhibitor and also other functional properties. In addition, mangosteen peel is also rich in pectin, tannin, black dye, and xanthan antibiotics [3], the anthocyanin content in mangosteen peel can produce pigments that can be used as safe natural dyes, especially those that can be used as food coloring. Anthocyanins have antioxidant properties and can prevent neuronal, cardiovascular, cancer and diabetes [4]. So that no doubt the mangosteen peel is rich in benefits. Apart from being made for processed food products, mangosteen peel can also be made of extracts which are used as active ingredients or anti-microorganisms in the manufacture of floor cleaning soap [5] and the manufacture of dishwashing liquid soap [6].

The population of Barengkok Village, amounting to 12,854 people, of which 55 percent are men (7,068 people) and 45 percent are women (5,768 people). Based on people's livelihoods, most of the population works as farmers and farm laborers as much as 40%, and the rest is spread as traders 25%, private 15%, drivers 20% and factory workers 10% [2]. Of the 40% of the population of Barengkok Village who earn a living as farmers and farm laborers, including the Women's Farmers Group, which is part of the Barengkok Village PKK organizational structure. This Women Farmers Group is included in the Working Group (POKJA) which manages the Food and Environmental Sustainability program with its flagship program in post-harvest activities of plantation products (Coffee, Durian, Avocado, Vanilla, and Mangosteen).

The Women Farmers Group has 25 members who are members of the Pelangi Gunung Suling Women Farmers Group (KWT). In post-harvest management activities, especially for mangosteen fruit, most farmers only carry out direct sales activities to collectors, especially for mangosteen that pass export, the rest that do not pass the export they sell to the local market at a low price, besides that, of course there will also be many mangosteen peel waste that is not utilized and difficult to decompose due to the content of xanthon, which functions as an antimicroorganism. Besides that, there are also many more ingredients in the mangosteen peel that are beneficial to health, for that we need technology and innovation efforts in utilizing this mangosteen peel waste and efforts to increase the added value of the non-grade mangosteen fruit, thus creating potential and new business opportunities for partners.

Increasing the productivity of community groups in the agribusiness sector processed by mangosteen fruit plantation waste, which is widely cultivated in Barengkok village, is an important effort. Because the increase in the productivity of this community group is expected to increase the income of mangosteen farmers and the welfare of the people of Barengkok Village. However, the problem that exists with partner farmers is that when the harvest season arrives, farmers only sell mangosteen that do not pass the export (non-grade) in the form of fresh fruit at a low price, besides that, there will also be a lot of mangosteen peel waste that is not utilized. In terms of post-harvest management activities, generally mangosteen farmers only carry out direct selling activities of the mangosteen fruit produced without sorting, grouping, and packaging. This is because farmers do not know about proper post-harvest handling, especially for mangosteen that do not pass export.

The sales system carried out by the majority of farmers for fruit that does not pass export is selling at harvest time to the local market or middlemen so that the price is very low. Meanwhile, to overcome this condition, farmers can also sell processed products from both the fruit and the mangosteen peel waste. The problems faced by members of the Gunung Suling Women Farmer Group in Barengkok Village are still low knowledge and skills in processing rejected or non-grade mangosteen fruit and in processing mangosteen peel waste, especially 1. Low knowledge and skills in managing the production of non-grade mangosteen fruit and low ability in utilizing the waste of the peel, 2. The low ability in business management of non-grade mangosteen fruit and mangosteen peel waste and 3. the low ability to make strategies to market their processed products, so it is necessary to study efforts to provide skills to partners who were previously rejected fruit and waste will making products that have high economic value and opening up new business opportunities.

II. METHODS

This study is based on a partnership through community empowerment in the Women's Farmers Group with a qualitative descriptive approach, observation, demonstration and training on the development of processed food products based on mangosteen peel waste and assistance to the community. Empowerment is a series of

activities to strengthen and optimize the empowerment of weak groups in society, including individuals who experience poverty problems [9]. Community empowerment has seven stages or steps carried out, namely 1) preparation stage, 2) assessment stage, 3) alternative program or activity planning stage, 4) action plan formalization stage, 5) program or activity implementation stage, 6) The evaluation stage, 7) The termination stage [10]. The target partner is the Pelangi Gunung Suling Women Farmer group which has 25 members, due to the Covid-19 pandemic conditions, participants are limited to only 10 participants, as a realization of maintaining a 3 M health protocol. Qualitative and quantitative data are collected with the help of a questionnaire using a scale Likert between 1 (Don't Know) to 5 (Very Knowing), which is tabulated and described in the analysis.

III. RESULT AND DISCUSSION

a. Implementation of the mangosteen peel utilization process program

The implementation of this partnership program is through the implementation of science and technology (IPTEK) to partners, namely how to process the mangosteen fruit and its skin waste so that it has economic value for the community. The conceptual framework for science and technology that is implemented is as illustrated in Figure 1. Members of KWT Partners have an average age of productive age, namely 40.8 years with 83.33% education, high school education or equivalent and the remaining 16.67 have primary school education or equivalent, marital status is 100% married with an average family of 1-2 children. With this condition, the partner's identity can be used as a reference in program implementation so that it is easy for partners to accept. In solving the problem, there is a lack of knowledge and skills in the management of production from non-grade mangosteen fruit and the low ability to utilize waste from its peel, which is done by providing counseling, demonstrations and training starting from the process of selecting healthy fruit, separating the pulp and mangosteen peel to making processed skin dried mangosteen as a simplicia for the shading process and used in the next program.

The first program is to use mangosteen pulp which is used as jam which will later be used as a filling in making snacks made from additional ingredients of mangosteen peel flour. Practical activities or training are carried out by dividing partners into small groups that are accompanied by a team. The results achieved were the partners were able to apply the theory to the practice of making jam and practice the process of making mangosteen peel simplicia. This mangosteen peel simplicia can be used as a functional drink, by processing tea by boiling it [10].

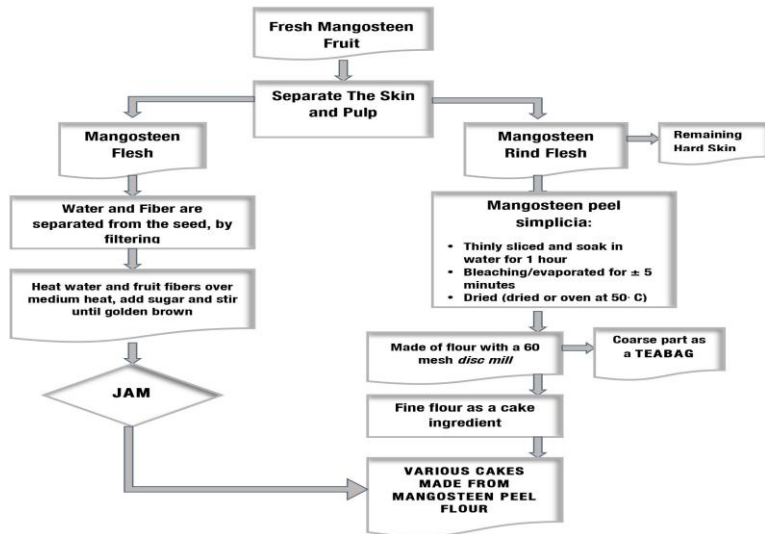


Fig 1. Science and technology implemented to Partners

Utilization of mangosteen peel simplicia through flour has the advantage of having a long shelf life, it is easy to store and is easy to distribute and can maintain the continuity of the supply of raw materials. The next program is to utilize simplicia through flour to be used as a functional food substance in making cakes or cookies. Products processed by mangosteen peel flour as an additional ingredient in the cake will complement the nutrition we need. Mangosteen peel flour substitution has a significant effect on cake color, taste, texture and overall cake [11].

The cake product that is implemented to partners is in the form of a wet cake in the form of a Pao cake or in this program the name Garcia Pao because this pao cake is made identical to the mangosteen fruit and besides that it also implements making choco chip cakes made from additional mangosteen peel flour. The output of the non-grade mangosteen fruit utilization program and mangosteen peel waste is in the form of mangosteen fruit jam, mangosteen peel simplicia, mangosteen skin tea, mangosteen peel flour, pao cakes and choco chip cookies based on mangosteen peel flour. Next, train partners in determining packaging and labeling to support the product sales process.

b. Business management and marketing strategy of mangosteen peel flour

Business management is one of the activities to regulate everything in running a business so that the expected goals can be achieved, including how to plan production and including planning the packaging and labeling design as one of determining strategies for marketing the product. Determining this packaging will determine market segmentation so that it will affect the cost of goods sold. In this program, the packaging has been determined primarily to meet the standards for the category of snacks or pastries, namely in the form of glass jars or made of acrylic, with a content capacity of 300 grams or according to the target market.

Labeling or labeling is a simple display of an intricately designed product or image that is an integral part of the packaging [12]. Labels can only include brands or information, in this activity an example of a label for a pao cake product is GarciPao and for a cookie product it is Gacia Chocochips produced by L & A Cookies, taken from the initial implementer of the activity.

In other business management activities implemented to partners, namely how to calculate the business analysis of making various cakes made from mangosteen peel flour to be used as additional family income or as a new entrepreneur. Mangosteen peel which has no value after going through processing can have the potential to improve the community's economy. Train partners how to calculate the amount of raw materials used and other supporting materials including packaging costs, to then get the results or cost of goods sold, both for pao cakes and for cookies.

The last activity of this program is to train partners in making marketing strategies for their products. Marketing that is introduced to partners is both online with various media that allows partners to do such as using mobile devices either through WA or Instagram and Facebook, besides conventional marketing, namely through consignment or selling directly through shops or participating in exhibitions.

c. Evaluation of Program Implementation

The final stage of this community partnership program is an evaluation of the entire series of activities. To see the success of the program, it was carried out through a recap of the results of filling out the pretest and posttest questionnaires related to basic knowledge of the benefits of mangosteen peel, functional food, how to process mangosteen peel, the ability to explain the processing of mangosteen peel to material activities that are easy to understand and benefit, besides that based on the results interviews with participants and the participation of partners or participants during the activity.

Judging from the participation of the participants, it looks very enthusiastic, this can be seen from the presence of the participants from the beginning to the end of the program the partners are always present and even tend to have additional attendance, participants are actively involved. In addition, seen from the impact of the results of empowerment activities, it was found that partner members were able to produce pastries independently and were able to implement business management and were able to market independently. This was evident from the results of partners' reports that they were able to produce 16 jars of pastries at a price of Rp. 20,000.00 per jar within 2 weeks before Eid al-Fitr 2021. The marketing strategy that partners use is through the new media WA by only posting status. While the results of the questionnaire analysis can be seen in the following histogram graph:

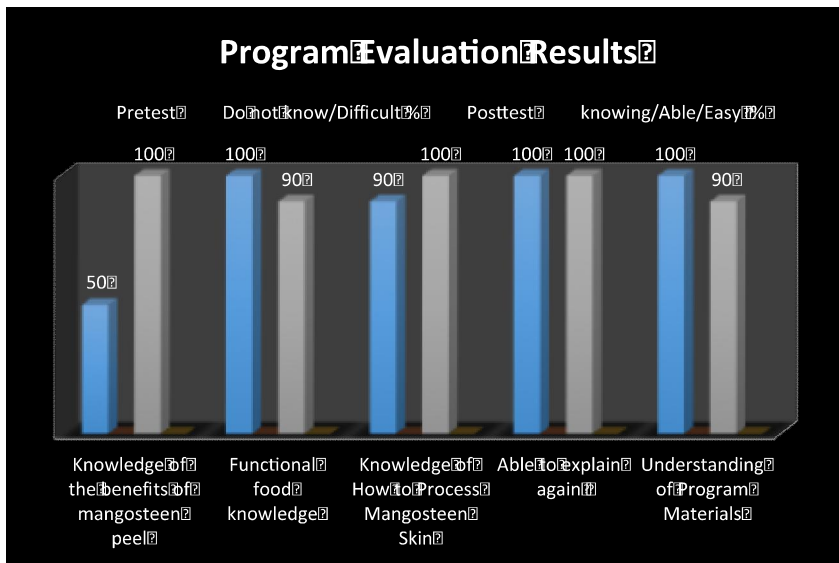


Fig 2. Histogram of Program Evaluation Results

The tabulation results showed that the participant's statement of knowledge about the benefits of mangosteen peel both health and economically there was an increase of 50% from partners who do not know, to all participants 100% knowing and understanding this can be seen from their understanding ability in restating the function of mangosteen peel. Meanwhile, the partners' knowledge of functional food knowledge, from all participants to 90% of the participants understand and know functional food for mangosteen peel. The knowledge of the partners from 90% who didn't know it to 100% of the participants became aware of it, then the participants' ability to explain again how to process mangosteen peel waste from those who did not know 100% to 100% knew about it.

The results of this study can support the statement of Jim Ife and Frank Tesoriero in Sunarsih (2020), that empowerment focuses on the education or learning process for the community to increase their empowerment, so that people have ideas, understanding, vocabulary, and work skills to achieve change that is effective and sustainable [13]. And also the research results of Sunarsih [13], Linar Humaira, Reny Andriyanti, Srikandi [5], as well as research results, Linar Humaira, Srikandi, Anak Agung [6] which show that the partnership model through community empowerment can be carried out through extension, demonstration and training on creativity for innovative ideas from local food processing. Thus, this program can be said to be successful in increasing the knowledge and skills of partners in processing mangosteen peel waste. There are several obstacles in the sustainability of this program, namely when the program implementation is constrained by the availability of raw materials, namely mangosteen fruit. Considering that the mangosteen fruit is seasonal and when the harvest season is completed, it is difficult for mangosteen to be available. So that the sustainability of the program to realize it again has to wait for the next harvest season. However, Partners have been equipped with the knowledge and technology of mangosteen peel processing accompanied by the raw materials that the team has

provided so that they can be practiced when the program is over and while waiting for the next mangosteen harvest.

IV. CONCLUSION

The community partnership model through outreach, demonstration, training and mentoring activities can increase the knowledge and skills of partners in processing mangosteen peel waste into functional food processing. Increased knowledge and understanding of the benefits of mangosteen peel both in health and economically increased from 50% to 100% of participants know and understand it, partners' understanding of mangosteen peel as a functional food ingredient increased 90%, partner knowledge and skills in processing mangosteen peel waste increased 100 %.

Partners are able to produce cookies and sell their products independently, through online sales of whatsapp media with a production capacity of 16 toples in a month or Rp. 320,000, - in a month. This activity is felt by partners to be very useful, and has been able to increase the partner's income. So that it is expected to improve the economic welfare of the Barengkok Village community in general.

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