

Utilization of Fruit Peel Waste Left From Ceremonials Into Economical Value Products in Batuan Village, Sukawati, Gianyar, Bali

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ABSTRACT

Several types of fruit that support ecotourism in the application of food waste include banana peels, apple peels, dragon fruit peels, and manga peels, which will be made into chips and tea products using good hygiene and quality standards. Innovative problem-solving and technology have emerged as promising approaches. The target partners are housewives who are members of the PKK in Batuan Village, Sukawati, from underdeveloped neighborhoods with a great desire to start their own businesses but who are not yet economically productive from underdeveloped neighborhoods with a great desire to start their own businesses but who are not yet economically productive. The methods that will be used are interviews, face-to-face, counseling, and direct practice. The output target to be achieved is that the training participants are independently able to make fruit skin chips and tea products from fruit skins so that they can become economically independent

INTRODUCTION

Food waste is a global challenge of great economic, environmental, and ethical significance (Djaini et al., 2023). As the world's population continues to increase, and with it, the demands on our food systems, the problem of food waste is becoming increasingly pressing (Ali et al., 2022; Aziz et al., 2022; Melikoglu, M., Lin, C. S. K., & Webb, 2013). In a world where millions of people are hungry (Garske et al., 2020), the waste of precious resources and the environmental impact of wasted food are unsustainable (E. L. Cosbuc, 2021). Addressing this multifaceted problem requires innovative strategies, and integrating data analytics and technology has emerged as a promising approach (Mokrane et al., 2023). Increasing population, economic growth, rapid urbanization, and increasing people's living standards significantly accelerate the accumulation of waste in the world (Song, Q., Li, J., & Zeng, 2015). Waste has become a global environmental issue. A strategic waste management system and sustainable consumption are essential for reduce waste accumulation. One approach suggested as a way to overcome the waste problem is the "Zero Waste" concept (Lestari et al., 2021).

The material flow in a zero-waste system is circular, i.e., the same material is used repeatedly until optimal consumption levels are reached. A circular system uses all of its materials without wasting any of them (Murphy & Pincetl, 2013). Reusing, repairing, selling, or redistributing the product inside the system are the options when its life comes to an end. Waste can be recycled or recovered from the waste stream and used as an input to replace the need for the extraction of natural resources if reuse or repair are not feasible. The material flow represents a circular waste system, in which waste output or end-of-life products are considered resources and fed into metabolic processes (Curran, T., & Williams, 2012). Waste management is still a serious and long-standing problem in most parts of Asia. Management policies and available technology have not been able to overcome waste production, which tends to increase (MacRae, 2012). The waste problem is also experienced by Bali, which is a popular tourist destination across the globe. The approximately 3.9 million residents of Bali and the more than two million tourists who visit the island each year are the source of this waste (Zurbrügg, C., Gfrerer, M., Ashadi, H., Brenner, W., and Küper, 2012). Waste output per person can reach 1.46 liters per day, or 0.38 kg per day, with 47% of the waste being organic, 15% being paper, 22% being plastic, 16% being metal, and so forth (Riswan et al., 2015). The ever-increasing volume of waste will ultimately be sent to final disposal sites (TPA) and will lead to a shorter lifespan of the landfill (Winahyu et al., 2019).

One of the seven Sapta Pesona points, or prerequisites, that must be met for a place or region in Indonesia to draw tourists, is being free of trash. The Minister of Tourism, Post, and Telecommunications' Decree Number.5/UM.209/MPPT-89 concerning Guidelines for the Implementation of Sapp Pesona lists these seven points (Siska Wahyu Rahmawati, Sunarti, 2017). Ecotourism has become one of the tourism development concepts that is in line with the implementation of Sapta Pesona. Ecotourism is a tourist activity that is not only recreational but also educational and conservation (Hayati, 2010). Three general concepts in

ecotourism are nature-based, educational, and sustainable, which include economic and social criteria.

A number of Indonesian regions have adopted ecotourism as a means of lowering emissions (Choi et al., 2020). Considering that the tourism industry is currently expanding at the fastest rate in the world, a major factor contributing to the rise in carbon dioxide emissions (Paramati et al., 2017). The idea of ecotourism is a response to a decentralized management style that places an emphasis on community involvement (Oktami et al., 2018). Community participation is important in conservation activities to realize sustainable tourism (Hayati, 2010). Several types of fruit that support ecotourism in the application of food waste include banana peels, apple peels, dragon fruit peels, and mango peels.

Banana production increases every year. In 2016, banana production reached 7,007,125 tons (Statistics, 2011). With high banana production, the number of banana peels produced will increase. Banana peel waste can reach 40% of the total fresh banana fruit. So, judging from banana production, the amount of banana peel reaches 2,802,850 tons per year. The nutritional elements contained in banana peels are quite complete, such as carbohydrates, fat, protein, calcium, phosphorus, iron, vitamin B, vitamin C, and water (Novitasari, 2013). Apples are one of the fruits that grow in the highlands. Apples are very popular with people, especially apples from within the country because they are available in all seasons, last a long time, and do not rot easily. Apples contain many vitamins, minerals, and other elements. This substance is very necessary for our body to prevent and overcome various diseases. There are several vitamins found in apples, namely vitamins A, B, B2, B3, B5, B6, B9, and vitamin C. Apple skin is also rich in vitamin K, more than 332%, vitamin C, more than 142%, calcium 20% more, and up to 19% more potassium than peeled apples. Unpeeled apples contain several chemical compounds and bacteria that are still attached to the skin of the fruit (Putra et al., 2023).

The rarely used skin of red dragon fruit contains high levels of antioxidants to fight oxidation in the body. Several other studies also state that dragon fruit skin contains flavonoids, vitamins A, C, E, and polyphenols (Handayani, 2014). This finding is supported by research by Noor (2016), which states that red dragon fruit (*Hylocereus polyrhizus*) skin extract contains vitamin C, flavonoids, tannins, alkaloids, and steroids (Ramadani et al., 2018). Phenolic compounds, especially flavonoids, have been proven to have benefits for skin health, including protecting the skin from sunlight (Yumas, 2015), providing a moisturizing effect, and brightening the skin so that the skin not only maintains its moisture but also looks radiant (Ginting & Andry, 2023). Mango skin is a potential processed source because it still contains 5-11% pectin (Malaiporn Wongkaew, 2021). Research from Nurmila et al. (2019) found that mango skin still contained 40-49% pectin after being extracted at a temperature of 90-95OC for 150 minutes. Wongkaew et al. (2020) studied that mango skin contains pectin and can be a substitute for fat in sausage-making formulations. The results of this research show that pectin extracted from mango skin can replace the role of fat during sausage making (Rachma et al., 2021). Mango peel as a source of pectin

can also be used to make oleoresin by extracting it using ultrasound (Harsanto & Saputra, 2023).

Our targets this time are housewives who are members of the PKK Mobilization Team in Batuan Village, Sukawati. Sukawati comes from a society that is not yet financially productive but has a strong desire to become an entrepreneur. Bananas, apples, dragons, oranges, and manga peels are examples of leftover fruit that can be used to make processed products from fruit waste. In addition, it can be used as an additional source of income that helps increase family income. The goal of Warmadewa University-funded community service projects is to give the PKK residents of Batuan Village, Sukawati, the abilities and knowledge needed to manage local natural resources. Partners are expected to have an entrepreneurial spirit, which will enable partners to open business opportunities related to the situation in Batuan Village. PKK Batuan Village, Sukawati, will be able to increase production and entrepreneurship through community service activities with the title "Utilizing Upakara Fruit Peel Waste into Products of Economic Value in Batuan Village, Sukawati District, Gianyar Regency, Bali."

IMPLEMENTATION AND METHODS

After the PKM proposal is approved, partners, the Family Welfare Development Group (PKK) Driving Team of Batuan Village, Sukawati District, Gianyar Regency, Bali Province, will carry out this community partnership program.. In Batuan Village, Sukawati District, Gianyar Regency, Bali, PKM activities for utilizing Upakara fruit peel waste into products of economic value are planned in the following way:

Interview

Interviews and discussions with partners, namely the PKK chairman and PKK members, to find out the problems experienced by partners. Batuan Village is an area that preserves religious ceremonial traditions. After the ceremonial procession, there are fruits from the religious ceremonial procession. So far, people have not used the fruit skins from the ceremonial results, so this has an impact on the accumulation of waste. To minimize waste, the solution is to make chips and tea from fruit pies.

Counseling

Direct counseling method, so that partners gain knowledge about processing the use of leftover fruit peel waste into products with economic value, such as chips and tea products. Direct learning and practice or a learning-and-doing strategy are used to carry out the implementation technique. conducted under the implementer's supervision as integrated training, counseling, and participatory practice (with residents), and then mentored. In socialization, education, empowerment of the community, and introduction to the significance of processes fruit skins and tea from fruit skins are provided for environmental sustainability and minimizing waste; education on processed fruit skin products and tea from fruit skins is followed by training in making and packaging fruit skin products and tea from fruit skin (Kadir et al., 2023). The goal of education

and counseling is to give the general public a foundational knowledge and awareness (Sutianto Pratama Suherman, Arafik Lamadi, 2023).

Live Practice

Direct practice method guided by instructors who are competent in their fields and students, so that partners can directly make the products provided. Method for Making Fruit Peel Chips and Fruit Peel Tea:

a. Making Fruit Skin Chips

There are 3 types of fruit peels used, namely apple peels, banana peels, and pear apple peels. The first step is to peel the fruit skin, wash the fruit skin, soak the fruit skin for 15 minutes in a solution of salt and sugar, then fry the fruit skin in a mixture of rice flour, tapioca flour, and water until brownish yellow, then remove the mixture and drain. until the oil content is reduced. Next, package it in a standing pouch and attach the product design from the partner.

b. Making Fruit Peel Tea

There are 5 types of fruit peel used, namely orange peel, snake fruit peel, apple peel, banana peel, and mango peel. The first step is to dry the fruit skin in the sun for approximately 1 week, then blend the fruit skin until smooth. The final step is to package it in a standing pouch and attach the product design from the partner.

Monitoring and Evaluation

The program evaluation stage was carried out by referring to the participants' skills in practicing making fruit peel chips and tea from fruit peel as well as monitoring the sustainability of product production activities (Ardiansyah et al., 2024). A descriptive analysis will be performed on the evaluation outcomes. The effectiveness of practices related to practice activities evaluation, knowledge and skill development, and empowerment, as well as the usage of waste raw materials and compost-making machinery (Suharman et al., 2022).

RESULTS AND DISCUSSION

The activity was carried out on Friday, June 14, 2024, with the title "Utilization of Fruit Peel Waste Left Over from Upakara into Products of Economic Value in Batuan Village, Sukawati District, Gianyar Regency, Bali." Demonstration to provide an understanding of the process of making fruit skin chips and tea from fruit skins and training on fruit skin chips and tea from fruit skins, imparting information about marketing, labeling, product packaging, and entrepreneurship. This exercise involved 15 members of the Family Welfare Empowerment Group (PKK) located in Batuan Village, Sukawati District, Gianyar Regency, Bali. In order to produce commercially useful fruit peel chips and tea, the PKM team also contributed equipment and supplies. Table 1 displays a synopsis of the activity results.

Table 1. Results of Activities (Output)

No.	Type of activity	Outcomes achieved (Output)
1	Counseling in the introduction of making fruit skin chips and tea from fruit skins	100% of Batuan Village Family Welfare Empowerment Group (PKK) Partners can use tools for the process of making fruit peel chips and tea from fruit peels to produce products that have economic value.
2	Education on how to use fruit peels to make fruit peel chips and tea from fruit peels	100% Partners of the Batuan Village Family Welfare Empowerment Group (PKK) understand the use of fruit peels to produce fruit peel chips and tea from fruit peels
3	Training to improve skills in using fruit peels to make quality fruit peel chips and tea from fruit peels	100% Batuan Village Family Welfare Empowerment Group (PKK) partners are skilled in utilizing fruit peels into quality fruit peel chips and tea from fruit peels

The electronic mass media has published this community service project. Two lecturers from the Warmadewa University Faculty of Agriculture's Agrotechnology Study Program and Food Technology and Agricultural Products Study Program – Dr. I Nengah Muliarta, S.Si., M.Si., and Ni Luh Putri Setianingsih, S.Si., M.Si. – were involved in the activity's implementation. The implementation of activities and the results of fruit peel products into fruit peel chips and fruit peel tea can be seen in Figure 2.



Figure.1 Warmadewa University PKM Team Counseling to Group Partners



Figure.2 Handover of Equipment Donations from the Warmadewa University PKM Team to Group Partners



Figure.3 Group Photo with the Unwar PKM Team (3 Lecturers and 3 Students) and 15 Group Partner Representatives



Figure.4 Training on Organic Fertilizer Composting by the Warmadewa University PKM Team for Group Partners



Figure.5 Product Results Fruit Skin Chips



Figure.6 Tea Products from Fruit Skins

The main activity consists of training in making fruit skin chips and fruit skin tea products. The activity begins with registration and presentation of material using lecture and discussion methods and product manufacturing practices. The first activity, training in making fruit peel chips and fruit peel tea products, was held on Friday, June 14, 2024, and the activity was held at Balai Puspa Aman, Br. Lantangidung, Batuan, Sukawati, Gianyar, Bali. The activity was attended by 15 participants. To support the entrepreneurial program, the team provides tools to support product creation so that it can reduce the costs required for capital.

Social and Economic Implications

This activity's implementation had an effect on the Batuan Village, Sukawati District, Gianyar Regency, Bali Province Family Welfare Development Group (PKK) Driving Team, a group made up of fifteen PKK representatives who were able to process fruit peel chips and fruit peel tea products on their own and get them ready for the market. Fruit skin chips and fruit skin tea products have added value and can boost the revenue of the Batuan Village Family Welfare Development Group (PKK) Driving Team due to the availability of food diversification items. Products made from fruit peels, such as fruit peel tea and chips, are accessible to all demographics and offer a number of health advantages, including antioxidants. In order to assist partners in beginning to create and market fruit skin chips and fruit skin tea items as a means of generating additional revenue, the PKM implementation team also donated equipment for processing these products. As a result, this activity can undoubtedly enhance community welfare, particularly for the PKK of Batuan Village, Sukawati.

Partner's Interest in Implementing

On Friday, June 14, 2024, PKK Batuan Village, Sukawati conducted Community Partnership Program activities related to fruit skin chips and fruit skin tea products. These activities took the form of counseling or theoretical studies to provide an understanding of fruit skin processing materials, packaging techniques, and marketing strategies. fifteen PKK representatives were present. Every partner (100%) actively participates in the events, and partners anticipate ongoing support in turning fruit peels into creative goods like fruit peel tea and chips.

Settlement of Social Services

PKK Batuan Village, Sukawati, is quite excited about their ability to make tea and chips from fruit skins. On their own, participants wish to experiment with producing fruit skin chips and tea, as well as begin selling them. Additionally, the PKM team will keep helping to turn fruit skins into high-quality, internationally competitive fruit skin chips and tea items. The implementation team will then go with the group to apply for a P-IRT permit, which will allow the product to be sold in a wider market.

CONCLUSIONS AND RECOMMENDATIONS

The community service projects went off without a hitch. PKK Batuan Village, Sukawati, has successfully established its own processes for making tea and chips from fruit skins. Partners are 100% proficient in the correct processing of fruit peels into chips and tea. To make better products, the community – in particular, the PKK in Batuan Village, Sukawati – needs to regularly turn fruit peels into chips and tea.

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