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Innovation to Increase Palm Sugar Production into Ant Sugar Coffee

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Abstract: Palm sugar is one of the leading products of Citengah Village, Sumedang Regency, this innovation aims to process palm sugar into ant sugar coffee, which is an instant product in the form of dry crystals resulting from a combination of palm sugar and coffee powder. The method used was a household-scale experiment with stages: cooking of palm sugar solution, mixing of local coffee grounds, crystallization, and drying at 90–100°C. The results showed that the product had a smooth crystalline shape, dark brown color, a distinctive aroma of coffee and palm sugar, and was easily dissolved in hot water. Organoleptic tests on 20 respondents showed a preference level of 85%, especially in taste and aroma. This product also has a shelf life of more than three months without preservatives. The innovation of ant sugar coffee not only increases the added value of local palm sugar, but also opens up new market opportunities for natural instant drink products. It is hoped that this product can be an alternative to typical Sumedang souvenirs while supporting the economic empowerment of the village community.

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INTRODUCTION

Sap can be processed into several food products to extend its shelf life, fresh palm sap contains a lot of sugar, which is about 93 g/100 g of dry base ingredients, especially sucrose, as well as some glucose and fructose. In addition, it contains protein (5 g/100g of basic dry ingredients) and minerals. The abundant sucrose content helps the process of crystallizing palm sugar. In addition to the crystallization process, the manufacture of palm sugar also involves heating, evaporation, stirring, and cooling processes. There are two processes that can be a critical point in the production of palm sugar, namely the heating and stirring process. These two main stages must be considered so that palm sugar can be produced with good quality and preferred.

Palm sugar is a natural sweetener obtained from plant flower nectar absorbed by ants, then processed in an environmentally friendly way. This product can be an alternative option for people who want to reduce the consumption of white sugar, which is known to have a bad impact on health. Low Glycemic Index: Palm sugar has a lower glycemic index than white sugar, which means it can help regulate blood sugar levels more stably. Nutritional Content: Palm sugar contains several essential minerals, such as potassium, magnesium, iron, and zinc, which are beneficial for maintaining the body's electrolyte balance and boosting the immune system. Improves Digestive Health: The fiber content in palm sugar can support digestive health and prevent constipation.

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Apart from the health side, palm sugar also has great economic potential. Palm trees that grow in tropical areas, such as Indonesia, can be used to produce sap which is then processed into palm sugar. This process is more environmentally friendly compared to the cane sugar industry, which requires the use of large amounts of land and more intensive chemical processes. Therefore, developing the palm sugar industry can improve the economy of farming communities, especially in rural areas, while contributing to environmental conservation. The development of palm sugar micro-enterprises has been proven to enchance income, skills, and market access for local communities, thereby becoming a sustainable rural economic empowerment strategy (Siregar et al., 2025)

Innovations in palm sugar-based products, such as palm sugar derivative products that can be used for healthy drinks, snacks, or other processed products, are increasingly sought after by consumers. Product Innovation Opportunities Palm sugar has great opportunities to be further developed in various forms of processed products, such as liquid palm sugar, palm sugar syrup, palm sugar tea, or even palm sugar-based candies. Processing palm sugar into practical and easy to use derivative products, such as granulated sugar and coconut ginger sugar, can increase added value, attractiveness, and the competitiveness of local products in modern markets (Wardhana & Budihardjo, 2019). In addition, palm sugar-based products can also be positioned as premium products in the market that care about environmental health and sustainability.

The Palm Sugar business was once successful in Citengah Village but it dimmed and few residents were interested, and now researchers are trying to increase the production of this Palm Sugar. In addition, there is also a lack of innovation from sugar products and a lack of understanding of marketing strategies controlled by the community.

The purpose of this innovation is to create a new product in the form of ant sugar coffee, which is a mixture of palm sugar crystals and coffee powder that is water-soluble, practically consumable, has a longer shelf life, and has high economic value. The innovation of palm sugar coffee products, which combines the taste of coffee with palm sugar, is a strategy to create value added products that attract consumers and open new market opportunities for local MSMEs (Firman et al., 2022).

The village economy is an important sector in the national economy, as most villagers rely on the agricultural sector and other natural resources to meet their livelihood needs. Villages have great potential to develop through the development of local products, which can improve their economy. Based on data obtained after the initial survey of Citengah Village, the majority of people earn income from agriculture, such as picking tea shoots, rubber, and sugarcane. In addition, there are people who earn income from tourist attraction workers. Village economic empowerment is one of the strategies to strengthen national economic resilience, especially in rural areas. One way that can be done is to increase the added value of local products through innovation, such as palm sugar production which can increase village income and create new jobs for the community.

Palm sugar is a sugarcane-based processed product that is naturally fermented and crystallized, so it has higher quality and is more environmentally friendly compared to conventional granulated sugar. Palm sugar not only has a more natural taste and better quality, but it also contains higher levels of minerals and vitamins. In addition, its natural production process provides added value to this product. Palm sugar is very suitable as a healthier natural sweetener alternative, especially in the midst of the trend of increasing public awareness of sugar consumption. Research by Nawawi et al. (2025) indicates that the production and processing of palm sugar, including granulated sugar, contribute significantly analyses show that palm sugar product processing is viable for development and has the potential to strengthen the local economy, in line with this, research by Ichsan & Karyantina. (2020) emphasizes that the development of granulated

sugar businesses has good prospects as a productive enterprise, capable of increasing community income and promoting rural economic growth.

Besides innovations in production technology, research on marketing strategies for granulated sugar products by Makale et al. (2023) indicates that marketing innovations, such as the development of promotional strategies, distribution channels, and product image improvement, are crucial for expanding market reach and increasing sales. In line with this, research by Arifin et al. (2025) shows that the development of visual identity and effective branding strategies can enhance product attractiveness, strengthen brand perception, and facilitate the acceptance of granulated sugar products in the premium market. By developing the right marketing strategies, such as the development of attractive packaging and the efficient utilization of distribution channels, ant sugar products can be more easily accepted by the wider market. An effective marketing strategy will also help introduce ant sugar as a healthier natural sweetener alternative, so that it can compete with similar products on the market. Thus, the development of ant sugar products is not only related to the production aspect, but also to how the product is marketed in order to reach a wider range of consumers.

Improving the village economy through palm sugar production can be done by utilizing the comparative advantages and competitiveness of local products. One of the efforts that can be made is to increase the production capacity of the village community by providing training and education on efficient and sustainable palm sugar production techniques. Research by Defidelwina et al. (2025) shows that training in palm sugar production, particularly through processing it into granulated sugar, can enhance the skills of local communities and create sustainable business opportunities based on local potential. By providing knowledge on better ways of processing ant sugar, villagers can increase their production, which in turn will increase their income. In addition, the sustainability of ant sugar production based on local agriculture will have a positive impact on food security and the welfare of village communities in the long term.

The development of palm sugar in Citengah Village hopes to have a significant social and economic impact, this not only opens up new economic opportunities, but also introduces local products to a wider market with the help of digital can currently be used for sales advertised through e-commers. Research by Mustafidah et al. (2024) shows that digital marketing training through e-commerce platforms has been proven to enhance the digital marketing skills of rural communities and expand the market reach of local products, thereby potentially supporting increased income for rural MSMEs. In line with this, digital marketing for MSMEs demonstrates that social media can significantly improve the effectiveness of product promotion, enabling MSMEs to reach broader markets and increase sales volume (Hidayat & Akbar, 2024).

In Sumedang, there is currently a trend of opening coffee shops, where this will be a great opportunity in supplying ant sugar Where cafes must have a palm sugar coffee menu. There are quite a lot of palm sugar coffee enthusiasts, this is believed that sugar derived from palm provides additional different flavors and aromas of coffee, in addition to that, palm sugar is also believed to be healthier because it has a lower glycemic index than white sugar.

Overall, the development of palm sugar as a superior product in Citengah Village is expected to have a significant economic impact. By implementing innovations in the production and marketing processes, as well as empowering village communities through training and skills education, the village economy can improve significantly. Therefore, the development of palm sugar can be one of the solutions to improve the welfare of the village community and encourage sustainable local economic growth.

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METHODS

This research uses an applied research approach with a simple experimental research type, which aims to develop innovative products based on local palm sugar into ant sugar coffee. The main focus of this research is the processing of local ingredients into new products that are more practical and have a high selling value. The subjects of the study are small business actors and palm sugar processing communities in Citengah Village, Sumedang Regency, while the object of the research is the process of making ant sugar coffee through palm sap processing and mixing with local coffee powder. This research was carried out from January to June 2025 at a small-scale production house owned by residents in Citengah Village, which also functions as a place for palm sugar and coffee processing practices.

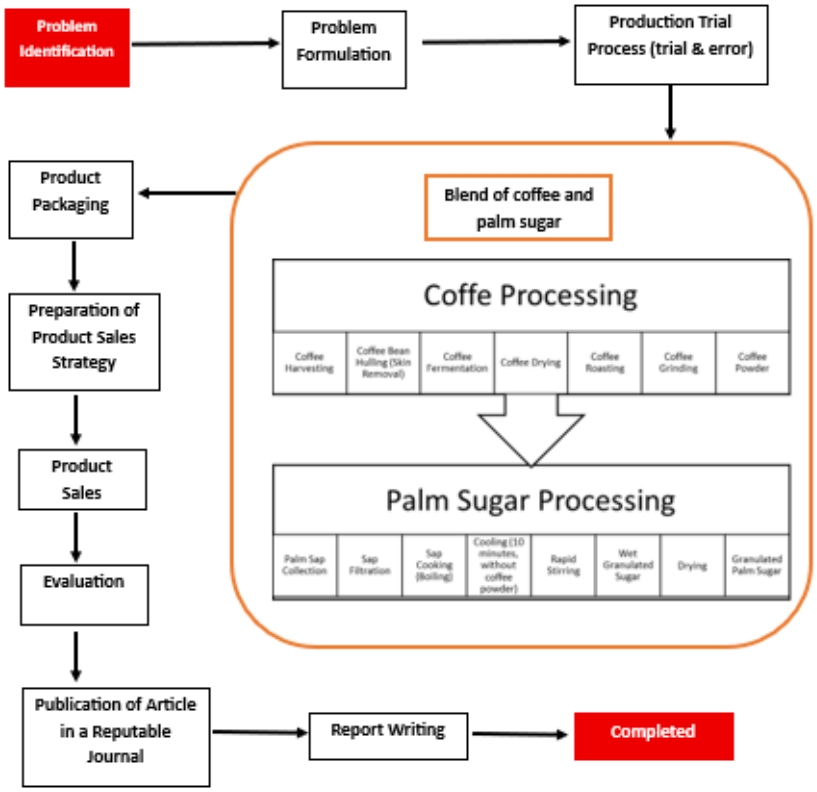

Figure 1. Research Flow Diagram
Source: Author processing results (2025)

Product samples were taken based on the purposive sampling technique, which is a sample deliberately selected from a group of business actors who have routinely produced palm sugar and coffee. In the organoleptic test stage, as many as 20 respondents from various circles were used as panelists to evaluate the taste, aroma, color, and level of liking the product.

Data collection techniques include direct observation during the production process, documentation, semi-structured interviews with artisans, and organoleptic tests on the final product. The data was analyzed in a simple qualitative and quantitative descriptive manner, namely by observing changes in product characteristics and calculating the percentage of respondents' preference level for sensory aspects such as taste, aroma, and solubility.

RESULTS AND DISCUSSION

In general, to process palm trees, processing is carried out as a side business for residents, this happens because the tapping carried out is carried out in the morning and evening, which is known that this time is outside the main working time. In product processing, the business carried out into the type of home industry is carried out personally at the residence of each processor here we collaborate with Mr. Utar's family in Citengah Village. Where Mr. Utar and Putra have the task of taking sap, the next process is processed by Mrs. Utar until it becomes sugar in plastic packaging and leaf packaging. Farmers in processing palm sugar use simple equipment, by utilizing cauldrons, stirrers and stoves whose fuel is still firewood. For coffee that is the product of production, farmers directly direct it to be sold to the market or sell it to collectors whose arrival schedule is on the days that have been arranged.

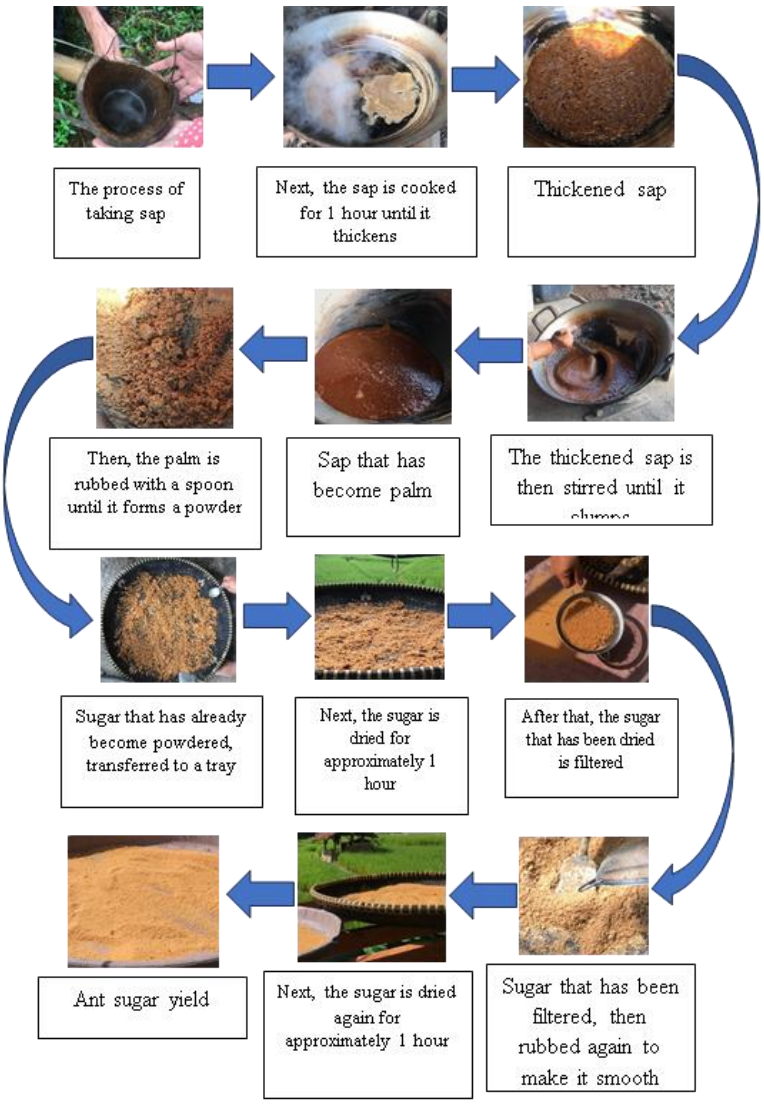

Figure 2. Making Sugar from the Distillery Until It Becomes Ant Sugar
Source: Author processing results (2025)

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For the next process, it can be seen from the picture above that palm sugar is dried and mashed with a target moisture content of 3% and below. In drying there are 2 methods, namely by heating directly in the sun or by putting it in the oven. In addition to palm sugar on the market, which functions as a food sweetener, it is said to be ant sugar because the visual of this sugar is crystalline sand grains as shown in figure 1 at the end. In the development of the ant sugar market has enough prospects, it is consumed by households, hotels, restaurants with good packaging conditions. If the size is small for sweetener tea or coffee. So that for the industry level, they can use a larger place with consideration of adjusting the market share. High enthusiasm was given by processors and village officials to develop palm sugar products that were changed in the form of ant sugar, so that later they would produce products with high selling value. But artisans complain about the long process, for palm sugar can be directly sold even though the selling price is low.

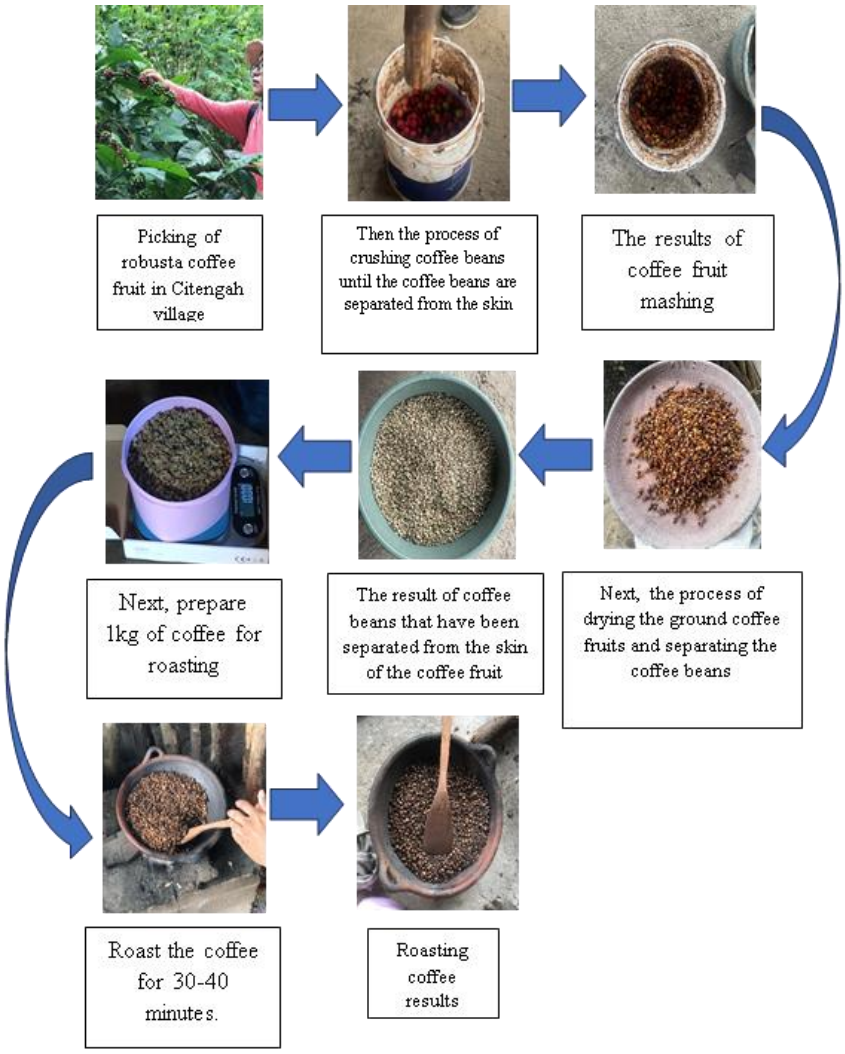

Figure 3. From Coffee Picking to Roasting
Source: Author processing results (2025)

The coffee processing process begins with picking coffee fruits (cherries) that have ripened perfectly, usually marked by a bright red color. Picking is done manually by the "red picking" method, which only selects ripe fruit to maintain the quality of the coffee taste. Once picked, the coffee berries are sorted to separate the good fruit from the raw, rotten, or defective fruit. Furthermore, coffee fruits are processed using one of two main methods, namely the wet process or the dry process. In the wet process, the outer skin of the coffee fruit is peeled using a mash. After that, the seeds are washed and dried in the sun until the moisture content drops by about 11–12%. Meanwhile, in the drying process, the coffee fruit is dried directly without peeling for several weeks until dry.

After the drying process, the dried coffee beans (green beans) are peeled to remove the bark, then re-sorted based on size, color, and defect level. Coffee beans that pass the sorting then enter the roasting stage, which is the process of heating at 180–240°C for 10–20 minutes depending on the desired level of maturity—from light roast to dark roast. This process is very important because it determines the final taste of the coffee. After roasting, the coffee beans are immediately cooled so that the heating process stops. Next, the roasted coffee beans are ground into coffee grounds with a level of fineness that is adjusted to the brewing method, such as smooth for espresso, medium for crude coffee, or coarse for French press. Finally, coffee grounds are packaged in airtight packaging, often with a one-way valve to maintain freshness and aroma. This entire series of processes aims to produce high-quality coffee grounds that are ready for consumption.

Preparation of Palm Sugar Coffee Product Packaging, the packaging of palm sugar coffee innovation products is carried out systematically to maintain the quality, durability, and attractiveness of the product in the market. This process consists of several stages as follows: Packaging Selection, the packaging used is selected based on resistance to air and humidity to maintain the aroma and taste of palm sugar coffee. Usually, aluminum foil packaging, standing pouches, or glass bottles are used to provide maximum protection and an attractive appearance. Weighing and Filling, Processed and dried palm sugar coffee is weighed according to the specified dosage (e.g. 100g, 250g, or 500g). After that, the product is put into the packaging using a measuring device that ensures cleanliness and consistency of the amount in each package.

Sealing, After the product is put into the packaging, the sealing process is carried out using a heat sealer machine or vacuum sealer to ensure that the packaging is tightly sealed. This sealing aims to keep the product fresh and protected from air or moisture contamination that can degrade its quality. Labeling and Packaging Design, Packaging is then given a label that includes important information such as product name, composition, production date, expiration date, net weight, as well as MSME logo and identity. The packaging design is made attractive with colors, fonts, and images that reflect natural and typical products from Citengah Village. Quality and Storage Checking, each packaging is inspected to ensure there are no leaks or defects before distribution. Products that have passed the check are stored in a clean, dry, and free place from direct sunlight exposure so that the quality is maintained before it reaches the consumer's hands.

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Figure 4. Packaging Sugar Coffee Bottles with Brewed Coffee
Source: Author processing results (2025)

The innovation of processing palm sugar into ant sugar coffee produces an instant drink product that has unique and attractive characteristics in terms of taste, aroma, and physical shape. Based on observations and interviews with business actors and taste test respondents, this product is considered to have advantages that distinguish it from other instant coffee drink products.

Visually, ant sugar coffee products are smooth crystal-shaped shaped with a dark brown color that reflects the blend of palm sugar and local native coffee. This color gives a natural and attractive impression to consumers who want products based on natural ingredients. The aroma produced is a harmonious combination of the sweetness of palm sugar and the distinctive aroma of coffee, which is able to arouse curiosity and interest in potential buyers. In terms of taste, most respondents stated that ant sugar coffee has a softer and sweeter taste naturally compared to regular instant coffee that uses granulated sugar or artificial sweeteners. The distinctive sweetness of palm sugar gives a different sensation and gives its own added value to this product.

Organoleptic feasibility tests show that the level of consumer satisfaction is quite high, with 85% of respondents giving positive feedback to the taste and aroma of the product. This shows that this innovation has succeeded in answering the market's need for practical coffee drink products while still prioritizing taste and natural ingredients. In addition, the simple but effective production process allows this product to be produced on a household scale with raw materials that are easily available in the Citengah Village area, so that it has the potential to support the economic empowerment of the village community. This product also shows good durability without the need for additional preservatives, which is an added value in the eyes of consumers who are increasingly aware of the importance of healthy and natural products.

The product also has a shelf life of more than three months even without the addition of preservatives, indicating that the stability and quality of the product are maintained naturally. This is a distinct advantage in the midst of increasing consumer awareness of food safety and health. This innovation of ant sugar coffee not only provides added value to local palm sugar which was previously only sold in conventional form, but also presents a new form of product that is more practical and has high competitiveness in the market. The combination of the distinctive taste of palm sugar and the aroma of local coffee produces a unique taste that can attract the attention of modern consumers, especially those who want an instant drink made from natural ingredients.

More than just product innovation, the development of ant sugar coffee opens up new market opportunities, both at the local and national levels, for instant drink products based on traditional ingredients. This potential is also in line with the current trend of consumers who are looking for products with a back-to-nature concept and supporting micro and local businesses. Therefore, this product is very feasible to be developed as an alternative to typical Sumedang souvenirs, enriching the regional culinary identity, while contributing to improving the economy of the village community. Through this innovation, it is hoped that a business ecosystem will be created that empowers palm sugar farmers, MSME actors, and the young generation of the village in creating products with high selling value while still carrying local wisdom.

CONCLUSION

The innovation of processing palm sugar into ant sugar coffee has succeeded in producing crystal-shaped instant drink products with distinctive taste and aroma characteristics of a combination of palm sugar and local coffee. The product has a smooth texture, dark brown color, and a good level of solubility in hot water, thus providing convenience and comfort for consumers in presentation. In addition, this ant sugar coffee product has a fairly long shelf life without the need for additional preservatives, so it is safe and suitable for consumption for a longer period of time. The development of ready-to-drink bottle packaging from ant sugar coffee products provides added value in the form of ease of consumption without the need for a rebrewing process, which is very much in line with the needs of the modern market for instant and practical products. The packaging also contributes to increasing the appeal of the product and expanding the reach of marketing and distribution. Overall, this innovation not only provides significant added value to local palm sugar, but also opens up new market opportunities for natural instant drink products. Ant sugar coffee products in ready-to-drink bottled packaging are expected to be an alternative to typical souvenirs that are able to support the economic empowerment of village communities through the sustainable development of local resource potential.

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