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The Potential of Pineapple Products as a Strategy for Community Economic Revitalization in Peatlands

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Abstract. The market potential of pineapple in Riau Province is entirely developed along with the development of local food products supported by a qualified pineapple production capacity of up to 354,878 tons/year, especially on peatlands. This study aimed to analyze practical steps in the community as an opportunity to improve the welfare of pineapple farmers and protect peatlands in Riau Province. This study uses a survey method through interviews and direct observation of respondents regarding the raw materials and processing methods of pineapple products that have been carried out. As support, secondary data is used through documents and reports related to the pineapple plant in Riau Province, peat land, community and farmer empowerment, and increasing the added value of products as supporting economic aspects. The economic aspect of the pineapple plant is analyzed by comparing the increase in population with the potential of pineapple. Pineapple food products from the existing pineapple diversification have good palatability and consumer acceptance from the sensory and physical aspects of the processed products produced. Pineapple farmers' social and welfare aspects are seen by applying appropriate technology in product processing and providing incentives for the community to fulfil production facilities.

1. Introduction

Pineapple (*Ananas comosus* L. Merr.) has the potential to be developed as an export commodity [1]. This fruit is preferred because it has a distinctive taste, both to be eaten fresh as a dessert or processed. Fresh pineapple is deficient in terms of a shelf life because it is not durable. It only lasts seven days at room conditions (temperature 28-30o C) [2]. The nature of such fruit will create obstacles in the supply of fruit for fresh consumption or storage for further processing stock. This is because horticultural products are living structures that are still undergoing chemical and biochemical changes caused by metabolic activities [3].

Fresh horticultural products have a high water content, making them sensitive to wilting, wrinkling and mechanical damage and susceptible to fungal and bacterial attacks. Each type of fruit has a different composition and is influenced by several factors, namely differences in variety, climatic conditions where it grows, plant maintenance, harvesting methods, maturity level at harvest time, and



conditions during ripening and storage conditions. In particular, pineapple has a high water content of 85.3% but is low in protein and fat levels and has pectin, which is readily hydrolyzed [4].

The potential for diversification of pineapple processed products in peat restoration areas is the object to be observed in this study. Diversification of pineapple products must be accompanied by incubation from a business perspective so that it can become a product that can provide results and impact society. Diversification will also bring benefits to peatlands. Because optimal pineapple plants it will make peatlands can be appropriately utilized. So it is necessary to research the potential of pineapple fruit diversification in peatland restoration.

2. Materials and Methods

The data in this study were obtained from several Peatland and mangrove Restoration Agency (BRGM) assisted villages in Bengkalis Regency in 2021. The types of data consisted of primary data obtained directly in the field from pineapple farmers, secondary data obtained from the final report of business incubation at the related peat restoration site, and the publication of related scientific papers. Data collection is done through observation, interviews and direct recording in the field. The data and information presented are descriptively informative.

This study looks at the potential to diversify pineapple processed products in peat restoration areas. Improvements were also made to pineapple processed products to improve the quality of the processed products produced and business management from the incubation village in Bengkalis through incubation. The incubation focused on product improvement and also improving the business management of Village-Owned Enterprises (BUMDes) in Bengkalis.

3. Results and Discussion

3.1. Pineapple Potential in Peatland Aspect

As one of the provinces with the most peat soils, Riau needs to be careful in its use, especially in the last few decades. The area of peatlands in Riau has declined due to human and natural causes. Errors in utilization are often reported as the leading cause of land degradation. Peat. So far, the use of friendly peat is still minimal, which means that it has not been able to produce significant benefits for its owners. Some studies even reveal that very vulnerable peatlands can be used for food production in the future with the following considerations [5]: (1) low productivity, (2) sizeable potential land, (3) cropping index (IP) is still low, (4) potential degraded land is still vast,

Pineapple cultivation on peatlands with an agroforestry scheme can reduce the potential for land fires and improve community welfare [6]. Pineapple is one of the crops recommended by BRGM and CIFOR to be planted on peatlands. From the interviews, planting pineapples in peat areas has resulted in tangible benefits for farmers. For example, planting pineapples in Pagaryung Village, Kampar Regency, can increase household income. Besides that, the community also admits that forest fires in recent years can be suppressed or even not occur again.

3.2. Pineapple Downstream Products

People in Bengkalis Regency, besides selling pineapple in the form of fresh fruit, also sell pineapple in other products such as pineapple jam, pineapple syrup, pineapple chips, pineapple crackers, pineapple lunkhead and also industrial goods such as pineapple vinegar.



Figure 1. a) Bengkalis Pineapple Downstream Product Exhibition b) Pineapple Product Quality Improvement Training in the Incubation Program.

Pineapple processed products produced by the community in Bengkalis Regency are not only consumed for personal use. The Bengkalis community has started commercializing pineapple processed products individually and through BUMDes. Based on the results of the BRGM report regarding the incubation of the peat restoration village business, it shows that the various types of processed products found by the community are pineapple dodol products, pineapple syrup, pineapple juice drinks, pineapple jam and pineapple chips.



Figure 2. One of the Pineapple Processed Production Houses in Bengkalis Regency

Various processed pineapples in the form of dodol gelamai, kelamai or jenang are snacks that are liked by many people [7]. The durability and shelf life of dodol are pretty long because of its relatively low water and high sugar content, relatively simple manufacture, can be used for several products, is easy to operate and control, and easy to add flavour. Pineapple dodol is made by peeling the pineapple until clean and removing all the eyes. Then the pineapple is cut and weighed as needed for puree with a blender. The crushed pineapple is mixed with thick coconut milk (1 coconut/1 kg pineapple), glutinous rice flour, rice flour and sugar. Cook the dough until it is slightly dry while constantly stirring so it does not stick to the pan. Remove and put in the mould. When it is cold, cut into pieces according to taste and then packed with plastic.

Pineapple syrup is a liquid product made from the main ingredients of pineapple juice, sugar and water, cooked until thickened and has a high dissolved sugar content [8]. Pineapple syrup is made by cleaning and crushing the pineapple for further filtering to produce pineapple juice. Pineapple juice is cooked until it boils, and the foam is removed. Then add sugar, CMC, salt, benzoate, and citric acid, stir well, then add food colouring and pineapple flavour. After it thickens slightly, turns off the stove and wait until it cools down. After it cools down, put it in a sterilized glass bottle.

Pineapple juice drink is a liquid obtained from the extraction of pineapple fruit with the addition of water and sugar [9]. Making pineapple juice is a straightforward process. Pineapple pieces cleaned of skin and dirt are weighed and then crushed with a blender/grater. Then the pineapple pulp is filtered with a filter cloth, and pineapple juice is obtained. Pineapple juice is cooked until it boils, and the foam is removed. Then sugar, salt, benzoate, and citric acid. Stirred well, and then food colouring and pineapple flavour were added.



Figure 3. Pineapple Jam Products from Bengkalis

Pineapple jam is a processed product made from pineapple pulp cooked with sugar. Pineapple jam is yellow with a thick texture [9]. Processing of pineapple jam is done by cooking pineapple pulp that has been mashed. Then mix it with sugar and citric acid to keep the colour yellow and have a distinctive pineapple taste. Usually, the people of Bengkalis make jam in a processed toast.

Pineapple chips are processed from pineapple, which has a crunchy texture and a slightly sour, sweet taste [10]. Pineapple chips are made by slicing a cleaned pineapple into thin strips. Then these thin pineapple pieces are then fried to dry using a vacuum fryer with a predetermined temperature and time. Then the pineapple chips are centrifuged to reduce the oil content in the chips so that the chips become crispy.

3.3. Social Aspects and Welfare of Pineapple Farmers on Peat

The economic aspect of the pineapple plant is analyzed by comparing the increase in population with the potential of pineapple. Pineapple food products from the existing pineapple diversification have good palatability and consumer acceptance from the sensory and physical aspects of the processed products produced.

Table 1. Total Population of Riau Province in 2017 – 2021

No	Year	Total Population (Soul)
1	2017	6,657,911
2	2018	6,814,909
3	2019	6,971,745
4	2020	6,394,087
5	2021	6,493,603

Source: Badan Pusat Statistik Provinsi Riau, (2022)

The increase in population that increases yearly will undoubtedly be associated with increased consumption, be it primary, secondary or tertiary consumption [12]. In the table above, it can be seen that the population growth of Riau Province fluctuates every year. From 2017 to 2019, there was a significant increase, but in 2020 it experienced a drastic decline [11]. This is due to the movement of people from Riau Province to other areas due to various things, one of which is the Covid-19 pandemic.

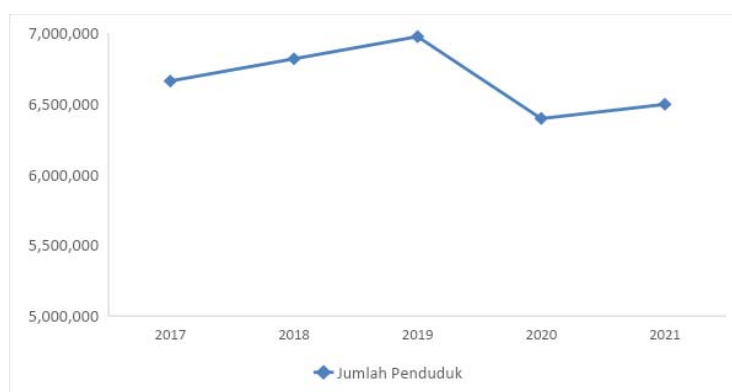


Figure 4: Graph of the Population of Riau Province, 2017 - 2021 [11]

The relationship between population and consumption is very close. Science and technology are developed to create various products for human needs, one of which is food made from raw fruits. Pineapple is mainly consumed worldwide as canned pineapple slices, pineapple juice, fruit salad, sugar syrup, citric acid, pineapple chips, pineapple jam and others. The existence of diversification of processed products from pineapple adds to the diversity and choices of the population in meeting their level of consumption. Pineapple has much potential to be processed to increase its added value [9]. Almost all circles of society can accept the taste with good palatability and acceptance.

The sensory and physical aspects tested in this study were pineapple chips and fresh drinks. The sample of respondents was taken with a quota of 100 people, which are people in Bengkalis Regency who consume processed products from pineapple. The average respondent answered that physically (crisp) the pineapple chips on the market today were not as crisp as crackers from flour. Pineapple chips still have a slightly tough texture. Sensory tests show that in terms of taste, colour, and shelf life, each time it is produced, it varies depending on the type of pineapple used as raw material. Overall, pineapple chip products are currently accepted by all consumers, and there are various improvements in terms of production.

This fresh drink made from pineapple significantly differs from other bottled or canned fresh drinks with a long shelf life. Fresh drink products in bottles, from the physical and sensory aspects, have an attractive yellow colour, fresh taste and pineapple grains that add to the sensation of authentic fruit pieces in the drink. The acceptance of this product is also quite good by consumers, but with a shortage of beverage shelf life.

3.4. Incubation of pineapple product business on peat land as an effort to revitalize the community's economy

Communities around peatlands should be given a strategic role in protecting and managing peat ecosystems, including by paying attention to their economy [13]. Economic revitalization through optimizing alternative commodities in the peat ecosystem is needed to improve the community's economic welfare. This economic revitalization is carried out by selecting commodities that have economic value, are friendly to wet peat, and can be accepted by the community [14], one of which is cultivating pineapples.

Pineapple is a plant that is often an alternative for cultivation on peatlands. Its nature that can grow well on peatlands and high economic value makes this plant very promising for revitalizing the community's economy. Efforts to revitalize the pineapple cultivation economy in this research location have been carried out by forming the Beringin Community Group (Pokmas). This Pokmas has established a fresh fruit marketing partnership with the Kuala Alam Village-Owned Enterprise (Bumdes). The Beringin Pokmas was formed in 2020 and will start planting pineapples in 5 Ha in 2021.

Pokmas and Bumdes' business development efforts still need to be carried out, especially those related to improving product quality, business legality, market development, and increasing business networks. A business incubator is needed to assist and facilitate the community in overcoming the problems faced in the operationalization of the business being carried out, especially the problem of human resource capacity in business operations, access to funding, networking aspects of the business support system being run and aspects of access to innovation and technology.

Business Incubation aims to create and develop new businesses that have economic value and are highly competitive by optimizing the utilization of academic human resources in driving the economy by utilizing science and technology. Arini et al. (2018) explain the scope of business incubation in agribusiness development aimed at increasing human resource and technological capabilities, improving bargaining positions, and ensuring price stability and supply of raw materials. Some of the business incubation strategies that need to be carried out at the research site are structuring and strengthening organizations and institutions [15].

3.5. Organizational and Institutional Structuring and Strengthening

The Beringin Pokmas was formed in 2020 to increase community income which is integrated with improving peatland management through the construction of canal blocking for re-wetting peatlands. Pokmas activity is the development of pineapple cultivation after seeing the success of pineapple cultivation by BUMDes Kuala Alam since 2019. Pokmas Beringin is currently part of the development of BUMDes Kuala Alam, which was established on November 17, 2015. BUMDes Kuala Alam was

formed to improve the economic level of the people of Kuala Alam Village, poverty alleviation, and become a source of Village Income. In addition, the BUMDes of Kuala Alam was established to provide wider business and work opportunities for the people of Kuala Alam Village.

The business model developed is a partnership; each Pokmas is an independent business unit, while BUMDes facilitates business licensing, product labelling, and markets products produced by Pokmas and MSMEs through Business Units. Operationally, pineapple cultivation activities carried out by Pokmas Beringin are well coordinated with BUMDes Kuala Alam. Taking this condition into account, the Business Incubation activity at the Beringin Pokmas, Kuala Alam Village, will make BUMDes a business unit to be incubated, with the commitment that BUMDes will carry out sustainable business development of the Beringin Pokmas.

3.6. Business Management Improvement

Based on data obtained in the field, business management at BUMDes Kuala Alam is still faced with challenges such as business units still operating independently with business planning and business operations, operational standards and procedures (SOP) for operationalization between units and within units are not yet available and have not played a role. Properly marketing management of products produced by Pokmas and business units, as well as MSMEs or other Pokmas, needs to be improved.

With the above conditions, it is necessary to develop a strategy for improving business management through [16] (i) business and business planning with a Business Canvas (MBC) approach to each unit, Pokmas and MSME Partners, which are then summarized in MBC BUM Desa Kuala Alam, (ii) structuring capital management and business unit management in the Kuala Alam Village BUM, (iii) Kuala Alam BUMDes organizational and institutional arrangement with the development of a community-based Peat Product Business Model, (iv) strengthening the core business of BUMDes in pineapple-based businesses (cultivation). pineapple – pineapple fruit sales – pineapple processing product development – pineapple waste product development) supported by trading units, and (v) consolidated BUMDes financial management arrangement between units by providing BUMDes financial applications.

4. Conclusion

Fresh horticultural products have a high water content, making them sensitive to wilting, wrinkling and mechanical damage and susceptible to fungal and bacterial attacks. This causes the durability and shelf life to be low. Besides selling pineapple in fresh fruit, people in Bengkalis Regency also sell pineapple in other forms such as pineapple jam, pineapple syrup, pineapple chips, pineapple crackers, pineapple lunkhead and also industrial goods such as pineapple vinegar. The comparison between the increase in population and the potential of pineapple is now quite adequate. Pineapple food products from the existing pineapple diversification have good palatability and consumer acceptance from the sensory and physical aspects of the processed products produced. Pineapple farmers' social and welfare aspects, as seen by applying appropriate technology in product processing and providing incentives for the community to fulfil production facilities in Bengkalis Regency, are adequate.

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