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AN ANALYIS ON THE ADDED-VALUE AND BUSINESS DEVELOPMENT OF ANALOG RICE MADE FROM SAGO (A CASE STUDY OF TIGA PUTRISELAT PANJANG MSME IN KEPULAUAN MERANTI REGENCY)

Abstract: *Analog rice is a processed food product resembling rice made from non-rice carbohydrate sources, like starch of tubers, corn, and sago. Analog rice contains a lower glycemic index making it more superior than rice. This product, analog rice, can help diversify the food consumption patterns of the Indonesian citizen to improve the nutritional quality of the food consumed. It will further improve the nutritional status of the population. In addition, It will help to reduce people's dependence on rice. This dependence leads to a national problem since rice is still imported. Therefore, to deal with the problem, we require an alternative food (analog rice) resembling rice with high nutrient content. Analog rice has easy-to-obtain raw materials (sago and taro) in which they are available throughout the years. Therefore, it possesses considerable potential to be developed. Finally, a technological innovation research is needed to determine the added value of each of these raw materials to produce analog rice and how to develop the business partners of this research (MSMEs "TigaPutera"). This study aims at: 1) determining the analysis of added value and business development of analog rice made from sago of to research partners (MSMEs "TigaPuetra") and 2) examining the product's characteristics produced physically or organoleptically. This study is expected to be applied by research partners to increase their business capacity and become a superior product area. Based on the results of this research, it can be concluded that analog rice processing can provide added value in the form of profits for entrepreneurs, remuneration for production factors, and income for workers.*

Key words: *Analog Rice, Added Value, Business Development.*

Language: *English*

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Introduction

Research Background

Currently, analog rice made from sago is rich in carbohydrates and poor in other nutrients required by the human body. Therefore, this product needs to be fortified with food functional components. Food functional components are food ingredients containing bioactive components providing multifunctional physiological effects for the body. The effects include strengthening the immune system, regulating the rhythm of physical conditions, slowing aging, and helping prevent disease. These bioactive components are compounds possessing certain physiological functions other than basic nutrients.

Fish oil supplements are one of the food functional components needed for the body to function properly. Therefore, supplements cannot be used to substitute drugs and foods completely. It means health food supplements are intended to complement or increase food intake. The results of previous research 1(Sukmiwati et al, 2020) found a nutrient-rich fish supplement is made from catfish oil (omega-9), shark (omega-3) and red palm oil (vitamin A) which are rich-in-nutrient food functional components. Therefore, this follow-up study is designed to create an economic multiplier effect through the development of producing analog rice made from sago to be used as a superior product.

In an effort to develop a reliable agro-industrial system, Riau was selected as a center for freshwater fish production, especially catfish. In addition, Riau is known as a palm oil (CPO) producer. Hence, it is expected that these commodities can be developed to be fortified in nutrient-poor food products, one of which is analog rice made from sago. Considering this potential has been optimally unutilized, this study is designed to create an economic multiplier effect through the development of high-nutrition products as superior products in Riau. The content of essential fatty acids containing fatty acids of omega-3, omega-6 and omega-9 is a food functional component which is potential from fish. The results of previous research carried out by 2Syahrul (2013) concerning the extraction of catfish oil showed that catfish oil was rich in omega-9 fatty acids (23%).

Recently, analog rice has begun being in demand by the public, especially diabetics. It is because the analog rice is believed to be able to maintain optimal and effective health. However, this potential has been unoptimized, especially from the economic aspect. One of the efforts that can be done is to utilize abundant local raw materials into processed products, such as analog rice made from sago, taro and their mixtures. The processing results can have added value, but it is not known exactly how much the added value will be.

At this time, analog rice made from non-rice starch is very much needed by the community to maintain optimal health. However, the product is only affordable for certain groups of people since the price is relatively expensive. This situation has prompted researchers to conduct a study being able to overcome this problem. Analog rice has easy-to-obtain raw materials (sago and taro) in which they are available throughout the years. Therefore, it possesses considerable potential to be developed. Finally, a technological innovation research is needed to determine the added value of each of these raw materials to produce analog rice and how to develop the business partners of this research (MSME "TigaPutera").

This study is carried out to follow up on the findings of prevoiuse research. This study aims at: 1) determining the analysis of added value and business development of analog rice made from sago of to research partners (MSME "TigaPuetra") and 2) examining the product's characteristics produced physically or organoleptically. This study is expected to be applied by research partners to increase their business capacity and become a superior product area.

In Indonesia, analog rice is a product that is already familiar by certain groups of people, intended to maintain optimal health. Various kinds of analog rice products on the market are analog rice made from corn, sweet potatoes and sago. Generally, analog rice is rich in carbohydrates and poor in other nutrients needed by the human body. Hence, it is necessary to develop analog rice made from sago which is fortified with food functional components to provide alternative food for the community.

Therefore, the most often thought arising is the need to develop technology for producing analog rice made from sago and fish oil which has an impact on economic added value. At this time, not many food industries have developed analog rice products made from sago. This is due to the limited knowledge, expertise and capital required to produce them.

Literature Review

Added Value

According to 3)Hutagalung (2009), to increase the use of forest product commodities, commodity processing is carried out through a series of production. Value added analysis is the concept often used in the discussion of the processing value. According to 4)MC, Patunru AA. 2012, added value

is the value given from a production process to a product. In the processing of forest products, the added value can be for every cubic meter of logs, every labor worked, or every kilogram of rattan used.

Furthermore, in the production process, the factors affecting the amount of added value consist of many things. The factors can be divided into two categories: technical factors and market factors.

Technical factors consist of product capacity, number of raw materials, and amount of manpower. Meanwhile, market factors consist of output prices, labor wages, raw material prices, and the value of other inputs besides raw material and labor inputs. Mathematically, the calculation of added value according to the method used by 5)Tambunan T. 1997) can be seen in the following formula:

Added Value = f (K, B, T, U, H, h, L)

Information:
K = production capacity (kg)
B = Raw materials used (kg)
T = Labor used
U = Wages of labor (Rp)
H = Price of output (Rp/kg)
h = Price of raw materials
L = Other input values

Food Diversification and Fortification

In the current, modern era, the market is full stocked with various food products. To be different, producers are required to be creative to be able to produce an innovation to offer to consumers. Innovative products accepted by the market (consumers) can provide added value for producers, and they can even dominate the market in certain segments. Hence, the diversification and fortification of a product are critically important to increase business production.

Food diversification and fortification are basic of food security foundation. According to nutritionists, diverse foods will be able to accommodate human nutritional needs. Moreover, food diversification also has other dimensions for food security. For producers, diversification of food consumption and nutrition will incentivize more diverse production, including food products with high economic value and food products based on local resources. Meanwhile, if viewed from the consumer side, the food consumed becomes more diverse, nutritious, quality and safe. In addition, from the point of view of food self-sufficiency, food diversification can also reduce food dependence on one type of food.

Food diversification is defined as an effort to diversify people's food consumption patterns to improve the nutritional quality of the food consumed which will further improve the nutritional status of the population. Food diversification is critically important to prevent dependence on one type of food, like rice. Utilization of various types of natural resources helps to improve the welfare of the community.

The existence of food diversification encourages the emergence of ideas to replace rice as staple food with other food ingredients that can also function as a source of carbohydrates. Some food products that may replace rice are cassava, sweet potato, taro, and other tubers. These food ingredients are still fully-unutilized for public consumption. The obstacle encountered is that it is non-durable food. As follows, it must be processed further with the aim of extending its shelf life. In addition, there is a public perception that consuming non-rice food is considered less prestigious and even sad than consuming rice.

Changing the habit of consuming rice with alternative foods is uneasy. Moreover, only rice is replaced, while the side dishes are still the same, what are usually accompanying rice. Based on that case, the community will of course be rejected the changing. It is because the community is accustomed to eat the side dishes with rice. They believe that the side dishes with rice tastes better. However, the processed non-rice food replacing the rice added with traditional-tastes side dishes or those with familiar taste to the tongue will certainly be easier to be accepted by community.

Assessment of people's consumption habits or consumer acceptance of new food products can be done by interview or by distributing a questionnaire. The collection of survey results on people's consumption habits through questionnaires is more effective than one-on-one interviews because it can reach many respondents in a relatively short time.

Fishery products are Indonesia's natural wealth which has good potential to be exploited. This potential should be balanced with the technology for its processing. Needless to say, it can increase the economic value and production of these commodities.

One way that can be developed to utilize the potential of fishery products is by diversifying processing, as an effort to diversify food and promote fishery products in which so far the products are still being processed directly.

Catfish is one of the well-known freshwater fish in Indonesia, and it possesses economic value. The taste of catfish's meat is delicious and savory, so it is favored by the community. The catfish's meat is thick and has not many spines, and the yield of fish can reach around 40 - 50% by weight.

In addition, catfish can also live and breed in non-flowing waters with low oxygen content, and it has rapid growth. However, the use of catfish as food is still limited. Based on this aforementioned information, it is necessary to diversify the processing of catfish commodity to increase the economic value of this fish. As was anticipated, the selling price of processed meat of fish will be higher than the raw meat.

This product diversification utilizing catfish as raw material will also increase consumer tastes, and it will help to improve the community welfare. Diversification of catfish processing includes fillet, surimi, kamaboko, nugget, meatballs, and fish protein concentrate.

Analog Rice

Analog rice is a type of rice made from raw materials like cassava, sago flour, corn, tubers, and several other carbohydrate sources. This analog rice is one of the programs from the Ministry of Agriculture to reduce the dependence of public consumption on rice and wheat flour.

Analog rice is a food product resembling rice made from non-rice carbohydrate sources in which the sources have carbohydrate content approaching or exceeding the rice. Analog rice is produced from cassava, sweet potato or sago in which those have a lower Glycemic Index than rice.

Analog rice can be made using an extruder. This tool is able to produce the products massively. Therefore, production capacity will be higher if using an extruder. This product, analog rice, can help diversify the food consumption patterns of the Indonesian citizen to improve the nutritional quality of the food consumed. It will further improve the nutritional status of the population.

Analog rice is one form of alternative food that can be developed to overcome food limitations and meet the availability of alternative food. It can be achieved by both using new food sources and diversifying existing food sources (diversification).

When they are compared, the source of carbohydrates and nutrients contained in rice and analog rice are almost the same. Carbohydrates are one of the macro components in food products containing elements of C, H, and O. Carbohydrates have various functions in the living body, such as fuel (e.g., glucose), food reserves (e.g., starch in plants and glycogen in animals), and building materials (e.g., cellulose in plants, chitin in animals and fungi).

Catfish oil

Fats and oils belong to the lipid group which is organic compounds occurring in nature, and it is insoluble compounds if it is sunk in water. However, it is soluble if it is sunk in non-polar organic solvents, like diethyl ether (C2H5OC2H5), chloroform (CHCl3), benzene and other hydrocarbons. Fats and oils are soluble in the aforementioned solvents because they have the same polarity as the solvents.

Fish lipids are biomolecular compounds found under the fish skin, around delicate and vital organs, and they fill the empty cavities in the tissue. What are included in the lipid group are fats, oils, phosphatides, sterols and steroids. The dietary fats derived from animal products being able to lower plasma cholesterol levels are the unsaturated fatty acid group consisting of omega-3 and omega-6 fatty acids. The unsaturated fatty is essential fatty acids that have double bonds at the third and sixth carbon atom from the end of carbon chain terminal. Linoleic acid is a member of the omega-3 fatty acids required by the body to produce docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). DHA in the body is critically important for the development of the brain and retina.

Fish oil is divided into two groups: first, fish liver oil which is mainly used as a source of vitamins A and D, and second is fish body oil. Fish oil contains many fatty acids with very long chain more than 20 carbon atoms, most of which have 5-6 double bonds. The fatty acid composition of fish differs depending on the type of fish, the diet and the season.

Initially, fish oil received special attention because of its high levels of vitamins A and D. Further developments, fish oil is known to contain omega-3 fatty acids that have a role for health. In Scotland, fish oil is used to aid to the bone growth and central nervous development. In England, France, Germany, and the Netherlands, cod liver oil is used to treat lung disease, rheumatism and other bone diseases. These various diseases can be cured because fish oil contains omega-3 fatty acids.

Reasearch Method

Research Site And Time

This study was conducted at Micro, Small and Medium Enterprises (MSMEs) "TigaPuteraSelat Panjang" in August, 2020. The research subjects were the processing of analog rice.

Material

The main raw materials used in this study were sago, taro and fish oil supplements. In addition, questionnaire materials and packaging materials were also used.

Methodology

This study was conducted using survey and experimental methods, surveying business conditions and conducting experiments in making analog rice fortified with fish oil supplements.

Data Types and Sources

In this study, data types and sources are primary and secondary data originating from observations on, interviews with, or questionnaires distributed to business actors. Secondary data were obtained through documents, articles, and analogue rice industry literature.

Production of modified analog rice (Syahrul et al. 2018).

For processing of analog rice made from sago substituted with starch of taro, it is carried out with the formula as shown in Table 1.

Table 1. Formulation for producing analog rice made from sago substituted with starch of taro

Raw material (%)	F_1	F_2	F_3
Starch of sago	100	50	0
Starch of taro	0	50	100
Water (ml)	130	130	130

% of the weight of the dough

Processing of analog rice is carried out at MSMEs "TigaPutera" located in Selatpanjang, Meranti Islands. Starting with producing 4 (four) types of analog rice dough formulas in which each dough is fortified with fish oil as described in the research procedure. Next, the dough is wrapped in gauze and steamed for 30 minutes. Under hot conditions after steaming, the dough is put into an extruder. It is performed because it will be challenging to shape it like rice when the dough has cooled down. This process is carried out until the last treatment combination. The finished analog rice is then air-dried to prevent mold growth by reducing the moisture content.

Figure 1. Steaming analog rice dough

Source: Personal documentation

Added Value Analysis

The added value analysis is determined by the method according to 5Kamisi (2011) with the procedure shown in Table 2. These are: (a) value added (Rp), (b) value added ratio (%), showing the percentage of added value from the value of the product, (c) labor remuneration (Rp), indicating the amount of money wages received by direct labor, (d) the share of labor (%), indicating the percentage of employee benefits from added value, (e) profit (Rp), showing the share received by the entrepreneur and (f) the profit rate (%), indicating the percentage of profit to added value.

Analysis of Revenue and R/C

To calculate business efficiency, analysis of R/C (Rodjak, 2006) is used which is the ratio between revenue (Revenue, R) and total cost (Cost, C). Based on the considerations, if R/C > 1, the business is profitable; while if R/C = 1, the business is even; and if R/C < 1, the business is unprofitable.

Table 2. Results of Added Value Analysis on Analog Rice Production

No	Variable	Notation	Analog Rice			
			Sago	Taro	Mixture (Sago+Taro)	Information
1	Production Result (kg/day)	a = bxm				
2	Raw Material (kg/day)	B				
3	**Labor** (HK/day)	C				
4	Conversion Factor (yield)	a/b=m				
5	Coefficient of Labor	c/b=n				

6	Average Product Price (Rp/kg)	D				
7	Average Wage (Rp/work day)	E				
	Income and Profit					
8	Price of Raw Material (Rp/kg)	F				
9	Other input contributions (Rp/kg)	G				
10	Product Value (Rp/kg)	a x d = k				
11	a. Added Value (Rp/kg)	k-f-g=l				
	b. Added Value Ratio (%)	(l/k)%=h%				
12	a. Labor Rewards (Rp/kg)	p=n xe				
	b. Labor Department (%)	(p/l)%=q%				
13	a. Businessman's Profit	r=l-(p*a)				
	b. Profit Rate (%)	(r/l)%=o%				

Source: Processed results of primary data, 2020

According to Pertiwi (2013), the factors that must be known in Hayami's analysis are: value of product output in units of quantity per unit of time, value of input of raw materials in units of quantity per unit of time, amount of labor input in the production process price of output products per unit quantity, average wage of labor, and price of input of raw materials per unit quantity

Data analysis

The data obtained will be processed, tabulated and graphed. Then the processed data will be analyzed descriptively and simple statistics.

Result And Discussion

Organoleptic Test of Analog Rice

The results of the organoleptic hedonic quality assessment of analogue rice with 6 treatment levels can be seen in Table 3 below.

Table 3. The average value of hedonic quality of organoleptic test of analog rice

Repetition	Treatment Level		
	M_5T	M_3TS	M_5TS
1	5.84	**7.52**	**7.32**
2	6.28	**7.24**	**7.32**
3	6.24	**7.24**	**7.44**
Average	6.12	7.33	7.36

In Table 3 above, it can be seen that organoleptically all treatment levels were acceptable to the panelists, but the highest value was found in the combination treatment level of starch of sago and taro. Characteristics of analog rice produced with 3 treatment levels can be seen in Figure 2.

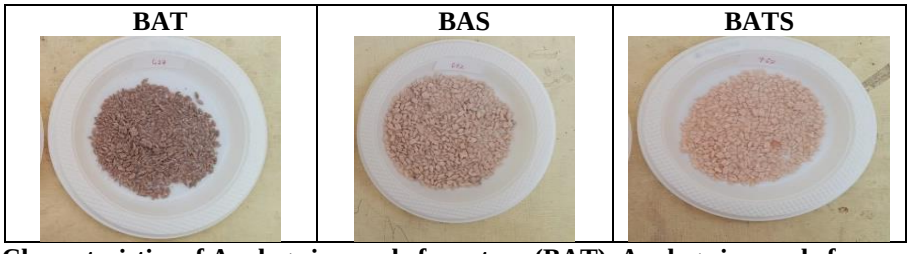

Figure 2. Characteristics of Analog rice made from taro (BAT), Analog rice made from sago (BAS) Analog rice made from taro and sago (BATS)

Added Value Analysis

Based on the added value analysis (Table 4) it is comprehended that the largest added value is obtained from processing of analog rice made from mixture between sago and taro Rp. 11,000,-/kg, and the lowest is from analog rice made from sago Rp. 3,000,-/kg of raw materials. In the business of processing of analog rice made from sago, the profit obtained is Rp. 30,000,-/kg of raw materials, while the profit from the analog rice made from taro is Rp. 130,000,- and

analog rice made from mixture between taro and sago Rp. 350,000,-

Table 4. Results of Added Value Analysis of Analog Rice Production.

No	Variable	Notation	Analog Rice			
			Sago	Taro	Mixture (Sago+Taro)	Information
1	Production Result (kg/day)	a = bxm	36	36	36	
2	Raw Material (kg/day)	b	40	40	40	
3	**Labor** (HK/day)	c	2	2	2	
4	Conversion Factor (yield)	a/b=m	0.9	0.9	0.9	
5	Coefficient of Labor	c/b=n	0.05	0.05	0.05	
6	Average Product Price (Rp/kg)	d	15.000	20.000	25.000	
7	Average Wage (Rp/work day)	e	50.000	50.000	50.000	
	Income and Profit					
8	Price of Raw Material (Rp/kg)	f	320.000	400.000	360.000	
9	Other input contributions (Rp/kg)	g	100.000	100.000	100.000	
10	Product Value (Rp/kg)	a x d = k	540.000	720.000	900.000	
11	a. Added Value (Rp/kg)	k-f-g=l	120.000	220.000	440.000	
	b. Added Value Ratio (%)	(l/k)%=h%	0.8	0.85	0.88	
12	a. Labor Rewards (Rp/kg)	p=n xe	2500	2500	2500	
	b. Labor Department (%)	(p/l)%=q%	0.006	0.004	0.003	
13	a. Businessman's Profit	r=l-(p*a)	30.000	130.000	350.000	
	b. Profit Rate (%)	(r/l)%=o%	0.79	0.85	0.87	

Source: Processed results of primary data, 2020

Business Development of Processing of Analog Rice

Some of the business development strategies that should be implemented by MSMEs "TigaPuteraSelatpanjang" are: (1) Product development strategy, through: a) Improving product quality in terms of shape, taste and packaging, including by standardizing standard operating procedures for the company to maintain uniformity of production results, improving packaging design with aluminum foil and completing information on labels with production and expiration dates, and b) Adding product variants aimed at reaching untouched market segments, and (2). Market Penetration Strategy, through: a) Increasing sales promotions aimed at persuading new customers while retaining old customers, b) expanding the marketing area, and c) placing commercial advertisements to persuade consumers to the appearance of the product.

Conclusion And Suggestion

Conclusion

Based on the results of the study conducted, it can be concluded:

1 Processing of analog rice can provide added value in the form of profits for businessman. Remuneration for factors of production, and income for labor. The biggest added value is obtained from processing of analog rice made from mixture of sago and taro, which is Rp. 11,000,-/Kg, and the lowest is from analog rice made from sago, which is Rp. 3,000,-/kg of raw materials

2 Internal factors becoming the main strength of processing business of analog rice are quality products and easy processing. Meanwhile, the main weakness is that people don't know much about analog rice products, especially their benefits. standard one. External factors that become.

Suggestion

Based on the results of the study, the recommendations suggested in the effort to develop business of analog rice at MSMEs "Tiga Putra Selatpanjang" can be added to analog rice variants using sago and taro as their raw materials.

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