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Business Feasibility Analysis and Business Model Canvas of Banana as Raw Material for Food Industry

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ABSTRACT:

The research objective was to analyze the business feasibility of "Raja Awak" and "Candi" banana flour. The variables studied include cost & benefit aspects and business model aspects. Financial data was analyzed using the B/C ratio, NPV, IRR, BEP, and Payback Period, while the business model was analyzed using the Business Canvas Model. The results showed that the BEP of banana flour products of raja awak banana and candi banana was achieved when 240 and 137 packages @ 250gr could be produced respectively with a total revenue of Rp 4,570,512 and Rp 4,680,000. Both banana types are feasible to develop with B/C values of 1.34 and 1.20, respectively. The IRR of raja awak banana flour is 12.82%, while that of candi banana flour is 7.56%. The main consumers of banana flour products follow special diet programs. Business partners include manufacturers of baby food, cookies, and snacks. The advantages of banana flour are that it contains potassium flavonoids and glycosides that are beneficial for diabetics and are easy to store and transport. Distribution channels can use e-commerce media, online platforms such as Tokopedia, and Shopee, official websites, and retail distribution. Relationships with customers must be built through phone, email, social media, education, and information through blogs, social media, and newsletters. Banana farmers, distributors and retailers, government and food manufacturers such as snack bars, cookies, and baby food are important partners that can expand the market and increase the product's value.

Keywords: Business Feasibility, Business Model Canvas, Banana, Industrial Raw Materials, Food.

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1. Introduction

Indonesia is one of the world's leading banana producers and is highly competitive. Indonesia has produced as much as 6.20% of world production, whereas 50% of Asian banana production comes from Indonesia [Soesilowati, 2016; Satuhu, 2008]. Banana is the second most exported fruit, total production reaching 7, 26 tons. Of course, national banana production is supported by banana production in the regions. Based on data obtained from BPS in 2020, East Java occupies the first position as the largest banana producer in Indonesia.

Banana Temple is an energy source that is rich in carbohydrates amounting to 22-32% of the weight of the fruit flesh. In addition, banana flesh is rich in vitamins A, B6, and C as well as minerals, especially potassium, magnesium, phosphorus, and folate [Adebayo-Oyetoro et al., 2016] [13]. Nutritional components contained in bananas include potassium 373 mg, and vitamin A amounting to 250-335 g in every 100 gr. Banana Candi has a higher starch content in the form of amylose compared to other conventional sources such as potatoes, corn, and tubers [Soesilowati, 2018] [14].

Banana is a prospective intermediate product as a local and functional food that is rich in carbohydrates (17.2-38%) (https://validnews.id/ekonomi/bps-januarinovember-impor-gandum-indonesia-843-juta-ton) [3]. Functional food can strengthen the body's defense mechanism, and reduce the risk of a disease [Legi et al., 2021] [4]. Bananas, apart from containing carbohydrate vitamins and minerals, are also a source of prebiotics needed to maintain the health of the body, especially for people with hypercholesterolemia and Alzheimer's Disease.

Banana fruit is one of the main commodities owned by Sidodadi Village, Gedangan District, Malang Regency (Fauzan et al., 2021). The bananas produced are of various types ranging from kapok bananas, plantains, candid bananas, and crew plantains. However, at harvest time there is an oversupply, especially of candy bananas & raja awak bananas, which during the main harvest reached 9,880,196 quintals weighing 55 to 70 kg per bunch with a selling price of only IDR 4,000 per comb.

A business feasibility analysis and business model canvas of bananas as a raw material for the food industry is required to increase the shelf life and usability of banana fruits through drying and milling technology. With drying techniques, banana flour can last up to 6 months (Kurniawan, 2009), extending shelf life, providing ease of storage and transportation of materials, and increasing the selling price of the banana itself, and farmers' income.

While the factors that are important when making a good business strategy are the company must be able to know a good market share and targeted market segmentation. The right method to create a good business development strategy is to use the Business Model Canvas (BMC). According to Anter et al. (2022), Business Model Canvas is a business model that describes the rationale for how a company creates, delivers, and captures value. In BMC there are 9 blocks consisting of Customer Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships, and Cost Structure.

Production activities are combining various inputs to produce outputs (Nicholson, 2005). Meanwhile, to see the feasibility of a business, a cost and benefit analysis is needed, which is the basis for farmers to work efficiently. This analysis is needed not only for short-term profit maximization but also for long-term wealth maximization.

The objectives of analyzing business feasibility are: (a) Avoiding the risk of loss. The function of a feasibility study is to minimize unwanted risks, both risks that can be controlled and those that cannot be controlled; (b) Facilitate planning; (c) Facilitate the implementation of work. Guidelines that have been systematically arranged, causing the business being carried out to be right on target and by a predetermined plan; (d) Facilitate the supervision of business implementation by the plans that have been prepared; (e) Facilitate control if in the supervision process deviations occur. The purpose of control is to control the company's objectives to be achieved Kasmir and Jakfar (2012).

2. Methods

The research used a mixed-method approach. The quantitative approach is to see the feasibility of the business, while the qualitative approach is to get to know in more detail the form of the

business to be undertaken. This research was conducted in Sidodadi village, Gedangan sub-district, Malang Regency with the research subject of the Women Farmers Group (KWT) "Pisang Raja Awak". Data was collected through observation and interviews.
To measure the profit that will be obtained on the assets invested is reflected in Return on Investment (ROI) = *Net Profit After*
Total Assets

Meanwhile, calculate when the investment returns are called the "payback period". Product.
Description:
I = Investment cost required (Rp)
Ab = Net benefits obtained per year
If PP < business life then the business is worth running, and vice versa.

Net present value (NPV)

$$NPV = \sum_{t=0/1}^{n} \frac{B_t - C_t}{(1+i)t} \text{ .....(1)}$$

Description:
Bt = Benefit in year t
Ct = Cost in year t
t = Year of business activity (t = 0, 1, 2, 3,,, n)
I = Discount rate (%)
If NPV> 0 then the project/business is feasible, and vice versa

2. *Net benefit cost ratio* (Net B/C)

$$\text{Net B/C} = \frac{\sum_{t=0/1}^{n} \frac{B_t}{(1+i)^t}}{\sum_{t=0/1}^{n} \frac{C_t}{(1+i)^t}} \text{ .....(2)}$$

Description:
Bt = Gross benefit (gross income) in year t
Ct = Gross costs (total business costs) in year t
I = Prevailing interest rate
If Net B / C> 1 then the project/business is feasible, and vice versa

3. *Internal rate of return* (IRR)

$$IRR = i_1 + \frac{NPV_1}{NPV_{1-NPV_2}} x\, i_2 - i_1 \text{ .....(3)}$$

Description:
i1 = Interest rate that has a positive NPV
i2 = Interest rate that has a negative NPV
NPV1 = NPV is positive
NPV2 = NPV is negative
If IRR > discount rate, the project/business is feasible, and vice versa.
To identify the KWT business model, a Business Model Canvas (BMC) analysis was conducted. The elements contained in the Business Model Canvas can be a guideline for companies in running a business. These elements can be described as follows:

1. Customer Segments, this element defines the various groups of people or organizations that the company wants to reach and serve.
2. Value Proposition, describes the products and services that the company has to create value for certain customer segments.
3. Channel, describes how the company communicates with customers and reaches its customer segments to provide the value of the products offered.

4. Customer Relationship, is an element that explains the type of relationship a company builds with certain customer segments.
5. Revenue Streams, describes the revenue generated by the company from each customer segment.
6. Key Resources, describe the company's most important assets and what is needed to make the business model used work well.
7. Key Activities, are the most important things a company must do to make its business model work well.
8. Key Partnerships, describe the partners who work with the company so that the business can run according to the existing business model.
9. Cost Structure, is an element that explains all the costs incurred to operate a business model.

3. Results and Discussion

One of the business feasibility analyses is to calculate the initial investment costs for the purchase of business assets and equipment. Business equipment in the banana flour industry includes graters, pans, tampah, sillers, and scales. This investment is needed to increase the added value of bananas by converting the raw materials into a more durable product in the form of flour. The estimated cost for the initial investment is IDR 1,335,000 as shown in Table 1.

Tabel 1 Early Investment

Equipment	Unit	Price (Rp)	Total Cost (Rp)
Grater	3	20.000	60.000
Pot	2	400.000	800.000
Tampah	5	25.000	125.000
Siller	1	300.000	300.000
Scales	1	50.000	50.000
Total	**1.335.000**		

The total variable costs required to produce flour from the raw materials of candi banana and raja awak banana are different because the price of candy banana itself is more expensive. The processing of bananas into flour based on the home industry, is carried out using a piece system, which requires the following costs in one production:

Tabel 2 Banana Flour Variable Cost

Description	Raja Awak Banana				Candi Banana			
	Vol	Unit	Price (Rp)	Quantity (Rp)	Vol	Unit	Price (Rp)	Quantitatiye (Rp)
Banana	5	Tandan	35.000	175.000	2	Bunch	70.000	140.000
Labor	2	Orang	100.000	200.000	1	Person	100.000	100.000
Flour Mill Machine	12	Kg	10.000	120.000	3	Kilogram	10.000	30.000
Gas	5	Produksi	6.000	30.000	1	Production	6.000	6.000
Mineral Water	5	Buah	1.000	5.000	1	Pieces	1.000	1.000
Sticker	43	Buah	1.000	43.000	12	Pieces	1.000	12.000

Total	**573.000**	**289.000**

The wholesale system is used because the bananas processed into flour have a long expiration date, so that in one production process they can be stored for future sales. The workers in this industry are members of the "Raja Awak" banana farmer group. Therefore, the community can continue to pursue their other livelihoods while producing banana flour at certain times.

Table 2 shows that the cost of a single production run with Raja Awak banana flour is Rp 573,000 with a total production of 43 packs/ 250 grams, while temple banana flour costs Rp 289,000 with a total production of 12 packs/ 250 grams. At about twice the cost, the plantain flour produced almost 4 times more than the production of banana temple flour. The two products also have different prices, where the price of plantain flour is Rp19,000/package, while banana temple flour costs Rp34,000/package.

The break-even point is the position of balance in a business. There are two types of BEP calculations, namely BEP calculated based on production volume and BEP calculated based on production price. For the BEP of plantain flour products, the crew reached the break-even point when producing 240.5 packages with a BEP price or the total revenue that must be received to reach the break-even point of Rp4,570,512. Meanwhile, the BEP of the temple banana flour product is 137.6 packages with a BEP price of Rp 4,680,000.

With a fairly long storage life of about 6 months, raja awak banana flour and candi banana flour can be marketed throughout Indonesia and the capital to produce comes from self-help. The average sales and profit loss statement for 4 months for each type of flour can be illustrated in Table 3.

Tabel 3 Profit/Loss Statement of Banana Flour Raja Awak & Banana Candi

	1st Month	**Month 2**	**Month 3**	**Month 4**
Raja Awak Banana (Rp)				
Sales	1.596.000	1.539.000	1.634.000	1.634.000
HPP	1.119.349	1.079.372	1.146.000	1.146.000
Gross Profit	476.651	459.628	488.000	488.000
Operational	30.000	30.000	30.000	30.000
Net Profit	**446.651**	**429.628**	**458.000**	**458.000**
Candi Banana (Rp)				
Sales	1.326.000	1.496.000	1.496.000	1.598.000
HPP	939.250	1.059.667	1.059.667	1.131.917
Gross Profit	386.750	436.333	436.333	466.083
Operational	30.000	30.000	30.000	30.000
Net Profit	**356.750**	**406.333**	**406.333**	**436.083**

Analysis of business feasibility with NPV is carried out by calculating the present value with expected results based on the specified discount rate. The economic value of banana flour business investment is calculated for the first four months of production with a discount rate of 1% per month. The result of the NPV calculation for plantain flour was Rp. 413,050.70, while the NPV for temple banana flour was Rp. 229,995.43. This condition shows a positive value greater than the initial investment required, so the banana flour business is feasible to develop as illustrated in Table 4.

Tabel 4 NPV Calculation of Pisang Raja Awak & Pisang Candi Flour

Discount Rate 1%
Raja Awak Banana

Month to	Nilai PV	Net Profit (Rp)	PV* Profit (Rp)
0	1	-1.335.000	-1.335.000
1	0,99009901	446.651	442.228,8741
2	0,980296049	429.628	421.162,5399
3	0,970590148	458.000	444.530,2878
4	0,960980344	458.000	440.128,9978
PV			**413.050,6995**
Candi Banana			
0	1	-1.335.000	-1.335.000
1	0,99009901	356.750	353.217,8218
2	0,980296049	406.333	398.326,9614
3	0,970590148	406.333	394.383,1301
4	0,960980344	436.083	419.067,5119
PV			**229.995,4252**

The calculation of the B/C ratio of raja awak banana flour and candi banana flour are 1.34 and 1.20, respectively. This means that both businesses are feasible to develop because the value > 1 where each cost incurred will generate revenue greater than the expenditure.

While the results of the analysis of business feasibility with IRR on banana flour business raja awak worth 12.82% and banana flour temple worth 7.56%, which means it is financially feasible to continue to be produced. The IRR value of raja awak banana flour is greater than that of candi banana flour, indicating that the rate of return on investment in raja awak banana flour is greater than that of candi banana flour. This may be due to the cheaper and more abundant raw materials in Sidodadi Village and the higher yield of flour produced.

The development of candi banana as a functional food and import substitution of industrial raw materials can be built through a canvas business model using the following variables:

1. **Customer Segments**

   Bananas contain many useful secondary metabolite compounds. The fruit is known to contain saponins, glycosides, tannins, alkaloids, and flavonoids that have various health benefits. In addition, bananas are also rich in potassium, which is good for hypertension. Research shows that those with hypertension experience a decrease in blood pressure after consuming bananas for five days, because bananas activity as an Angiotensin Converting Enzyme (ACE)-Inhibitor in the body so that it can inhibit the formation of angiotensin and reduce blood pressure (Sutrya and Insani, 2017). The average blood pressure reduction ranged from 11.70 mmHg for systolic and 3.45 mmHg for diastolic (Dayanand et al., 2015). Another study also showed that giving three bananas every day for a week can reduce systolic blood pressure by 9.54 mmHg and diastolic by 9.091 mmHg (Tangkilisan et al., 2013). With these benefits, the main customer segments for banana flour products include people who are health-conscious and on special dietary programs, such as low-salt diets or anti-hypertensive diets; food and beverage industries that require wheat flour substitutes for baby food products, cookies, and other snacks; retail end consumers who are looking for healthy and nutritious food ingredients for their daily needs; and banana farmers who want to maximize the added value of their banana products.

2. **Value Propositions**

   The unique value offered by banana flour products includes several important aspects, both in terms of health, in terms of practicality, ease to store and transport, ease to obtain raw materials, and even abundance because of local products so that the price is cheap. Banana flour can also be used as a substitute for wheat flour in various processed products

(Nurhayati & Andayani, 2014) such as dried sponge cake (Pratomo, 2013); crackers (Wahyuningtyas, et al., 2014); snack bars (Ekafitri, et al., 2013); even baby porridge (Nurhayati, et al., 2015).

3. Channels

To reach the banana flour customer segment, the distribution channels that can be used include e-commerce through online platforms such as Tokopedia, Shopee, and official websites that allow access and ease of consumers to make purchases; retail distribution through cooperation with supermarkets and grocery stores. The marketing of processed bananas has received a positive response from the community with many small entrepreneurs using online marketing methods through grab food and other (local) delivery services, and market place. The development of this marketing method can boost the income of banana farmers because the selling value of the banana has increased in price (Kurnianto et al., 2023).

4. Customer Relationships

The relationships that need to be built with customers include several important aspects including: responsive customer service via phone, email, and social media, where consumers can ask questions and provide feedback; education and information through blogs, social media, and newsletters can help consumers make better decisions and maximize the benefits of the product; and loyalty programs through offering discounts and special promotions to customers who continue to support the product, loyalty programs can improve long-term relationships and encourage repeat purchases.

5. Revenue Streams

The main sources of revenue come from: First, direct sales through online and retail channels that enable direct consumer outreach and create a steady cash flow; Second, bulk wholesale sales to food manufacturers and distributors. These wholesale sales enable large-scale production and increase overall sales volume; Third, derivative products from the sale of processed products such as snack bars, cookies, and baby food that use banana flour as a base.

6. Key Resources

The key resources required include Firstly, banana raw materials supplied by local farmers, where a stable and quality supply is essential to ensure continuity of production; Secondly, production facilities including drying machines and flourers required to process bananas into flour, which are required to meet hygienic standards and efficient production processes. Knowledge of effective production processes and the latest processing technologies will help improve efficiency, product quality, and competitiveness in the market; Third, a highly competent workforce comprising of production, marketing, and customer service teams. A well-trained and experienced team will ensure that the production process runs smoothly, marketing strategies are effective, and customers get satisfactory service.

7. Key Activities

The key activities that need to be carried out include several: First, the processing of bananas into banana flour. This process must be done well to ensure the quality, quantity, and continuity of the products produced. Second, research and development (R&D) plays a role in new product development. R&D enables continuous innovation, introducing new variants of banana flour products that can attract consumer interest and meet evolving market needs. Third, marketing is a key activity to increase product sales. This includes

promotional strategies and various sales activities designed to reach the target market and drive increased sales. Finally, supply chain management to ensure that banana flour products are available in various locations, both through online channels and physical retail, making them easily accessible to consumers.

8. Key Partnerships

Key partnerships that need to be built include: First, partnerships with banana farmers to ensure the availability of quality bananas, but also support the welfare of local farmers. Second, partnerships with distributors and retailers to effectively distribute the product. By establishing partnerships with distributors and retail stores, banana flour products can reach a wider market and be available in various locations that are easily accessible to consumers. Third, collaboration with the government and research institutions for product development. Finally, partnerships with food manufacturers to develop derivative products into various processed products such as snack bars, cookies, and baby food, which can expand the market and increase the added value of the product. This is in line with the research of Odi Andanu, et al (2021) related to factors affecting the banana supply chain, namely increasing the ability or skill of each actor (0.25), having a contract agreement between actors regarding clear product quality (0.21), structured farmer group institutions (0.13), optimizing local wisdom (0.10) and the role of the government in assisting the development of farmers and industry (0.08).

9. Cost Structure

The main costs that need to be considered are; First, raw material costs in the form of banana purchases. Second, production costs include the cost of factory operations, machinery, and maintenance Efficiency in the production process can help reduce this cost. Third, distribution costs include shipping and product distribution costs. Good distribution management will help reduce logistics costs. Fourth, marketing costs include costs for promotion, advertising, and other marketing activities. Finally, labor costs include salaries and benefits for employees. These costs are important to maintain a competent and solid team in various aspects of operations, including production, marketing, and customer service.

Based on the explanation above, the BMC can be depicted in the following figure:

Business Model Canvas

Key Partners	*Key Activities*	*Value Propositions*	*Customer Relationships*	*Customer Segments*
1. Petani Pisang 2. Distributor dan Retailer 3. Pemerintah dan Lembaga Riset 4. Produsen Makanan	1. Pengolahan Pisang 2. Riset dan Pengembangan 3. Pemasaran dan Penjualan 4. Distribusi	1. Kesehatan 2. Kepraktisan 3. Versatilitas 4. Keberlanjutan	1. Layanan Pelanggan 2. Edukasi dan Informasi 3. Program Loyalitas	1. Pasar Kesehatan 2. Industri Makanan 3. Konsumen Akhir 4. Petani Pisang
	Key Resources		*Channels*	
	1. Bahan Baku 2. Fasilitas Produksi 3. Tenaga Kerja 4. Pengetahuan dan Teknologi		1. E-commerce 2. Distribusi Retail 3. Pameran dan Bazaar 4. Distributor dan Agen	

Cost Structure	*Revenue Streams*
1. Biaya Bahan Baku 2. Biaya Produksi 3. Biaya Distribusi 4. Biaya Pemasaran 5. Biaya Tenaga Kerja	1. Penjualan Langsung 2. Penjualan Grosir 3. Produk Turunan

Processing bananas into flour is the same as utilizing the various health benefits contained in the banana fruit. In the context of developing candi banana as a functional food and import substitution of industrial raw materials, banana flour has great potential to reduce dependence on wheat flour imports. Through the right strategy of canvas business model formulation,

effective marketing, solid partnerships, and continuous product innovation, temple banana flour products have great potential to succeed in the market, support public health, and reduce dependence on imported raw materials.

4. Conclusion

The research concluded that processing plantain and temple bananas into banana flour can extend shelf life and increase selling value. The analysis showed that the BEP of plantain flour was reached at the 240th production for plantain flour and 137th production for banana flour @ 250g with total revenue of Rp4,570,512 and Rp4,680,000, respectively. Both types of banana are feasible to develop with B/C values of 1.34 and 1.20, respectively. The IRR of raja awak banana flour is 12.82%, while that of candi banana flour is 7.56%. The BMC analysis showed that the main consumers of banana flour products follow special diet programs. Business partners include manufacturers of baby food, cookies, and snacks. The advantages of banana flour are that it contains potassium flavonoids and glycosides that are beneficial for diabetics, and easy to store and transport. Distribution channels can use e-commerce media and relationships with customers need to be built through telephone, email, and social media, education, and information through blogs, social media, and newsletters. Banana farmers, distributors and retailers, government and food manufacturers such as snack bars, cookies, and baby food are important partners that can expand the market and increase the product's value.

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