Canvas business and feasibility model of cassava gluten-free noodle processing in Cirendeu Village

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Abstract. The technology of processing noodles without using wheat flour can be developed in order to reduce the import of raw materials in Indonesia. Functional food market segmentation in the form of gluten-free products is a separate business orientation for the development of noodle products without using wheat flour raw materials. The technology of processing noodles with raw materials using cassava flour without using wheat flour began to be developed in Cirendeu Village which is known by the community to consume rice from cassava. The purpose of this research activity to carry out canvas business analysis and the feasibility of the development model of processing gluten-free cassava noodles in Cirendeu Village. The stages of this research activity include (1) designing business model canvass of gluten-free noodles; and (2) analyzing the feasibility of processing technology for gluten-free noodles. Based on the analysis customer segment are tourist followed by parents with children ASD (Autism Spectrum Disorder) cases and health-concern community. The main value proposition is healthy noodle products with social impact. Key partners extend to Cimahi City Culture and Tourism affairs. Line processing models for gluten-free noodles began operating through small groups implementing processing units. Business results show that the optimal marketing method is through the retail channel with the support of the west java province and Cimahi City TTI Centers with the marketing tourism concept of Cirendeu Village. These results illustrate the business feasibility of cassava noodles found in Kampung Cirendeu was feasible because of the B/C ratio 1.24. For further development, it still requires several improvements, especially related to market optimization and development.

1. Introduction

Noodles are an increasingly popular food in Indonesia especially and commonly in the world. Based on the data from WINA (World Instant Noodles Association), the level of consumption of instant noodles in the world in 2017 reached 100 billion or an increase of 2.7%. While the level of consumption of instant noodles in Indonesia reached 12.63 billion packs and was ranked second in the level of demand for instant noodles in the world. Countries that have the highest level of consumption of instant noodles in the world are occupied by China/Hong Kong around 38.97 billion packs or about three times the level of consumption needs in Indonesia [1].

Approximately 40% of the wheat used in Asia is to cover the needs of the noodle factory. This phenomenon is the reason for the use of the gluten component found in wheat flour to improve the...
elastici of the noodle products [2,3]. Another aspect is that gluten triggers celiac disease or inflammation of the digestive tract. This is the reason why children with ASD (Autism Spectrum Disorder) are prohibited from consuming any foods containing gluten. Increase of celiac or inflammatory bowel disease caused by gluten [4], Ghalichi et al [5] mention that GFD (Gluten-Free Diet) may be effective in controlling gastrointestinal symptoms.

Celiac disease in the world is increasing, especially in western countries which are around 0.5-1%. This disease, rarely found in countries with low levels of flour consumption as in Indonesia, Korea, the Philippines, and small islands in the Pacific [6]. However, with the increasing trend of consumption patterns of noodles in Indonesia, it is feared that this celiac disease can develop in Indonesia. Indonesia's wheat consumption has reached around 8 million metric tons by 2018 increase from the previous year 7.9 million metric tons where 66% contributed by SME’s (Small and Medium Enterprise) [7]. The prevalence of autism in the world is increasing. In 2012, the CDC data showed that a total of 1:88 children had autism, and in 2014 it was increased by 30%, which was 1.5% or 1:68 children in the United States had autism. Whereas in Indonesia there is still no definite data. It is estimated, there are 2 new cases per 1000 population per year and 10 cases per 1000 population. While the population of Indonesia is 237.5 million with a population growth rate of 1.14%, it is estimated that people with ASD in Indonesia are 2.4 million people with an increase of 500 people/year [8]. One of the opportunities to overcome this is through research and development of processing instant noodles with Indonesian local flour raw material without using flour or gluten-free.

Research and development of gluten-free noodles using cassava flour as raw material are carried out in Cirendeau Village, Cimahi City. To determine the position of the canvas business model and the feasibility of developing the gluten-free noodle processing model, a BMC analysis and financial feasibility of the gluten-free noodle processing business unit were conducted in Cirendeau Village, Cimahi City. BMC is visualizing ideas, logical thinking or framework consisting of nine key elements partnerships, key activities, key resources, value propositions, customer’s relationships, channels, customer segments, cost structure and revenue stream.

Meanwhile, to see the business feasibility of developing a gluten-free noodle processing unit, a financial feasibility analysis method can be used to measure the feasibility of business feasibility [9]. To calculate the feasibility of a business, it can use market, technical, financial, legal, management, economic and social aspects. In this research, the financial feasibility approach is used. Analysts consider cash flow projects, initial investment, and other factors to calculate a capital project's payback period [10]. The purpose of this research activity is to conduct BMC analysis and financial feasibility of the gluten-free noodle processing business in Cirendeau Village, Cimahi City.

2. Methods
The research was using the customer development method which consists of two main stages, search, and execution. At the search stage, it’s a looping process that begins with customer discovery and ended with customer validation. Meanwhile, the execution stage starts looping with customer creation and ends with the company building process. Another method is the feasibility study with scope for financial feasibility study specially payback period (PBP) and benefits and cost ratio (B/C ratio). The benefit-to-cost ratio (BCR) is a financial ratio that's used to determine whether the amount of money made through a project will be greater than the costs incurred in executing the project. Small businesses and large alike tend to focus on projects with a likelihood of faster, more profitable payback. Analysts consider project cash flows, initial investment, and other factors to calculate a capital project's payback period [10].

Basically, production costs (total costs - TC) that are calculated in the short run are fixed costs and variable costs [11,12]. The ratio of income to production costs (R/C ratio) is used to measure the level of relative profit, meaning that the ratio can be seen whether a business is profitable or not [13]. Fulfillment of financial eligibility criteria (B/C ratio) Calculation of business efficiency uses benefit-cost ratio (B/C ratio) [14], which is calculated from the ratio between profits (B) and production costs (TC).
Techniques for analyzing Business Model Canvas can use several types of methods. To conduct an analysis BMC can use tools that can be used to answer questions during the research process. Six tools that can be used in identifying BMCs as Rengganis et al. [15] include: consumer insights, idea formation, visual thinking, prototyping, storytelling, and scenarios. BMC is visualizing ideas, logical thinking or framework consisting of nine key elements partnerships, key activities, key resources, value propositions, customer's relationships, channels, customer segments, cost structure, and revenue stream.

The second stage of customer development is customer validation, namely business model testing activities that have been made to consumers. The activity requires a marketing communication strategy, which has four basic components, namely product, place and promotion [16]. The third stage is consumer creation, which is the first step in execution and the final stage is company building which changes the startup organization to become a company that focuses on executing a business model validated [17]. The customer development process mechanism evaluation based analysis as followed by Figure 1.

![Customer development process mechanism](image)

**Figure 1.** Customer development process mechanism.

2.1. Customer discovery

The first stage is a hypothesis statement that comes from literature studies and previous researches. The hypothesis was extracted in the form of BMC with the aim of deconstructing the customer's vision into nine elements (products, customers, sales channels, demand creation, revenue models, partners, key resources, key activities, and cost structure). The hypothesis requires testing by listing all the concerns from the customer. These steps will get some customer's point of view about daily consumption, product perception, health condition, product preference, customer's potential and channel acquisition. This process is not to find out whether the customer likes product ideas but to understand the problem and how big customer needs. Next, presenting the value proposition in a product to address all the customer concerns. The functions are not to sell products but to validate our understanding of customer problems and how their response to the value proposition offered. After converting hypothesis into fact then it continues in the last stage, namely, verification which covers market, customer, channel, and revenue stream fitness.

2.2. Customer validation

The step is to prove that a tested and iterated business model in the customer discovery stage can be repeated and growth, which attract the number of customers to build a profitable company. The first two steps of the customer development model are carried out to improve, strengthen and test a start-up company business model. Completing these two steps will verify features of the product, know the market and customer location, test demand of the product, identify the price and sales channel strategies, and examine the proposed cycle and sales process.

2.3. Customer creation

Customer creation varies according to the type of company. Some are entering well-defined markets by competitors or creating new markets, and others are still trying to create hybrid markets by re-
segmenting existing markets with lower price strategy or creating a new niche market. Every market type strategy requires different customer creation and cost activities.

2.4. Company building
Company building is the stage for startup companies to find a business model that able to recur and grow. Fundamentally, it is no longer a search-oriented organization known as a startup. Company building focuses on execution, replacing customer discovery teams who oriented to "learning and finding" into formal and structural departments such as sales, marketing, and business development with the value proposition. These executives are now focusing on building their departments to grow the company.

2.5. Financial analysis
The cassava noodle production business requires a business feasibility analysis from the financial aspects, it is useful to find out whether the business to be run is feasible or not, there are B/C ratio, BEP, PBP and ROI.

3. Result and discussion
To find out the position of the product at the beginning of the business establishment, BMC stage 0 was plotted as shown in figure 2. As the production and marketing process went on, thus BMC stage 1. Evaluated and plotted the business feasibility of cassava noodles includes BEP, PBP, and ROI.

![Figure 2. Business model canvass stage 0 of cassava noodle.](image)

3.1. Customer segments
Mie singkong is one of Indonesia's local flour products using cassava as the main raw material. Cassava flour known as mocaf (modified cassava) have some nutritional content such as gluten-free that is needed for ASD and celiac disease patient. Other nutritional contents from mocaf are high in carbohydrates, low fat, fibrous and low glycemic index, which excellent to consume for people with diabetes mellitus and/or obesity. Healthy diet perpetrators also become one of the customer segments of mocaf-based processed products, Mie singkong.

3.2. Value propositions
The initial value propositions are products with utilizing local food sources, gluten-free, low glycemic index, hygienic and nutritious. The tagline of the value proposition is local healthy food combined with social impact contribution.
3.3. Channel
The channel consists of two types, business to customer (B2C) and business to business (B2B) concept. The B2C concept executed through an online channel such as social media and e-commerce while B2B concept using wholesaler/distributor.

3.4. Customer relationships
Blank and Dorf [10] stated, customer relationships have three important principles, namely Get, Keep and Grow. Get customers, namely the company's efforts to get and/or direct the customer to use the product. Keep customers is an effort by the company to maintain customers who have been acquired to continue to trust and subscribe to the products offered. Grow customer is an effort to increase customers and increase sales.

Based on the results of the BMC 0 mapping, a Get, Keep and growth pattern can be created. The mapping results are plotted and the results obtained are shown in table 1.

| GET | KEEP | GROW |
|-----|------|------|
| The company's activities to get customers is promotion. | One way to keep customers loyal is by maintaining the quality and taste of the product since that is the frequent issue arise from healthy food. Provide discounts on occasional events such as Eid Mubarak days, Christmas days, Imlek, etc. | Product innovation is crucial in this stage. Another significant step is the availability and accessibility of the product.

The company will display the product through cooperation with "Tokok Tani Indonesia (TTI)" (offline & online store arrange by the government), e-commerce platform complete with easy payment gateway.

3.5. Revenue stream
Revenue streams are income received by a company that obtained from the sale of mocaf-based products such as cassava noodles.

3.6. Key resources
There are two elements of resources, namely raw material (cassava) & food additives, the other is machine and technology. Technology becomes a significant factor because of the 100% gluten-free require specific mocaf with certain food additives (licensed property) in which bring their similarity to wheat product character.

3.7. Key activities
Key activities must be carried out by the company to produce accepted products by customers. Key activities offer value propositions, gain the market, maintain customers, and earn income. They are sales & Marketing, production and logistic/distribution.

3.8. Key partnership
Key partnership is a network of partners that makes the business model properly. Mie singkong collaborates with suppliers of raw materials coming from a local farmer. Other key partners are local government departments such as the agriculture department and health department, and scientists as well as marketing.
3.9. Cost structure

Cost structure describes all costs incurred to operate a business in producing a product. The cost structure in this business consists of fixed and variable costs. Fixed cost including manpower, machine & technology, advertising, while variable cost is raw material and packing & delivery.

Based on interviews with industry players, visitors, government and researchers, the five main clusters why consumption of cassava noodles is very low for selected segments in BMC 0 are: Product awareness and knowledge; Availability and accessibility; Belief in nutritional issues (gluten-free, high fiber, low glycemic index); Expensive price for healthy and Unfavorable food taste.

Previous BMC 0 segment converts to BMC 1 with additional customer segment namely tourist culinary. Firstly, the visitors who came wanted to see a new technology because there were cassava noodle products with a total substitution of flour reached 100% which meant gluten-free. The installed line processing turns out to be of particular interest because of the existence of an ecosystem. This ecosystem is formed because the production location of cassava noodles is also a place for supply of cassava and the product being made with a similar character to flour-based noodle products. There are changes in customer sources where the biggest sales income comes tourists rather than previous designed customer in BMC 0. Other potential income also come from visitor who request for similar duplication at the locations of other cassava producer centers scattered throughout the territory of Indonesia.

3.10. Business model canvass stage 1

This new segment buys cassava noodle because of its unique experience because the producer provides openness of the line processing with the special characteristic of mie singkong. This kind of new customer brings producers a new way of customer relationship which adding experiential marketing. Offline store to display and to cover the need for experiential marketing becomes the reason for another channel. Thus value proposition not only healthy food and social impact but also eco-tourism. To support the new value proposition another key partner created who is the tourism department of local government. Based on the results of the customer validation above, a new BMS is formed as shown in figure 3.

![Business Model Canvass Stage 1 of Cassava Noodle](image)

**Figure 3.** Business model canvass stage 1 of cassava noodle.

Data results of solutions test shows: Respondents’ interest in buying cassava noodle products; Sales channels approved by the respondent; Availability of new partners to grow the cassava noodle industry in accordance with their respective authorities and Product communication channels that are of interest to respondents.
Market size is divided into three types, namely Total Addressable Market (TAM), Served Available Market (SAM) and Total Market (TM). The market calculation is determined by assuming that the secondary data is available. Based on the verification of market suitability, the market segment of cassava noodles is people with diabetes mellitus, obesity, dieters and autism spectrum disorder (ASD). Based on the economic projection data of the Indonesian population, it is explained that the projection of the middle class population of Indonesia in 2020 is 33% of the total population of Indonesia or around 85 million people. TAM is taken from the middle class population of Indonesia on the island of Java that is equal to 47,850,000 inhabitants. The average frequency of purchasing cassava noodles in research is 2-3 times a week, with the price of Rp. 20,000 cassava noodle products per pack of contents 160 grams of TAM value is Rp1T 914M per year. SAM value is based on the target consumers to be served, namely people with diabetes mellitus, obesity, autism spectrum disorder (ASD) and dieters.

3.11. Feasibility analysis
The cassava noodle production business requires a business feasibility analysis from the financial aspects of halal, it is useful to find out whether the business to be run is feasible or not, there are B/C ratio, BEP, PBP and ROI. Attached is the data on business feasibility calculations as shown in table 2 below.

| Component         | Value      |
|-------------------|------------|
| Fixed Cost (year) | 63,220,000 |
| Variable Cost (year) | 52,920,000 |
| Income (year)     | 144,000,000 |
| Profit (year)     | 27,860,000  |
| B/C Ratio         | 1.24       |
| BEP (pieces)      | 111        |
| ROI/ROE (year)    | 28%        |
| PBP (month)       | 44         |

Based on the results of the financial feasibility analysis of the cassava noodle business in Cirendeu Village using several assumptions (production per day 160 pieces, selling price IDR 3000.0 and number of working days 25 days per month) resulted B/C ratio of 1.24, BEP 111 pieces, ROI 28% and PBP 44 months. These results illustrate the business feasibility of cassava noodles found in Kampung Cirendeu was feasible because the B/C ratio 1.24. This can be interpreted to mean that from every Rp. 1 cost incurred for the production of cassava-free gluten noodles obtained a profit of Rp. 1.24 [12]. For further development, it still requires several improvements, especially related to market optimization and development of the consumption of gluten-free noodles to prevent celiac disease in Indonesia.

4. Conclusion
BMC Stage 1 of cassava noodle data results of solutions test shows: Respondents' interest in buying cassava noodle products; Sales channels approved by the respondent; Availability of new partners to grow the cassava noodle industry in accordance with their respective authorities and Product communication channels that are of interest to respondents. The financial feasibility analysis of the cassava noodle business in Cirendeu Village using several assumptions, B/C ratio of 1.24, BEP 111 pieces, ROI 28% and PBP 44 months. These results illustrate the business feasibility of cassava noodles found in Kampung Cirendeu. For further development, it still requires several improvements, especially related to market optimization and development.
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