

## **BUSINESS MODEL ANALYSIS OF AGRO-INDUSTRIAL DEVELOPMENT OF RICE HUSKS-BASED SILICA BY BUSINESS MODEL CANVAS APPROACH**

### **ANALISIS BISNIS MODEL PENGEMBANGAN AGROINDUSTRI SILIKA DARI SEKAM PADI DENGAN PENDEKATAN BUSINESS MODEL CANVAS (BMC)**

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#### **ABSTRAK**

*Penelitian ini bertujuan untuk mengembangkan bisnis model agroindustri silika dari sekam padi dengan pendekatan Bisnis Model Kanvas. Sekam padi diproses menjadi silika dilakukan melalui proses pembakaran dengan suhu tinggi. Arang sekam padi mengandung sekitar 72,1% silikon oksida dan meningkat menjadi 94,95% setelah dibakar pada 700 °C selama 6 jam, sedangkan abu sekam kering mengandung silikon oksida sekitar 80% - 90%. Arang dan abu sekam padi dapat digunakan sebagai alternatif sumber silika dan silikon. Hasil penelitian ini memiliki prospek untuk mengembangkan agroindustri silika berbasis sekam padi sebagai alternatif bahan baku terbarukan. Metode yang digunakan untuk membangun model bisnis adalah Business Model Canvas (BMC). Business Model Canvas adalah metode visual menggambarkan bagaimana suatu perusahaan membuat dan melakukan bisnis. Visualisasi dengan kanvas lebih komunikatif, hal ini akan mendeskripsikan model bisnis secara sederhana untuk dimengerti. BMC diuraikan dalam sembilan komponen yaitu Customer Segment, Customer Relationship, Customer Channel, Revenue Stream, Value Proposition, Key Activities, Key Resource, Cost Structure, dan Key Partners. BMC perlu dilakukan sebagai acuan untuk mengisi kanvas model bisnis pengembangan agroindustri silika, tidak hanya berkaitan dengan manfaat atau keuntungan tetapi juga cara organisasi menciptakan, menyampaikan, dan menangkap nilai secara rasional. Silika yang dihasilkan dari proses pirolisis dalam skala medium memiliki kemurnian yang tinggi. Proses produksi silika berbahan dasar sekam padi memiliki potensi yang baik untuk dikembangkan menjadi agroindustri silika sebagai bahan baku alternatif terbarukan.*

*Kata kunci: business model canvas (BMC), rice husks-based silica*

#### **ABSTRACT**

This study aimed to develop a business model for silica agroindustry from rice husk with a Canvas Business Model approach. Rice husk was processed into silica through a high-temperature combustion process. Rice husk charcoal contained about 72.1% silicon oxide and increases to 94.95% after being burned at 700 °C for 6 hours, while dry husk ash contains about 80% - 90% silicon oxide. Charcoal and rice husk ash can be used as alternative sources of silica and silicon. The results of this study have prospects for developing silica agroindustry based on rice husk as an alternative renewable raw material. The method used to build a business model was the Business Model Canvas (BMC). The Business Model Canvas is a visual method of describing how a company creates and does business. Visualization with canvas is more communicative, it will describe the business model in a simple way to understand. BMC is described in nine components, namely Customer Segment, Customer Relationship, Customer Channel, Revenue Stream, Value Proposition, Key Activities, Key Resources, Cost Structure, and Key Partners. BMC needs to be carried out as a reference to fill the canvas of the silica agroindustry development business model, not only related to benefits or advantages but also the way organizations create, deliver, and capture value rationally. Silica produced from the pyrolysis process on a medium scale has high purity. The production process of silica based on rice husk has good potential to be developed into silica agroindustry as a renewable alternative raw material.

Keywords: business model canvas (BMC), rice husks-based silica

## INTRODUCTION

Rice husks are abundant agricultural waste in Indonesia. Globally, the availability of rice husks in 75 countries is estimated at around 100 million tons with the potential energy of about  $1.2 \times 10^9$  GJ/year and an average caloric value of 15 MJ / year. Indonesia as an agrarian country has about 60,000 rice grinding machines scattered throughout the provinces with a rice husk production of about 15 million tons a year. Several large-capacity rice-grinding machines are capable to produce 10-20 tons of rice husks daily [6]. Indonesia's rice production in 2015 reaches a total of 69.05 million tons of dry milled grain (GKG) or raise of 6.64% from 2014 (BPS, 2015). The increase in rice production surely promotes the rice husk's stock. The weight fraction of rice husks toward the bulk weight of grain ranges from 20-30%. This indicates that the rice husks produced in Indonesia by 2015 reached about 15.91 million tons as waste.

Rice husk charcoal can be processed into silicon oxide (silica) with a yield of 16.85% (Patil et al. 2014:26-29). Rice husks charcoal contains about 72.1% of silicon oxide and increases 94.95 % after being burned at 700 °C for 6 hours (Rohaeti et al., 2010:1-7), while dry rice husks ash in dry conditions contained about 80% - 90% (Givi et al., 2010) so that rice husks charcoal and ash can be used as an alternative source of silica and silicon production (Muthadhi dan Kothandaraman, 2010). The results of this study offer a good opportunity to build rice husk-based silica agro-industry as an alternative renewable raw material. A method that can be used to build a business model is the Business Model Canvas discovered by Osterwalder and Pigneur in 2015. In designing the business model canvas, an approach is required as a reference to fill its content because the business model canvas deals not only with benefits or advantages but also the way organizations create, deliver and capture value rationally (Osterwalder et al., 2015).

Developing a product is not an easy task. Some research state that only half of the companies are able to show a good performance at their products (Adam, 2016). Some challenges that must be overcome in developing the products are: the number of trade-offs that must be considered in making decisions, dynamic consumer preferences, details in identifying needs, time pressures that make companies must be able to produce quickly to meet consumer needs, and creation that means differences in ideas and perspectives in the development of new products (Pahlavi et al., 2017). One aspect that is widely researched in creating a product is to predict how likely it is to be successful in the market based on the value offered or value proposition (Agustina, 2011); (Pokorná et al., 2015); (Adam, 2016).

In this study, a business model was identified based on the Business Model Canvas approach by Osterwalder and Pigneur (2015). The nine elements of BMC are: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure. After identifying the 9 elements of BMC, there will be validation and verification of the business model of agro-industrial development of rice husks-based silica by expert (Osterwalder et al., 2015).

## RESEARCH AND METHODS

### Production Process of Rice Husks-Based Silica

Rice husk ashing is carried out in a medium scale furnace with a capacity of 15 kg. Rice husks are burned at a heating rate of 1.5 °C/min to a temperature of 900°C. During the burning process, the temperature is retained each for 1 hour at 400 °C and 900 °C. Rice husk ash is then washed using hydrochloric acid (HCl) 3% (technical grade). It aims to eliminate the impurities so that the high purity silicon dioxide is obtained. The washing process use 12 mL HCl 3% technical for 1 g of husk ash.

The mixture is then heated over the hot plate at a temperature of 200°C and stirred using a magnetic stirrer at a speed of 240 rpm for 2 hours. It is then washed using hot aquadest several times until acid-free condition is obtained (tested using litmus paper). It is then filtered using ash-free filter paper. The filtering result (residue and filter paper) is heated in a furnace with a temperature of 1000°C until white silicon dioxide remains. The sample is cooled in a furnace until it attains room temperature. The resulting silica ash is then characterized by its structural and electrical properties. The structural properties is tested using SEM (Scanning Electron Microscope), the silicon dioxide purity is tested using EDX (Energy Dispersive X-Ray) and its electrical properties using LCR meter (Casnan et al., 2019).

### Mapping of Business Model Canvas of Rice Husks-based Silica Agroindustrial Development of

Business Model Canvas is obtained from secondary data by literature review. The flow diagram of developing the Business Model Canvas is shown in Figure 1.

In mapping the business model, it starts by defining and filling the consumer segment box. It is because only a customer who generate profit will support the organization. The next step is filling the value proposition box, which is a statement of the uniqueness of the product or service guaranteed by the company to the targeted consumer segment.

Next is filling the channel box that explain how organizations communicate, deliver, and interact

with their customers. The channel box should be filled because this box defines how intense the organization maintains its relationships with customers. If the consumer segment is well focused, the value proposition is boldly expressed and the customer channel and relationship is maintained properly, then the income flow box can be filled,

which means it generate revenue into the organization. Each box for key resources, key activity, key business partner, also should be filled and set up so that it runs efficiently. The efficiency in these boxes is necessary to keep the cost structure box optimal. The business model canvas framework is displayed in Figure 2.

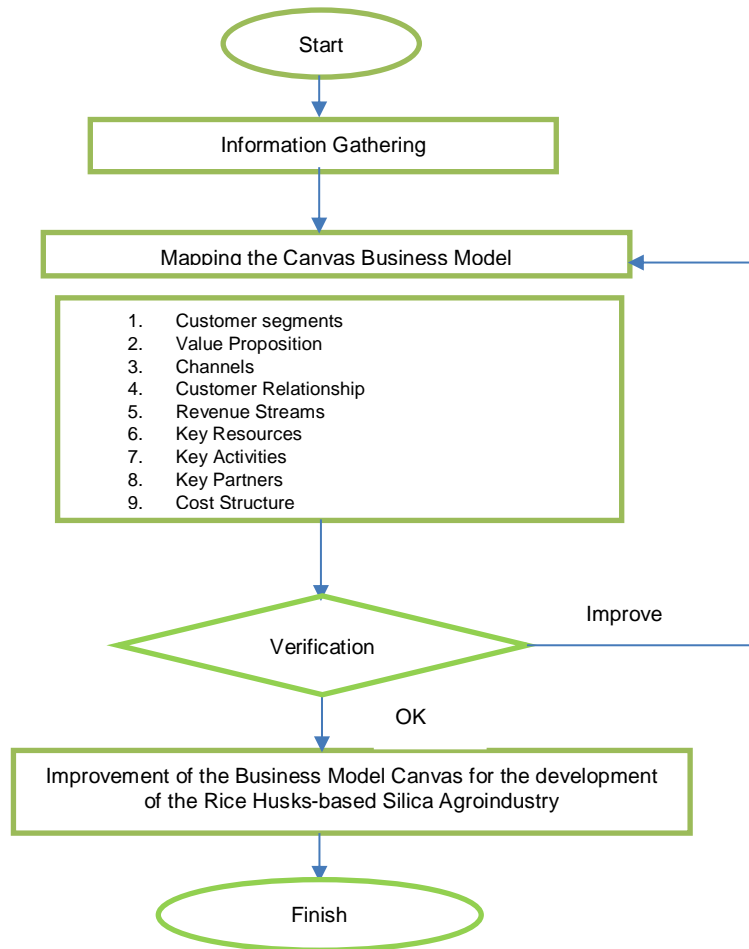


Figure 1. Process diagram of business model canvas development of rice husks based-silica agro-industry

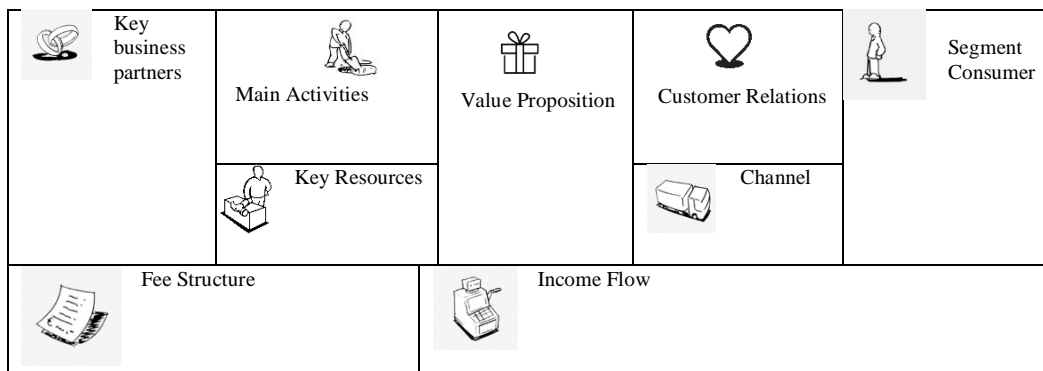


Figure 2. Canvas business model outline

## RESULT AND DISCUSSION

The Business Model Canvas is a business model of a logical picture of how an organization creates, delivers, and captures value (Osterwalder et

al. 2015). The canvas divides a business model into 9 main components, then separate further into the right (creative) and left (logic) components. The explanation of each 9 components is listed in following Figure 3.

<b>Key Business Partners</b> <ul style="list-style-type: none"> <li>• Sales through agents such as cooperatives or distributors (representing MSMEs)</li> <li>• Direct sales or through distributors</li> <li>• Cooperation with farmers as suppliers of raw materials</li> </ul>	<b>Key Activities</b> <ul style="list-style-type: none"> <li>• Produce through a combination of MSMEs (Rice-husk ash production is carried out in a medium-scale furnace with a Furnace capacity of 15 kg)</li> <li>• Producing by medium and large-scale industries (a business plan is required)</li> </ul>	<b>Proposition</b> <ul style="list-style-type: none"> <li>• Relatively high purity/grade silica</li> <li>• resulted by selected process designs</li> <li>• Flexibility of scale</li> </ul>	<b>Customer Relations</b> <ul style="list-style-type: none"> <li>• GET: identify similar industries that potentially to become customers.</li> <li>• KEEP: Maintain customer loyalty by continually providing the latest information (product samples, better processes), brochures, books</li> <li>• GROW: by participating in exhibitions or seminars</li> </ul>	<b>Customer Segment</b> <p>Industries that use silica as its raw material:</p> <ul style="list-style-type: none"> <li>• Ceramics industry;</li> <li>• paper industry,</li> <li>• paint industry,</li> <li>• rubber industry,</li> <li>• Polymer industry;</li> <li>• Cement Industry;</li> <li>• Chemical equipment industry;</li> <li>• Glass Industry</li> </ul>
	<b>Key Resources</b> <ul style="list-style-type: none"> <li>• Production by MSME has several advantages: <ul style="list-style-type: none"> <li>○ equipment can be procured at a relatively low cost.</li> <li>○ the availability of a patented production process</li> <li>○ Human resources and capital can be provided through credit</li> </ul> </li> <li>• Production by medium/large scale required business plan development</li> </ul>		<b>Channel</b> <ul style="list-style-type: none"> <li>• agent, if production executed by several SMEs</li> <li>• direct, if produced on a medium or large scale</li> </ul>	
<b>Cost Structure</b> <ul style="list-style-type: none"> <li>• If produced by several SMEs: <ul style="list-style-type: none"> <li>○ major costs are SMEs start-up and production according to the process</li> <li>○ Production cost</li> </ul> </li> <li>• If it is produced by medium and large industries: costs are comparable to those at private industry (but cooperation with financial institutions is easier)</li> </ul>		<b>Revenue Stream</b> <ul style="list-style-type: none"> <li>• Silica Sales <ul style="list-style-type: none"> <li>○ sales of products via agents when produced through a cooperation of SMEs</li> <li>○ direct sales if production on medium and large scale</li> </ul> </li> <li>• Establish sales cooperation</li> <li>• Collaboration with cooperatives</li> </ul>		

Figure 3. The design of the silica agroindustry canvas business model

### Consumer Segment

Consumer segment is a description of a group of individuals or organizations who buy a product according to their urge, resources, location, and buying habits. Because of unique needs and urge, each buyer is a potential market of its own. Therefore, defining the proper Consumer Segment can help a company or organization in determining its business development strategy. The consumer segment of rice husk-based Silica Agro-industry is a niche market. The niche market business model is done by fixing on one particular segment, because it is assumed that the consumers have specific and specialized needs/characteristics (Milovanovic, 2016). A business model whose market segmentation is a special market (niche) targeting certain specific market segments which are usually small in number and have not been served well. This business model is commonly found in business relationships between suppliers and buyers. The consumer segment of rice husk-based Silica Agro-industry are ceramic industry; Paper industry, Paint industry, Rubber industry, Polymer industry; Cement Industry; Chemical equipment industry; Glass Industry (Kumar *et al.*, 2012). The industry uses silica as its main raw material.

### Value Proposition

Value Proposition is the value offered by rice husk-based Silica agroindustry to its customers. The benefits of this value proposition is manifested as a set of products or services. According to Osterwalder and Pigneur (2015), there are eleven elements that can form a Value Proposition including: novelty, performance, customization, job completion, design, brand/status, price, cost reduction, access, and convenience/ease of use. The Value Proposition of rice husk-based Silica agroindustry is relatively high Silica Purity, resulting from selected and scale-flexible process design.

- a. The resulting silica has a relatively high purity of 63.99% - 82.74%. This product is suitable for

applications in various industries, either as the main raw material or mixed raw materials [8]. The results of pyrolysis in a medium-scale furnace produced rice husk ash with a yield of 15.40%. Silica purity in rice husk ash before washing was obtained between 63.99 – 80.79% and silica purity in rice husk ash after washing.

- b. Produced from selected process designs Rice husk-ash production is carried out in a medium-scale furnace with a furnace capacity of 15 kg. Rice husks are burned at a heating rate of 1.5°C/minute to a temperature of 900°C, in the process of burning rice husks, holding at a temperature of 400°C and 900 °C for 1 hour, the washing process of husk ash using HCl 3% technical grade (i.ee 12 ml of HCl for 1 gram of husk ash), then heated on a hotplate with a temperature of 200°C and stirred using a magnetic stirrer at a speed of 240 rpm for 2 hours. Then it is washed using hot distilled water repeatedly until acid-free condition is achieved and then filtered with ash-free filter paper. The filtered result is heated in a furnace at a temperature of 1000°C until the remaining white silica is obtained.

- c. Scale-flexible

The graph of the relationship between the heating rate and the rice husks capacity of, shows a good correlation. Using the regression method, the correlation between the mass of rice husks and the heating rate is obtained as Equation 1. This equation can be used to predict the heating rate for larger rice husk capacity. The limitation of the regression method is the melting point of silica. If the temperature of the pyrolysis process exceeds the melting point of silica.

$$y = 0.0135x + 1.2037$$

Information:

y : Rate of temperature rise (°C/menit)

x : Mass of rise husk (kg)

Table 1. Results of EDX silica analysis of rice husks on shelves 1, 4 and 8

Element	Percentage (%) atom					
	Rack 1		Rack 4		Rack 8	
	Before Washing	After Washing	Before Washing	After Washing	Before Washing	After Washing
C	11,98	7,27	11,92	9,73	10,14	8,39
O	59,86	64,39	65,61	62,2	65,81	65,7
Na	0,47	0,52	1,13	0,44	-	0,21
Mg	0,3	-	-	0,18	-	0,23
Al	-	27,58	21,33	0,44	23,85	25,48
Si	26,93	0,24	-	26,73	0,2	-
K	0,45			0,29		
Silica Purity	80,79	82,74	63,99	80,19	71,55	76,44

### Channel

The channel built by Silica Agroindustry is in the form of direct sales and sales agents. Silica agroindustry serves a direct-sales for products in the form of powdered rice husk-based silica when it is produced on a medium or large scale. On the other side, the form of agent-based channel is built by cooperating with silica supplying agents for several industries that use silica as its primary raw materials or mixed raw materials, such as the ceramic industry; Paper, paint, rubber, polymer industry; Cement Industry; Chemical equipment industry; Glass Industry. Agents-based cooperation are carried out when the production is carried out by a combination of small and medium enterprises (SMES).

### Customer Relations

The relationship that exists with customers is through GET: identifying the number of similar industries that have the potential to become customers (Pahlavi *et al.*, 2017). KEEP: Maintaining consumer loyalty by always providing the latest information (product samples, better processes), brochures, books (Parvatiyar and Sheth, 2001);(Purwanto and Widodo, 2016)and GROW, i.e. by attending exhibitions, seminars, etc. (Pradana and Danisa, 2016).

### Revenue Stream

The revenue stream of Silica Agroindustry is transaction revenues, i.e. revenue generated from customers through single payment. Revenue streams in the form of recurring revenues (recurring revenues) are also developed. The generated Revenue Stream is obtained from the silica sales. The sales of silica products is done via agents when the silica is produced by cooperation of MSMEs or via direct-sales if the production is carried out in medium and large scale, and by establishing sales cooperation with cooperatives.

The production costs is calculated based on business feasibility analysis to obtain the cost of production (HPP). The HPP calculation for one-time production with a capacity of 15 kg of rice husks is as follows:

- Fixed capital
- Furnace Rental cost: Rp 2 000 000,-Production cost. The production cost is listed in Table 2.
- Income  
Silica yield by the pyrolysis process is 15.4%. Therefore, from 15 kg of rice husks, there are 2,230 grams of silica are obtained. The price of silica per gram is IDR 2,600,- (Aldrich, 2006), so the revenue from selling silica is IDR 5,798,000,-
- Net income  
The net income from silica sales is the discrepancy between revenue, fixed capital and production costs.  
Net income = 5,798,000 – 2,315,000 – 2,000,000  
= 1,480,000
- Cost of Production (HPP)  
The cost of production is the division of production costs by the production amount, so the HPP can be calculated as follows:

$$\begin{aligned} \text{HPP} &= 2,315,000 / 2,230 \\ &= \text{IDR } 1,056.801 \text{ rounded up to IDR } 1,100 \end{aligned}$$

Therefore, the HPP of rice husk-based silica by pyrolysis process is IDR 1,100,- The potential revenue from silica sales according to the results of this study, based on the supply of Indonesian rice husks, is obtained through following calculation:

The dried rice husks are weighed as much as 15 kg to be burned in a medium-scale Furnace at a temperature of 400°C for 1 hour and followed by a temperature of 900°C for 1 hour. After heating process, as much as 2,310 grams of rice husk ash (15.4%) is obtained, then 10.029 grams of husk ash were weighed to be washed using HCl 3% technical grade (12 ml HCl for 1 gram of husk ash) for 2 hours, then it is filtered and rinsed using distilled water (aquadest). After the washing process, rice husk ash was heated in a kiln at a temperature of 1000°C for 1 hour, obtained silica as much as 7,062 grams (70.41%). Silica samples were analyzed by EDX, obtained 82.74% silica purity (Casnan *et al.*, 2019)

Table 2. Production Cost

No.	Fee type	Quantity	Unit Price (Rp)	Amount (Rp)
1	Rice Husk	1	15,000	15,000
2	Ceramics for shelves	2	300,000	600,000
3	HCl	4	25,000	100,000
4	Sample characterization	3	400,000	1200,000
5	Workers' salary	2	200,000	400,000
Sub-Total				2,315,000

- Yield of SiO<sub>2</sub> (82.74%) = % Rice husk ash X % Silica X % Silica purity.
- Yield of SiO<sub>2</sub> (82.74%) = 15% X 70.41% X 82.74 % = 8.74%
- Calculation of SiO<sub>2</sub> price (82.74%).
- BPS data (2015) Indonesian Milled Dry Rice (GKG) = 69.05 x 10<sup>9</sup> kg
- Rice husk is 20% of GKG (Muthadhi, 2007) = 13.81 x 10<sup>9</sup> kg.
- For 1% of the existing rice husk, SiO<sub>2</sub> (82.74%) = 1% x 13.81 x 10<sup>9</sup> kg x 8.74% = 1 207 000 kg
- SiO<sub>2</sub> price (82.74%) (Aldrich 2006) = \$180.50 x 1 207 000 kg = \$217 863 500; = Rp. 3 050 000 000 000; (Assuming \$1 = Rp.14 000 ;)

Determination of the price is performed by dynamic pricing. that is, the price changes based on market conditions. If the price of raw materials increases, the price of the sales products will also increase.

**Key Resources**

Rice husk is a renewable silica source. BPS data (2015) showed that the Indonesian Milled Dry Rice (GKG) = 69.05 x 10<sup>9</sup> kg. It is a quite huge resource to be developed for silica processing. If rice husk-based silica is produced by MSMEs, the equipment can be provided at a relatively low cost. The production equipment for pyrolysis process on a medium scale is made of ceramic, then coated with kaowool to maintain heat flow in the furnace. The heat source for furnace apply a gas fuel burner located at the bottom of furnace. The shelves made of ceramics are placed inside the furnace to store rice husks during the pyrolysis process. Rice husks are placed on ceramic racks with a height of 2 cm to produce silica powder from rice husks. The cost related with patents application of the silica production process, human resources (HR) and capital can be handled through credit. If the rice husk-based silica is produced on a medium or large scale, a business plan development and substantial business capital are required.

**Key Activities**

The key activity carried out for the development of silica agroindustry is the rice husks-based silica production through a cooperation of SMES or through medium and large industries. The production process through medium or large industries requires a business plan and substantial capital, but if it is produced through SMES, production equipment can be provided at a relatively low cost.

The steps of the silica production process from rice husks are as follows:

a. Confession

Ashing of rice husks is carried out in a medium-scale furnace with a furnace capacity of 15 kg. Rice husks are burned at a heating rate of 1.5°C /minute to a temperature of 900 °C, in the process of burning rice husks, holding at a temperature of 400°C and 900°C for 1 hour.

Ashing of rice husks is carried out in a medium-scale furnace with a furnace capacity of 15 kg. Rice husks were burned at a heating rate of 1.5°C /minute to 900 °C, in the process of burning rice husks, holding at a temperature of 400°C and 900°C for 1 hour.



Figure 4. Medium scale furnace capacity 15 kg rice husk

**Silica Extract**

Rice husk ash was washed using technical 3% hydrochloric acid (HCl). The washing process is aimed at reducing the existing impurity to obtain silica husk ash. The washing process husk ash using HCl 3% technical (ie 12 mL of HCl 3% technical for 1 g husk ash), then heated over a hotplate at a temperature of 200 °C and stirred using a magnetic stirrer (magnetic stirrer) at a speed of 240 rpm for 2 hours. Then washed using hot distilled water repeatedly until free of acid (tested using litmus paper), then filtered with ash-free filter paper. The filtered result is heated in a furnace at a temperature of 1 000 °C until the remaining white silica. The samples were cooled in the furnace (furnace temperature labored together at room temperature). Silica final product produced from rice husk is shown in Figure 5.



Figure 5. Silica from rice hus

### Key Business Partners

Silica agroindustry has cooperation with farmers as suppliers of raw materials, sales through agents such as cooperatives or distributors (representing SME's) and direct sales or distributors.

### Cost Structure

The cost structure is developed as follow, if it is produced through a cooperation of SME's, the costs are focused on the major costs, namely SME's start-up and production according to production processes and costs. If the production is on a medium and large industrial scale, the costs are comparable as borne by those at private industry (but cooperation with financial institutions is easier).

Based on the results of research and secondary data analysis, improvements were made to the elements of the business model canvas as shown in Figure 6. To improve the business model seven elements were selected, i.e. key activities, key resources, key business partners, customer relations, channels, cost structure and revenue streams.

### Key Activities

Based on the research result on the pyrolysis process of rice-husk-based silica production on a medium scale, by a capacity of 15 kg of rice husks, this process can be performed by cooperation of SME's

### Key Resources

The production process by cooperation of SME's, is potentially implemented in short-term programs. This is supported by several factors: a) equipment can be procured at a relatively low cost, b) there is a patent on the production process c) human resources and capital can be accommodated via credit through collaboration with financial institutions.

### Key Business Partners

Silica Agroindustry has cooperation with several suppliers of raw materials and supporting materials, Sales Agents, and cooperation with online shops.

<b>Key Business Partners</b> <ul style="list-style-type: none"> <li>Sales through agents such as cooperatives or distributors (representing SMES)</li> <li>Direct sales or distributors</li> <li>Cooperation with farmers as suppliers of raw materials</li> <li>Cooperation with Online Stores (Pradana and Danisa, 2016)</li> </ul>	<b>Key Activities</b> <ul style="list-style-type: none"> <li>Produce through a combination of SMES (Rice husk production is carried out in a medium-scale Furnace with a Furnace capacity of 15 kg)</li> </ul>	<b>Value Proposition</b> <ul style="list-style-type: none"> <li>Relatively high purity</li> <li>Generated from selected process designs</li> <li>Flexibility of scale</li> </ul>	<b>Customer Relations</b> <ul style="list-style-type: none"> <li>GET: identify the number of similar industries that have the potential to become customers.</li> <li>GROW: attend exhibitions, seminars</li> <li>Promotion through the Website (Purwanto and Widodo, 2016)</li> <li>Promotion through Social Media (Pujastuti <i>et al.</i>, 2014)</li> </ul>	<b>Customer Segment</b> <p>Industries that use silica as raw material:</p> <ul style="list-style-type: none"> <li>Ceramics industry;</li> <li>paper industry,</li> <li>paint industry,</li> <li>rubber industry,</li> <li>Polymer industry;</li> <li>Cement Industry;</li> <li>Chemical equipment industry;</li> <li>Glass Industry</li> </ul>
	<b>Key Resources</b> <ul style="list-style-type: none"> <li>Produced through SMES</li> <li>equipment can be procured at relatively low cost</li> <li>the existence of a patent on the process</li> <li>HR and capital can be handled via credit</li> </ul>		<b>Channel</b> <ul style="list-style-type: none"> <li>agents, because they produce with a combination of SMEs</li> <li>Online Sales (Pradana &amp; Danisa 2016)</li> </ul>	
<b>Fee Structure</b> <ul style="list-style-type: none"> <li>production through a combination of SMES</li> <li>major costs are SMES start-up and production according to the process</li> <li>Production cost</li> </ul>		<b>Revenue Stream</b> <ul style="list-style-type: none"> <li>Silica Sales</li> <li>sales of products through agents because they produce through a combination of MSMEs</li> <li>Establish sales cooperation</li> <li>Cooperation with cooperatives</li> <li>Cooperation with online stores (Pradana and Danisa, 2016)</li> </ul>		

Figure 6. Design of silica agroindustry canvas business model version 6



### Customer Relationship

The production process is carried out by a cooperation of SMES, so that customer relationship can be established through GET: i.e identifying the number of similar industries that have the potential to become customers. and GROW: i.e. participating in exhibitions, seminars, and promotions via

Website and Social Media. The promotion was carried out by introducing high purity silica products through promotional and social media. Some researches on the influence of websites and social media show that the consumer trust in e-commerce or online stores in Indonesia is strongly influenced by the quality of the website and the security arrangement presented through the website... The security arrangement, according to consumers in the study, is the existence of symbols and specific explanations about the warranty before the consumer proceed the transaction (Pujastuti *et al.*, 2014).

### Channel

The channels built by Silica Agroindustry are sales agents and online sales. One reason of the development online is affected by the changes in technology. The use of the internet has changed the way people shop for a product. The role of the internet is significant in all processes, both as social media and economic activities such as e-commerce, even though without we realize that social media utilization, apart from being a means of socializing, is also used for online shopping. Probably, this explain the reasons why consumers choose social media for their shopping activities. One reason is that through the social media, , consumers can get convenience in getting the product information they need or want (Putri, 2018).

### Fee Structure

The cost structure required for the production of rice husk-based silica are: a) the major cost is the start-up of SME's and production according to the process and b) Production Costs.

### Revenue stream

The sales of silica products is carried out through agents. In addition, itis carried out by collaboration with cooperatives. The revenue stream of Silica Agroindustry can be obtained from online sales transactions (Pradana and Danisa, 2016).

The application of the business model canvas for the development of rice husk-based silica agroindustry aims to formulate a business development strategy through a business model. This canvas business model can be applied in the context of future business development. Nine elements including consumer segmentation, value proposition, key business partners, key activities, key resources, customer relations, channels, cost structure, and revenue streams can provide a specific picture of the conditions that exist for the development of silica

agroindustry from rice husk. The results of the analysis based on the results of research and secondary data analysis are used as improvement steps in the elements of the business model canvas. In the improvement, four elements were selected, i.e. key business partners, customer relations, channels, and revenue streams (Figure 6).

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

The concept of Silica Agro-industry development is carried out using the Business Model Canvas approach. BMC is described in nine components, namely Customer Segment, Customer Relationship, Customer Channel, Revenue Stream, Value Proposition, Key Activities, Key Resources, Cost Structure, and Key Partners. Based on the results of the analysis of the production of rice husk-based silica through a pyrolysis process to be developed through a combination of SMEs, the business scheme will be potentially profitable. Therefore, the process of rice husk-based silica production is feasible to be developed into rice husk-based silica agroindustry.

### Recommendations

Rice husk charcoal contains about 72.1% silicon oxide and increases to 94.95% after being burned at 700oC for 6 hours, while dry husk ash contains about 80% - 90%. From silicon oxide Charcoal and rice husk ash can be used as an alternative source of silica and silicon. The results of this study have the prospect of developing silica agroindustry based on rice husk as an alternative renewable raw material.

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