

Utilizing potentials and problems into business opportunities for the BMC method in educating students

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Abstract

The entrepreneurial ability of undergraduate graduates is a problem for universities. Project-based learning with the issue of the existence of zeolite stone waste due to the construction materials industry is the main focus in this research. This research aims to create new businesses for students who have participated in project-based learning. A combination of quantitative and qualitative methods is used for business feasibility analysis. Data collection uses a survey method to identify the readiness of raw materials, production equipment, markets, and resource requirements, as a basis for analyzing the feasibility of running a zeolite powder production business. Furthermore, an analysis of the cost requirements and feasibility benefits of running a business is carried out using the business model canvas (BMC) method. The survey results show that the raw material for zeolite stone in one mine can provide raw materials for 30 years, hammer mill machines are available on the market as production tools, the market for zeolite powder in Indonesia is quite low, but consumers in Asean countries are very high. The results of this business plan analysis are profitable, so the zeolite powder production business is declared feasible to run.

Keywords: Business Model Canvas, Business Feasibility, sustainable materials, zeolite powder, zeolite properties

I. Introduction

In general, people think about where they will work after graduation (Tamaki et al., 2022), because the need for labor is less than the number of graduates looking for work (Okudaira, 2020), therefore in an area there are still many unemployed, and as a result of this large number of unemployed can give rise to crime.

Graduates of strata 1 tertiary institutions after graduating from college generally look for work according to the field of knowledge studied at college (Agustin, 2013), very few graduates open businesses for their income and employ other people (Zhang, Duysters, & Cloudt, 2014), this is

a problem that must be addressed by the government as well as higher education (Baeti, 2019).

The weakness of graduates to open a business is that they think they are not able to compete with businesses of the same scope as businesses that have been running for a long time, therefore they prefer to work in a company that is already running a business. Ability to create a new scope of business feeling unsure that a business can be run and profitable (Agrosamdhyo, 2020).

To run a new business, it is necessary to have good business planning skills, by taking advantage of existing opportunities (McKenzie,

2017). No matter how small the opportunity needs to be utilized so that it becomes big (Venkataraman, 2019). Business opportunities can arise due to natural potential and even due to community problems (Jansson, Nilsson, Modig, & Hed Vall, 2017).

So that students have entrepreneurial skills, not only thinking about what and where to work after graduation, it is necessary to apply project-based learning, by raising the theme of community and industry problems into business opportunities.

One of Indonesia's natural wealth is zeolite stones (Anagi, Hadiwardoyo, Sumabrata, & Wahjuningsih, 2017). In Indonesia, processed zeolite stone is used as a soil amendment in agriculture (Alvernia, Minardi, & Suntoro, 2017). In the European Union zeolite as Myco-Toxin binder (70/524/EEC) (Simona & Camelia, 2019), while in the USA, FDA Approved it as an anti-caking agent (CFR 582-2727) (Eroglu, Emekci, & Athanassiou, 2017). In Asian countries, natural zeolite is used as a feed additive for poultry (Prasai et al., 2017).

One of the business opportunities due to the natural potential, namely zeolite stone and zeolite stone mining, already exists in Sukabumi, Indonesian (Affandi, n.d.). This zeolite mining product is processed by a company into zeolite granules for export to Malaysia, Thailand, China, and several other countries. The processing of zeolite stone is also carried out as a community effort to produce tiles or stone tiles (Najmuddin, 2019).

Due to the processing of zeolite stone into tiles or stone tiles, a new problem arises, namely the presence of small pieces of rock with irregular shapes, and these small rocks become waste (He, Shang, Sun, Li, & Yang, 2016) which has not been utilized, therefore this waste originating from nature needs to be utilized into a useful product (Galetakis & Soutana, 2016).

With the existence of natural potential and community problems, it can be used as a case study of project-based learning in lectures so that students are able to take advantage of problems as opportunities to create new businesses.

Based on these problems, this research is very important with the aim of creating a new business unit for the production of zeolite powder, especially for students after receiving project-based learning, by utilizing problems into opportunities.

If zeolite stone waste can be processed into zeolite powder, there is a large quantity market, and the selling price of zeolite powder is higher than production costs, then this is a new business opportunity, therefore this research is very important.

The benefit of the results of this research is to provide information to the public about the opportunities and feasibility of a new business to produce zeolite powders, by utilizing zeolite stone waste generated because of the business of tile or stone makers. Benefits internationally can provide information that in Indonesia there are zeolite stones that have been processed into zeolite powder.

The contribution from the results of this research is expected to be able to apply project-based learning that produces new business units to reduce unemployment. The zeolite powder production business can minimize zeolite stone waste into an internationally valued product.

2. Literature Review

In general, undergraduate graduates will look for work, so it is necessary to know the essential factors in deciding which job they are interested in. The think-aloud protocol method was used in this research, in which interviewees, namely graduates, were asked to read job position descriptions and answer semi-structured interview questions about the desire to apply for a job position of interest. So it can be concluded that job position descriptions for students need to be made in such a way as to make it attractive for graduates to apply for work in the desired position (Piper & Wilairat, 2022).

Universities in general are committed to producing graduates who are ready to work and highly competitive. To achieve this, one of the learning methods used is project-based learning.

Research using the mixed-method convergent parallel design method concludes that project-based learning can improve students' academic achievement to become entrepreneurs and create a fun learning atmosphere (Zen & Ariani, 2022).

The consequences of drugs, especially antibiotics, are that they contaminate water and soil quality. A promising approach in the future to reduce the presence of drugs and other micro-pollutants in the environment is API. API is a "greener drug", which is produced in research and contributes to the Sustainable Development Goals, and this API is a new business opportunity due to a problem (Kümmerer, 2019).

Plastic waste is a problem that attracts the attention of the public at large. The idea of research is to turn plastic waste into construction materials. Triangulation based on data sources is adopted here to find out the underlying factors influencing the conversion of plastic waste into construction materials in relation to the supply chain and production chain. Through the transformation of linear use of plastic products into sustainable circulation, recycling has become the preferred approach to recovering plastic waste into a valuable construction material (Li, Zuo, Duan, Wang, & Chang, 2022).

Based on previous research explained that college graduates generally look for suitable jobs, project-based learning improves academic quality and encourages entrepreneurs, a problem can become a potential for new businesses, and waste can be converted into valuable materials. All of this is closely related and there are similarities with this study. The difference is that this research is a learning experiment based on project-based learning as a learning method for students so that students immediately start entrepreneurship specifically to produce zeolite powder by utilizing the natural potential and zeolite stone waste due to the activities of stone craftsmen entrepreneurs.

3. Materials and Method

3.1. Materials and Tools

The materials used in this study are zeolite stone originating from mines and zeolite stone waste from tile and stone tile makers as the main raw material to produce zeolite powder. While the tool used is a hammer mill machine as a means of zeolite powder production. These materials and tools are for experiments in the production of zeolite powder which will then be used as a basis for consideration for production feasibility in the business plan that will be produced in this research.

3.2. Method

The combination of quantitative and qualitative methods in this study is used for business feasibility analysis. Data collection uses a survey method to identify the readiness of raw materials, production equipment, markets, and resource requirements, as a basis for analyzing the feasibility of running a zeolite powder production business. Next, an analysis of the cost requirements and feasibility benefits of running a business is carried out using the Business Model Canvas (BMC) method (Keane, Cormican, & Sheahan, 2018).

The three groups of students in this study were actors and direct beneficiaries as experiments to carry out project-based learning to solve the problem of zeolite stone waste into products that have sales value and become new business units. Business planning using the BMC method.

Business Model Canvas (BMC) uses the theory of Value Proposition, Customer Segments, Customer Relationships, Channels, Key Activities, Key Resources, Key Partners, Cost Structures, Revenue Streams (Simanjuntak, 2021).

Value Proposition is the selling point of products/services so that consumers choose the products of this business over other competitors (Erlangga & Erlangga, 2021).

Customer Segments are closely related to the Value Proposition (Osterwalder, Pigneur, Bernarda, & Smith, 2015). Target consumers can be divided into various segments according to needs. To get solutions to business problems,

partner suggestions as consumers are very important (Morkunas, Paschen, & Boon, 2019). Suggestions and solutions from these partners form the basis for improving product quality and developing target markets (Raja & Frandsen, 2017).

Customer Relationship is the theory of building good relationships with all those involved in the scope of business (Wang & Kim, 2017).

Channels are a medium for entrepreneurs for Customer Relationship purposes (Charoensukmongkol & Sasatanun, 2017).

Key Activities is the theory of determining reliable resources so that the business remains competitive and able to compete (Täuscher & Laudien, 2018).

Key Resources means that in business it is necessary to maintain and manage existing resources, both human resources, money, materials, tools, methods, and information (De Massis, Audretsch, Uhlaner, & Kammerlander, 2018).

Key Partners means that in a business, partners are needed to support the business (Dijkman, Sprenkels, Peeters, & Janssen, 2015).

Cost Structures are financial schemes to finance business operations (Sarmiento & Renneboog, 2016).

The Revenue Stream is the company's source of income from various sources, such as sales, dividends and so on (Chansarn & Chansarn, 2016).

4. Results and Discussion

4.1. Results

To run a new business, it is necessary to have good business planning skills, by taking advantage of existing opportunities. No matter how small the opportunity needs to be utilized to become a big business. Business opportunities can arise due to natural potential and even due to a community problem. The findings of this study indicate that in Indonesia there are many zeolite stones in various regions. In the Sukabumi region, Indonesia, there is a zeolite mine with an area of 5 hectares containing 1,000,000 m³ of zeolite. Utilization of zeolite mining products can provide a market for 30 years. Utilization of zeolite around the mine most of it is processed into tiles and paving stones by artisans because these craftsmen's activities result in small pieces of zeolite stone that are not utilized. With the mining of zeolite stone and the remaining zeolite stones from craftsmen, it becomes a new business opportunity, namely the production of zeolite powder. The results of the analysis show that the zeolite powder production business can minimize zeolite stone waste generated by craftsmen, there is an adequate market in Indonesia and a high market internationally, it is profitable for those who run the business, and can absorb labor. This study concludes that, to run a zeolite powder production business, raw materials are available for a long period of time, production tools are available, there are many consumers, low investment costs, have relatively high profits, and return on business capital is no longer than 2 years, profitable, can minimize zeolite stone waste, and absorb labor, so that the zeolite powder production business can be declared feasible to be run by the community.

Based on experiments on the production of zeolite powder using a hammer mill machine with a production capacity of 1.25 tons/hour, it is known that the capital and profits of MSMEs every month in running this business are as described in Table 1

Table 1. Business profits every month

N	Description	Qty	Unit Price (IDR)	Amount (IDR)
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A. Monthly exit fee				
1	Purchase of zeolite stone	260 ton	30.000	7.800.000
2	Operator wages person	1 26 days	200.000	5.200.000
3	Wages for workers	2 52 days	150.000	7.800.000
4	Monthly electricity costs	1 month	910.000	910.000
Monthly expenses				21.710.000
B. Monthly input				
1	Sales of zeolite powder	260 ton	175000	45.500.000
C. Monthly profits				23.790.000

Monthly operational costs IDR 21,710,000. The gross profit of the zeolite powder production business every month is IDR. 23,790,000. The market demand for zeolite powder in Indonesia from one company can accommodate 3000 tons/month, so it can be stated that MSMEs are feasible to run this business. Analysis of the need for and readiness of raw materials, production quality, and market share will be explained in the discussion.

4.2. Discussion

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Figure 1. Zeolite stone from mining products

Zeolite stone, as the main raw material comes from mining and is a large chunk of rock that then before being produced into zeolite powder needs to be crushed into small rocks that can be processed using a Stone Crusher machine.

4.2.1. Raw material

The primary raw material in the zeolite powder production business is zeolite stone which is a natural material. In Indonesia, zeolite stones are found in various regions (Melani Rizki Utami, 2022). Zeolite stone contains hydrated aluminosilicate chemical compounds with sodium, potassium, and barium cations, so zeolite rock is a hard rock (Akhtar, Khan, Khan, Akhtar, & Nejem, 2022). As an illustration of zeolite stone as described in Figure 1.

In addition to these small stones, the raw material for zeolite powder can come from the waste of tile or stone craftsmen, as shown in Figure 2.



Figure 2. Zeolite stone waste from tile craftsmen

To minimize and optimize natural materials into useful products, zeolite powder prioritizes waste raw materials from tile or stone craftsmen.

The zeolite stone which is produced into zeolite powder in this business has properties namely, Name Sodium Calcium Silicoaluminate, Color Ivory Green, Typical Chemistry SiO₂: 66.29%, Al₂O₃: 12.16%, K₂O: 2.92%, CaO: 4.48%, Na₂O: 3.17%, CEC: above 100 meq/100gr, plus trace elements.

Based on information from one of the owners of a zeolite mine in the Sukabumi region, Indonesia with a mining area of 5 hectares has a zeolite content of 800,000 m³, as the main raw material for this mine can provide materials for the next 30 years, therefore the availability of raw materials to run the production business zeolite powder is very adequate

4.2.2. Zeolite Powder Production

The raw material for zeolite powder is zeolite stone in small chips. These rocks need to be ground into flour. The size of the flour granules is determined based on market demand, namely 80 mesh. The production equipment used is a hammer mill machine with 80 mesh, with a production capacity of 1.25 tons/hour.

The method of production using a hammer mill machine is by inserting small zeolite rocks into the hammer mill machine, and after it becomes flour, it is then packaged, therefore the production cost of zeolite powder/ton is as described in Table 2.

Table 2. Production cost of zeolite powder per ton

N	Financing description	Qty	Unit price (IDR)	Amount (IDR)
1	Purchase of zeolite/ton	1,25	30.000	37.500
2	Machine operator wages 1 person	0,8	25.000	20.000
3	Wages for 2 workers	1,6	18.750	30.000
4	Electricity fee/hour	1	4.375	4.375

Total production cost/hour	91.875
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With a production capacity of 1 hammer mill machine of 1.25 tons/hour and a working time of 8 hours a day, the production cost/day is IDR. 835,000, so the need for production costs/month is IDR. 21,710,000 with an effective working time/month of 26 days.

The minimum supply of raw materials in 1 month is 260 tons, which is regulated in procurement every week, for the efficiency of raw material storage space. Mining of zeolite stone every day at 1 mine reaches 50 tons, and it is estimated that there are still 1,000,000 tons of zeolite deposits, so the availability of raw materials for the zeolite powder production business using 1 hammer mill machine is sufficient for 300 years. Because the availability of raw materials is quite high, the zeolite powder production business in this study was carried out by 3 SMEs, and each used 1 production tool. The availability of raw materials for 3 MSMEs is sufficient for 100 years.

The zeolite stone mine which is the object of this research is to provide other businesses such as tile, tile, and granule zeolite craftsmen. Based on the raw material needs of each zeolite stone business, from 1 mine can provide raw materials for a period of 30 years, therefore it can be stated that the availability of raw materials to run the zeolite powder business is sufficient.

4.2.3. Business Model Canvas (BMC)

The production of zeolite powder in this business must be sold as a whole, so the Business Model Canvas (BMC) concept is used with theory Value Proposition, Customer Segments, Customer Relationship, Channels, Key Activities, Key Resources, Key Partners, Cost Structures, Revenue Streams (Hadi & Supardi, 2020).

The Value Proposition Theory is used to determine that the zeolite powder production is of the quality required by the market (Balea et al., 2020). The main customer in this business is an import and export company of zeolite granules which has markets in several countries such as

Malaysia, Thailand, and China. Several other potential customers have been identified to ensure that the products produced in this business can be accepted in the market in general. The zeolite powder required in general based on market needs is between 40 to 400 mesh, but more demand for 80 mesh flour quality, therefore the production of zeolite powder in this business is determined by 80 mesh flour quality, which consumers need more. To ensure that consumers continue to choose this zeolite powder product, an agreement was made regarding the production quality of zeolite powder mesh 80, an initial price of IDR 175,000/ton, and a minimum purchase quantity of 780 tons/month, so that this business can be run by 3 MSMEs, and each produces 260 tons of zeolite powder/month.

Customer Segments theory is used by grouping target consumers into several segments, to provide suggestions and corrections as input to overcome problems that may occur in the company. Several consumers were asked to fill out questionnaires about customer satisfaction, provide suggestions and corrections to the products produced by this zeolite powder production business. Improvement in quality and service must be carried out by the wishes of consumers, so that consumers continue to choose this zeolite powder product, and to develop target markets.

Customer Relationship Theory is used in this business to build good relationships with consumers, workers, suppliers, and the government. Social media and UMKM websites are media used to maintain good relations with selrh related to this zeolite powder production business.

Key Activities Theory is used to determine standards in this business, such as raw material quality standards, production quality, packaging, tools, and labor.

Key Resources theory is used to maintain all the resources needed in running this zeolite powder

production business so that all predetermined standards are met and consistent.

Key Partners theory is used to identify the right partner to run this business. The partners needed include suppliers, consumers, banking, labor providers, investors, and all human resources involved in this business.

Cost Structures as a theory of financial schemes to finance operations in this business, so it is closely related to Revenue stream theory. In running the zeolite powder production business, investment is needed. The investment needed includes business premises, tools, raw materials, and initial-stage operations. It can be identified that the investment needs are as shown in Table 3.

Table 3. Investment in zeolite powder production business

N	Description of investment costs	Qty	Unit price (IDR)	Amount (IDR)
1	Production site and office	1	50.000.000	50.000.000
2	Hammer mill production tools	1	125.000.000	125.000.000
3	Zeolite raw materials	60	30.000	1.800.000
4	Zeolite powder packaging	600	10.000	6.000.000
5	Office equipment	1	15.000.000	15.000.000
6	Labor wages	6	500.000	3.000.000
7	Electricity cost	6	35.000	210.000
Total investment needs				201.010.000

To be able to run a zeolite powder production business requires an initial investment of Rp. 201,010,000, this initial financing can use business capital loans to banks. This capital loan program is called KUR (People's Business Credit) with a Bank interest of 0.5% per month. Return on investment capital for 2 years, then return on capital every month as calculated using the Future Value (PV) theory equation 1 (Paikun, Kadri, & Hudayani Sugara, 2018).

$$F = P(1+i)^n \quad (1)$$

F = future value

P = The value to be projected

i = Inflation (interest rates)

n = period (projection year)

Based on the theory of Future Value (PV) equation 1, the return on capital for the next 2 years can be schematized in Figure 3.



Figure 3. Future Value (PV) analysis scheme

Based on the Future Value analysis scheme, the return on business capital with KUR loans in 2022 is IDR 201,010,000 then the refund in the next 2 years with an interest rate of 6% per year will be IDR 235,967,236. This return on capital is paid in monthly installments of IDR 9,831,968.

Furthermore, the Revenue theory is used to estimate the inflow of funds as a source of income for the zeolite powder production business. This business income is a consideration of business feasibility. The source of income

must be able to provide business benefits, return on capital, and business development.

The price of zeolite powder because of the market survey has several price differences, from IDR 175,000/ton to IDR 200,000/ton. The largest consumer who can afford to buy zeolite powder in high quantity sets a price of IDR 275,000/ton therefore the initial sales target is at least IDR 275,000/ton, therefore operating income can be calculated as in Table 4.

Table 4. Return on capital

N	Description	Qty	Unit price (IDR)	Amount (IDR)
1	Penjualan zeolite powder/bulan	260	175.000	45.500.000
2	Biaya operasional/bulan	1	21.710.000	21.710.000
3	Pengembalian dana investasi/bulan	1	9.831.968	9.831.968
Profit/month				13.958.032

Based on the analysis of investment costs, operational costs, and sources of business income, it can be stated that every month's net profit is IDR 13,958,023, and within a 2-year business period it can return business capital, so that in the 3rd year it can increase business.

5. Conclusion

The project-based learning method in this study was able to take advantage of the natural

potential and problems of zeolite stone waste to become new business opportunities. Students who take part in this course can immediately run a new, highly profitable zeolite powder production business. The business model canvas (BMC) method is highly recommended for making business plans. The results of this study contribute to providing information to the public in general that even the smallest pieces of zeolite rock can be produced into zeolite powder using a hammer mill machine, to minimize waste. Providing new business opportunities to the

community due to the availability of raw materials and the market for zeolite powder. The production of zeolite powder using a hammer mill machine causes noise, low production capacity, and in general the machine has a weakness for the crusher which wears out quickly, therefore it is recommended for further research to produce an innovative hammer mill machine that does not cause high noise, the poulder lasts longer, and high production capacity.

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