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# Preliminary FS Of Fiber Production From Local Food Material At Small Business For Processed Food Product

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***Abstract***

*Indonesia as a tropical country that has fertile land so that many food crops that can be managed, including cassava and tofu waste. Utilization of tofu waste can be categorize at low added value like animal food for IDR 250/kg. Utilization of raw materials through management with a technological approach can make raw materials valuable and can compete with imported quality, such as fiber. At present the use of fiber for food by a lot of business people is still using import fiber product.The technological process that is ready to be applied in the community through coaching by tertiary institutions, namely research and community service. In addition, the process does not provide new problems, such as producing waste that is damaging to the environment. The use of enzymes in the process of making fiber from these raw materials does not produce waste that damages the environment.The resulting fiber can be used for making nuggets or other food that is expected to minimize imports. This import substitution in the future is expected to be able to give birth to the nation's independence in food matters.As the results of the study for 500 grams of tofu waste got 62.5 grams of fiber, simply 125 gr fiber / IDR 250 . Utilization of this 12.5 grams fiber by doughing 37.5 grams of chicken meat produced 50 grams nuggets with flavors competably with the same nugget ingredient with commercial fiber through organoleptic tests of 10 participants. 500 grams of cassava produced 27.5 grams of fiber, simply 125 gr fiber / IDR 11.363. Luckly, the flavor of cassava fiber was similar with that of tofu waste.*

***Keywords***: *preminary FS; Fiber of local food; Small & Medium Enterprise; People Empowerment; Import subtitles.*

## A. BACKGROUND

Based on data from SUSENAS, in 2014 released by BPS, 7.07 kg of tofu was consumed by one person per year, It was proximately 67.28% 67.28% or 1.96 million tons Therefore, tofu waste was abundant, 120% tofu pulp from dried soy beans. In addition, the waste has important food composition 25% protein and 10% fat. Unfortunately, only in limited application the was usage such as animal blended.

Another potential source to produce fiber is cassava. The characteristics of Cimanggu cassava consist of starch levels of 20-30%, HCN <40 ppm, sugar levels of 8.80% (bk) while Kaspro cassava has starch levels of around 25 - 32%, HCN levels> 100 ppm and total sugar 41, 29% (bk) 3. When cassava was used as raw material, the important by product was also gained, dextrin. Unfortunately, the investment for downstream processing was quite expensive.

A lot of derivatives products produced from the pulp waste of tofu is interested. and cassava as well by establishing an industrial-scale lab processing machine into fiber.

Our most important thing in order to realize this industrial-scale laboratory is in order to support the independent campus program, Permendikbud number 3 of 2020 concerning higher education standards, universities must provide the right for students to volunteer (able to taken or unable to take credits in different study programs in the same company or industry for 1 semester (equivalent to 20 credits), can take credits outside of college for 2 semesters (equivalent to 40 credits)Feasibility study for industrial application was analyzed. For the fiber scale that we produce is still in the scale of the raw material for making nuggets, sausages and burgers,

This industrial-scale machine can also be used not only to produce tofu fiber, but to produce other products that industry needs in Indonesia in the future.

University students are ready to educate us in the field of technology in order to meet the company's needs for ready-to-use workers. This will provide convenience and comfort for companies in fulfilling human resources and is very beneficial for students who graduate from not only the diplomas they carry but have capital mental managerial capabilities and skills in their respective fields.

## B. MATERIALS AND METHODS

### Materials and Tools

**Tofu Dregs**

Tofu pulp and cassava were examined to produced fiber for dietary product. This local waste and casava were treated in utilization to produce fiber.

**Cassava**

The materials used in this study were cassava varieties Kaspro and Cimanggu obtained from cassava farmers.

**Method**

1. Samples preparations

This activity involves an association of tofu entrepreneurs in South Tangerang. All tofu pulp samples are taken immediately after the screening process, we are processed for inspection. Samples from all craftsmen are then mixed into one before analysis. The analysis was carried out in three replications.

2. Characterization of tofu pulp

In this research the data obtained from research dietary fiber production from casava and tofu waste pulp, supported by several other additional technical data from previous research.

The chemical substance of tofu waste was analyzed already like water. Moreover, proximate (protein, fat, ash, carbohydrate and fiber) analyzes will be analyzed afterward, by methods as listed in SNI 3751-2009, namely heating in the furnace for ash content, oven method for water content, Kjeldahl method (N x 5.7) for protein content and methods enzymatic graphimetric (AOAC 1995) for fiber content.

**Methods**

Several methods which were applied was assessed in order to delivered to support this feasibility study.

Hydrolysis

Enzymatic hydrolysis using amylase was applied to those raw materials. The local amylase was used in this process to minimize the production cost. Unfortunately, as local product, some information was missing in technical terms. To overcome this problem, the experiments were conducted in similar ways, concentration, time and treatment.

Deproteination

Deproteinaztion was delivered enzymatically and chemical. Protease was also local product. Unfortunately, the price was considered stile very expensive. Alternatively, chemical process was conducted by base condition, commercial reagent and pro analyses reagent.

Washing

Fiber processing was used aquadest for washing because this product would be applied to produce dietary product.

Drying and grinding

Downstream process, drying and grinding, was conducted in the cheapest way. drying by relying on the sun's heat is done as is the habit of people generally do these activities here. In addition, grinding process was also done in the simplest way.

All methods will be done by machinery for industrial scale and already prepared the equipment.

**Analyzes**

Several analyzes method was conducted.

Water content in raw material and final product was analyzed based SNI method SNI ISO 939:1980.

Sugar content was analysed by refractometry. 1 brix showed 1 % sugar content in the sample. This analyzation was calibrated by the conversion of analyzation that conducted by commercial laboratory.

## C. RESULTS AND DISCUSSION

Chemical Characteristics, Physical Tofu Dregs Based on the results of chemical analysis (Table 1), tofu waste has a high total fiber content, which is 28.4%. Human dietary fiber requirements are around 38 g / day for men and 25 g / day for women. Thus, tofu waste has a great potential to become a food source of fiber. Moisture level of tofu is quite high (Table 1), so it is perishable. Therefore, tofu waste requires heat treatment to remove these contaminants. The heat treatment is carried out at the heating stag

**Table 1. The chemical content of tofu waste from the tofu artisans association in South Tangerang.**

| Chemical Composition | Amount (%) |
|---|---|
| Moisture content (bb) | 86.8 |
| Ash content (bk) | 24.6 |
| Protein content (bk) | 14.6 |
| Total fiber (bk) | 28.4 |

Visual observations showed that the physical condition of the tofu dregs did not change much until 12 hours of storage (Table 2), which was white, distinctively smelling of soybeans, smooth texture and powdering. But after that, the tofu waste turns into a dull, slightly acidic to acidic, has mucus, and fungus that is clearly visible through visual observation (Table 2).

**Table 2. Physical characteristics of tofu pulp for 48 hours of storage.**

| Clock | Color | Aroma | Texture |
|---|---|---|---|
| 0 | White | Typical Soy Fine, | Smooth ,strewn |
| 6 | White | Typical Soy Fine, | Smooth, strewn |
| 12 | White | Typical soybean a bit dull | Smooth, strewn |
| 18 | Dull white | Typical soybean, slightly acidic Fine | Slimy, slippery |
| 24 | Yellowish | There are white mushrooms, Typical soybean Fine acid | Slimy, slippery |
| 48 | Yellow Very | Sharp sour odor;Moldy white & black | Smooth, slimy, slippery |

**Feasibility Analysis**

Economic analysis was estimated based on the discussion. The cheapest production cost was considered when using tofu waste pulp. Capital Expenditures (CAPEX) and Operational Expenditures (OPEX) were estimated for the standard price in local market for tofu waste pulp and 50-60% from commercial online price for dietary fiber. The investment calculation was shown on table 1.

**Table 1** Capital Investment

| **Capital Investment** | **Price Biogas $CH_4$** |
|---|---|
| Civil work | $400,000 |
| Processing | $250,000 |
| Mechanical | $33,333 |
| Piping | $65,000 |
| Down Stream Process | $157,500 |
| Total | $1,106,233 |

The project was located in Pamulang University at Witana campus. Therefore, this analysis ignored the costs incurred for the area procurement. Analyzes calculation at full capacity and 11 months, the company's revenue in one year will reach $ 792,744.

In term of OPEX, some expense was detailed in table 2. All employees were counted as full time workers. This dietary fiber plant was operated for 24 hours per days so that there should be 3 shifts. The plant was designed with automatic system; thus, the number of labors and administration staffs could be minimized.

**Table 2**

List of Operational Expenditures

| **Fixed Cost** | **Expenses** |
|---|---|
| Depreciation [17] | $110,623.30 |
| Salary | $75,311.65 |
| Utility and administration | $10,000.00 |
| Total | $195,934.95 |

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| Variable Cost | Price |
|---|---|
| Tofu waste pulp | $9,406.80 |
| Maintenance and utilities | $110,623.30 |
| Total | $120,030.10 |

**Investment Performance**

Performance of economic analysis firstly showed by Fig. 2 that discuss about Break Event Point (BEP) was reached by 28% production capacity. Low BEP means that Biogas Power Plant will not experience any losses even though if Biogas Power Plant is only operated 28% of the planned capacity.

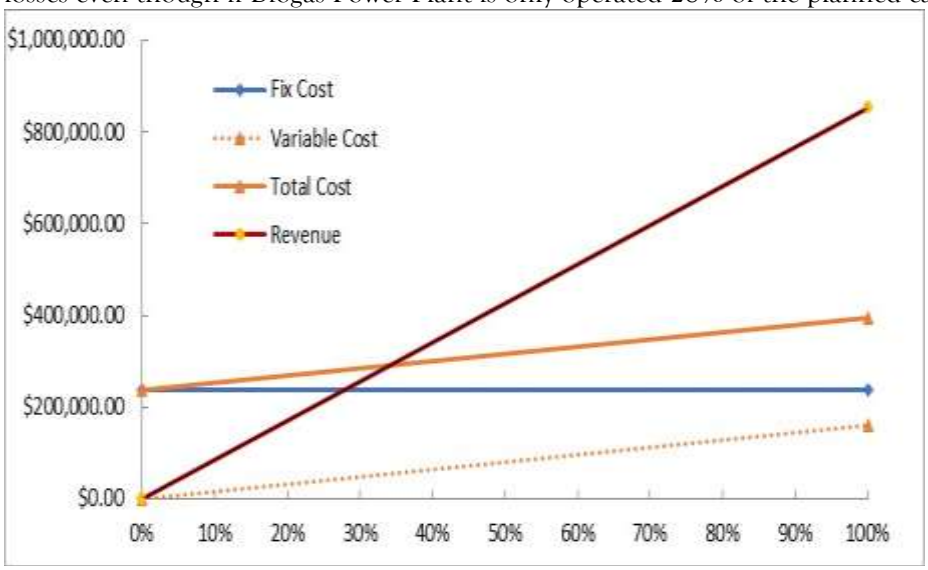


**Figure 1** BEP Analysis

Investment performance was analyzed by calculating Internal Rate of Return (IRR) and Pay Back Period (PBP). Dietary fiber Plant was built so that it did not take into account bank interest for this investment performance analysis. Moreover, economic analysis was calculated US $ currency so that the inflation rate was ignored. The investment needed $1,506,233 and the project was estimated to generate $852,191 in cash flows each year for ten years. The IRR= 33.96% is the rate at which those future cash flows can be discounted to equal $1,506,233. PBP could be achieved within 3 years 11 months.

**ANALISA KELAYAKAN INVESTASI**

**Soya Fiber**

COST AND BENEFIT

**A. INVESTASI**

| | | | |
|---|---|---|---|
| 1. | Investasi Awal | Rp. | 4.106.475.000 |
| 2. | Working Capital | Rp. | 243.728.000 |
| | **Total Investasi** | Rp. | **4.350.203.000** |

**B. PRODUKSI**

| | | |
|---|---|---|
| Target Produksi | 400 | Kg/Jam |
| Produksi Efektif per Hari | 8 | Jam |
| Kapasitas Produksi per hari | 3.200 | Kg / Hari |
| Hari Kerja | 20 | Hari |
| Target Produksi per Bulan | 64.000 | Kg |

**C. RENCANA PENDAPATAN**

Rencana Pendapatan per Bulan

| No | Produk | Harga Jual | Pendapatan |
|---|---|---|---|
| 1 | Soya Fiber | 11.000 | 704.000.000 |
| 2 | - | - | - |
| | Jumlah | | 704.000.000 |

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**D. BIAYA**

| | | | Soya Fiber |
|---|---|---|---|
| **1. Biaya Produksi (per kg)** | | Rp. | 1.308 |
| Tenaga Kerja Langsung | Rp | 686 | |
| Tenaga Kerja Tidak Langsung | Rp | - | per Kg |
| Energi Listrik & Gas | Rp | 598 | |
| Packaging Cost | Rp | 24 | |
| **2. Biaya Marketing (per kg)** | | Rp. | - |
| Delivery | Rp | - | |
| Promosi | Rp | - | per Kg |
| Sales | Rp | - | |
| **3. Biaya Tetap (per bulan)** | | Rp. | 9.116.200 |
| Tenaga Kerja Tidak Langsung | | 7.116.200 | per Bulan |
| Biaya Beban Listrik | | 1.000.000 | |
| Perawatan Mesin | | 1.000.000 | |

## SUMMARY

| | | |
|---|---|---|
| Nama Proyek | : | **Soya Fiber** |
| Perusahaan | : | UNPAM |

**DASAR PERHITUNGAN ANALISA KELAYAKAN**

| | | | | |
|---|---|---|---|---|
| Total Investasi | : | Rp. | 4.350.203.000 | |
| Periode Hitung | : | | **36** | Bulan |
| | | | 1 | |
| | | | Soya Fiber | |
| Target Produksi Per Bulan | : | | 64.000 | |
| Harga Jual | : | Rp. | **11.000** | |
| Rencana Pendapatan | : | Rp. | 704.000.000 | |
| Rencana Pendapatan per Bulan | | Rp. | **704.000.000** | |
| | | | Soya Fiber | |
| Biaya Variabel | : | Rp. | 3.808 | |
| Biaya Tetap | : | Rp. | **9.116.200** | |
| Biaya Variabel Per Bulan | : | Rp. | 243.728.000 | |
| Total Biaya Per Bulan | | Rp. | **252.844.200** | |
| Laba per Bulan | | Rp. | **451.155.800** | |

**HASIL ANALISA KELAYAKAN**

| | | | | | |
|---|---|---|---|---|---|
| Discount rate | : | | 12% | per Tahun | |
| Cek NPV | : | | 50% | per Tahun | |
| NPV | : | Rp. | 8.882.817.412 | | Layak |
| | | | Soya Fiber | | |
| BEP Qty | : | | 1.268 | Kg per Bulan | |
| BEP Value | : | Rp. | **13.943.505** | per Bulan | |
| PBP | Bulan ke | | 14 | | |
| ROI | | | **124%** | per Tahun | |
| BC Ratio | | | 278% | | |
| IRR | | | 70% | | Layak |

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**DATA INVESTASI DAN BIAYA**

Isi Sel yang berwarna kuning

**INVESTASI**

| Investasi Awal | Jml | | Harga Satuan | Jumlah |
|---|---|---|---|---|
| Dokumen | | - | | - |
| Tanah | 1000 | m2 | 1.000.000 | 1.000.000.000 |
| Bangunan | 1000 | m2 | 1.300.000 | 1.300.000.000 |
| Mesin | 1 | unit | 1.806.475.000 | 1.806.475.000 |
| Instalasi Listrik | 0 | unit | 50.000.000 | - |
| Instalasi Air | 0 | unit | 25.000.000 | - |
| Peralatan Kantor dan Furnitur | 0 | set | 25.000.000 | - |
| | | | TOTAL | 4.106.475.000 |

**TENAGA KERJA**

| Tenaga Kerja Langsung | Jml | | Gaji per Bulan | Jumlah |
|---|---|---|---|---|
| Operator | 7 | orang | 3.116.200 | 21.813.400 |
| Mekanik | 1 | orang | 3.116.200 | 3.116.200 |
| Gudang | 4 | orang | 3.116.200 | 12.464.800 |
| Umum | 1 | orang | 2.500.000 | 2.500.000 |
| Kepala Produksi | 1 | orang | 4.000.000 | 4.000.000 |
| | | | TOTAL | 43.894.400 |

| Tenaga Kerja Tk Langsung | Jml | | Gaji per Bulan | Jumlah |
|---|---|---|---|---|
| Kepala Pabrik | 1 | orang | 4.000.000 | 4.000.000 |
| Keuangan | 1 | orang | 3.116.200 | 3.116.200 |
| Admin | 0 | orang | 2.500.000 | - |
| Security | 0 | orang | 1.500.000 | - |
| Marketer | 0 | orang | 4.000.000 | - |
| | | | TOTAL | 7.116.200 |

**Biaya Tetap**

| Komponen Biaya | | | | Jumlah |
|---|---|---|---|---|
| Biaya Beban Listrik | 1 | Bulan | | 1.000.000 |
| Perawatan Mesin | 1 | Bulan | | 1.000.000 |
| | | | | |
| | | | | - |
| | | | TOTAL | 2.000.000 |

**Label & Kemasan**

| Uraian | apasitas | | Harga Satuan | Beban Biaya (Rp/kg) |
|---|---|---|---|---|
| Karung | 50 | kg | 1.200 | 24 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Jumlah | 24 |

**Biaya Marketing**

| Uraian | Beban Biaya (Rp/kg) |
|---|---|
| Delivery | - |
| Sales Insentif | - |
| Promosi | - |
| | |
| | |
| Jumlah | - |

| Konsumsi Listrik Mesin | | |
|---|---|---|
| Daya Mesin | 52 | kW |
| Pemakaian 1 jam | 52 | kWh |
| Harga Energi Listrik | 1.430 | rp/kwh |
| Biaya Pemakaian Listrik | 74.360 | per Jam |
| Lama Pemakaian | 8 | jam per Hari, per Shift |
| Biaya Pemakaian Listrik | 594.880 | Rp per Hari/shift |
| Lama hari kerja | 20 | hari kerja per bulan |
| Biaya Pemakaian Listrik | 11.897.600 | Rp /Bulan/Shift |

| Pemakaian Bahan bakar | | | |
|---|---|---|---|
| Pemakaian 1 jam | | 110 | kg |
| Pemakaian cangkang sawit | | 17.600 | kg/bulan |
| Harga cangkang sawit per k | Rp | 1.500 | Rp/kg |
| Biaya Pemakaian cangkang per Bul | | Rp | 26.400.000 |

| Biaya Energi Listrik | | | |
|---|---|---|---|
| Biaya Energi Listrik | Rp. | 186 | |
| LPG | Rp. | 413 | per Kg |
| Biaya Energi | Rp. | 598 | |

## C. CONCLUSION

After we analyzed the soybean and cassava fibers from their economic value, if needed, this laboratory began to eat the raw material we used was soybean fiber, with a total investment of Rp. 4,350,203,000, the profit calculation is obtained as follows: income plan Rp. 704,000,000 cost calculation Rp. 252,844,200 resulting in an estimated profit of Rp. 451,155,800. feasibility analysis with BEP Value of Rp. 13,943,505 per month, ROI 124% per year, with an IRR of 70%.
so the conclusion is considered decent.

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