Potential Financial Feasibility Analysis of Soybean Tempe Production in Madagascar Based on Indonesian Soybean Tempe Home Industry

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Abstract

Originally from Indonesia, soybean tempe is a traditional fermented soybean food that has found popularity in many country. Madagascar has enormous potential for soybean production. However nowadays, there is a decline in production due to the lack of product processing and marketing knowledge. The promotion of this commodity help to contribute to food security and to fight against malnutrition and poverty by improving the income of the actors. This research aim to analyze the soybean tempe business (small scale industry) in Surakarta city in order to introduce and implement that business in other countries. Madagascar is the target country in this research. A financial feasibility study was conducted to determine an eventual launch of soybean tempe business in Madagascar. The result shows that the average cost of soybean production in a month in Surakarta City is Rp 13,751,786. The average revenue is Rp 15,917,067, so that we get an average profit of Rp 2,165,281 per month. The soybean tempe business is beneficial with a profitability value of 15.74%. The efficiency value is estimated at 1.16. Based on the local price in Madagascar and the analysis made in Indonesia, it was determined that the project need an initial investment of Rp 14,661,638 for its launch in Madagascar. The Situation Analysis based on the SWOT method, the Benefit Cost Ratio (BRC), the Net Present Value (NPV) and the Internal Rate of Return (IRR) show that the soybean tempe business is clearly feasible in Madagascar. The comparative analysis of price reveal also that soybean tempe is a good alternative for the Malagasy people as it is far cheaper than the other food rich in protein. However, the sensitivity analysis highlighted that the business cannot resist to an increase of 10% of the soybean price or a decrease of 10% of the production or both.

Key words: Tempe, Business Analysis, Financial analysis, Surakarta, Madagascar

Introduction

In Indonesia, there are many agricultural processing industries, one of which is the soybean tempe industry. Indonesia is the largest producer of tempe in the world and the largest soybean market in Asia. Madagascar has enormous potential for soybean production. However nowadays, there is a decline in production due to the lack of product processing and marketing knowledge. The promotion of this commodity can help for the contribution of food security and for the fight against malnutrition and poverty by improving the income of each concerned actors (Nina, 2010).
Currently, in Indonesia there are approximately 81,000 tempe businesses that produce 2.4 million tons of tempe per year. Tempe industry produces about Rp 37 trillion value-added for the country. The average tempe consumption per person per year in Indonesia is currently estimated to be around 6.45 kg. In Indonesia, tempe industry is generally categorized as home industry scale where most of its workforce comes from the family. Introducing this business in Madagascar can be very interesting for the Malagasy population because so far no transformation of soybeans into soybean tempe has been recorded in the big Island.

Material and Method

Soybean tempe

Soybean tempe contains about 19.5% protein, 4% of fat, 9.4% of carbohydrates, 3.9-5 mg of vitamin B12 per 100 g soybean tempe (Sarwono, 2000). The presence of vitamin B12 content in soybean tempe, is seen as something unique. The soybean tempe should have a white-yellow color. Its durability is quite short because it cannot be kept longer than two or three days. As a source of nutrition, soybean tempe serves as a source of protein, iron minerals and acts as an anti-diarrhea and anti-bacterial (Syarief et al., 1999).

Business analysis

1. Production Cost

According to Kadarsan (1992), all the costs faced by companies can be broken into two main categories: fixed costs and variable costs. Fixed costs are costs that are independent of output. Variable costs are costs that vary with output. The total cost is the sum of the fixed cost and the variable cost (Mankiw et al, 2013)

\[ TC = TFC + TVC \]  
\[ \text{Where:} \]
\[ TC \quad : \quad \text{Total Cost} \]
\[ TFC \quad : \quad \text{Total Fixed Cost} \]
\[ TVC \quad : \quad \text{Total Variable Cost} \]

2. Revenue

According to Mankiw and al (2013), the revenue is the multiplication between the production obtained and the selling price and usually the production is negatively related to the price, meaning that the price will fall when production is excessive. Mathematically it can be written as follow:

\[ TR = Q \times P \]  
\[ \text{Where:} \]
\[ TR \quad : \quad \text{Total Revenue} \]
\[ Q \quad : \quad \text{Quantity} \]
\[ P \quad : \quad \text{Price} \]
3. **Profit**

According to Markwin et al (2013), profit is defined as total revenue minus total cost. Mathematically can be formulated as follow:

\[ \pi = TR - TC \]  
\[ \text{Where:} \]
\[ \pi = \text{producer profit} \]
\[ TR = \text{total revenues} \]
\[ TC = \text{total cost} \]

4. **Profitability**

According to Harward & Upton (1961) profitability is the ability of a given investment to earn a return from its use. According to Ibrahim (2003), if Profitability > 1 means that the industry is profitable; Profitability = 1 means that the industry runs BEP (Break Even); Profitability < 1 means that the industry is not profitable; Profitability can be written as follow:

\[ \text{Profitabilitas} = \frac{\pi}{TC} \times 100\% \]  
\[ \text{Where:} \]
\[ \pi = \text{Profit} \]
\[ TC = \text{Total Cost} \]

5. **Efficiency**

According to Soekartawi (2001), efficiency has the goal of minimizing production costs per unit of product in order to gain profit. The criteria used in the calculation of efficiency are: If the value of \( \frac{R}{C} > 1 \), means the industry is efficient; If the value of \( \frac{R}{C} = 1 \), means the industry has not been efficient or the industry has reached a breakeven point (not profitable and no loss); If the value of \( \frac{R}{C} < 1 \), means the industry is inefficient. Systematically to know the level of efficiency we use the formula:

\[ \text{Efficiency} = \frac{R}{C} \]  
\[ \text{Where:} \]
\[ R = \text{Revenue} \]
\[ C = \text{Cost} \]

**Situation Analysis**

Before the launch of new business, it is important to analyze the situation. There are several methods that can help to have a better understanding of the situation, SWOT analysis is the most common tool. A SWOT analysis is a strategic planning tool used to understand the strengths, weakness, opportunities and threats that could exist in a business (Kotler, 2002).
Analysis of Investment Criteria

1. Net Present Value

The NPV is defined as the sum of present values of annual net incomes earned in the period of the project exploitation (Stone, 1988). The results of the Net Present Value (NPV) calculation of investment decisions can be interpreted as follows: NPV > 0, then the business investment is feasible; NPV < 0, then the business investment is not feasible; NPV = 0, then the business investment does not have any effect. NPV can be calculated as follow:

\[
NPV = \frac{P}{(1+i)^t} - C
\]

Where:
- \(P\) = Cash inflows
- \(i\) = Discount Rate
- \(t\) = Period of investment
- \(C\) = Initial Investment

2. Net Benefice-cost ratio (Net B/C)

Benefit-Cost Ratio (BCR) compares project benefits to the cost of the project, and for the project to be feasible, the benefits have to be greater than the cost. The criteria in assessing the feasibility of a business in terms of BCR are as follows: Net B / C > 1 then the business is declared viable; Net B / C = 1 means the business breaks even; Net B / C < 1, the business is declared unfeasible. According to Kadariah (1978), here is the formula of Net Benefit-cost ratio:

\[
Net\ B/C = \frac{\sum_{t=1}^{n} (B_t-C_t)}{\sum_{t=1}^{n} (C_t-B_t)} \]

Where:
- \(C_t\) is the costs of the year \(t\)
- \(B_t\) is the benefits of year \(t\)
- \(r\) is discount rate
- \(n\) is the age of the project

3. Internal Rate of Return

Internal rate of return (IRR) is a discount rate that makes the net present value (NPV) of all cash flows from a particular project equal to zero (Arief, 2013). The criteria in assessing the feasibility of a business in terms of Internal Rate of Return are as follows: IRR > \(r\) (discount rate), then investment is interesting and feasible; IRR \(\leq\) (\(r\) discount rate), then investment will not be able to be implemented.
The formula used to calculate IRR is:

$$\text{IRR} = i_0 + (i_1 - i_0) \frac{\text{NPV}_0}{\text{NPV}_0 - \text{NPV}_1}$$

(8)

Where:
- $i_0 = \text{Level of rate of return}$
- $i_1 = \text{Interest rate comparison}$
- $\text{NPV}_0 = \text{net present value on } i_0$
- $\text{NPV}_1 = \text{net present value on } i_1$

**Sensitivity Analysis**

Sensitivity analysis is performed to see the response to the price changes that occur in the input and the output of the production. This analysis was conducted to increase the price of soybean by 10%, then to decrease the production of 10% and to combine both situations simultaneously. This analysis requires the use of the switching value method.

**Results and Discussions**

**Business Analysis**

1. **Production Cost**

   The fixed cost is estimated at Rp 2,531,337, and variable cost is estimated at Rp 11,220,448. The largest variable cost is attributed to the soybean, estimated at Rp 8,701,980, which represents 77.55% of the total variable cost. For the fixed cost, the largest spending is attributed to the workforce, which is Rp 2,511,000 per month.

2. **Revenue**

   Receipts obtained by the company come from the production value of each tempe size. Tempe price applicable for small banana leaves is Rp 368 per package, for a small plastic bag is Rp 336, for a medium plastic bag is Rp 1,042, for a big plastic bag is Rp 2,386. The largest revenue comes from the small package, estimated at Rp 5,795,967 per month, representing 36.41% of the total revenue. The total production of soybean tempe is evaluated at Rp 15,917,067 per month.

3. **Profit**

   The profit gained from the production of soybean tempe in a month is equal to Rp 2,165,281 with an efficiency equal to 1.16. This value indicates that every Rp 1 cost incurred, helps to earn a receipt of 1.16. The value of investment, cost, recipients and business analysis can be seen in Table 1.
Table 1. Total cost, Investment, Total Revenue, Profit, Efficiency, Efficiency of soybean tempe industry in a month in Surakarta City

<table>
<thead>
<tr>
<th>No</th>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total cost (TC)</td>
<td>13.751.786 Rp</td>
</tr>
<tr>
<td>2</td>
<td>Total Fixed Cost (TFC)</td>
<td>2.531.337 Rp</td>
</tr>
<tr>
<td>3</td>
<td>Total Variable Cost (tvc)</td>
<td>11.220.448 Rp</td>
</tr>
<tr>
<td>4</td>
<td>Initial Investment</td>
<td>2.562.932 Rp</td>
</tr>
<tr>
<td>5</td>
<td>Total Revenue (TR)</td>
<td>15.917.067 (Rp )</td>
</tr>
<tr>
<td>6</td>
<td>Profit</td>
<td>2.165.281</td>
</tr>
<tr>
<td>4</td>
<td>Efficiency</td>
<td>1.16</td>
</tr>
</tbody>
</table>

Situation Analysis

According to the situation analysis made in Madagascar, five potential opportunities and four potential threats identified (Figure 1).

Figure 1. Situation Analysis in Madagascar

<table>
<thead>
<tr>
<th>Internal Factors</th>
<th>External Factors</th>
<th>Opportunities (O)</th>
<th>Strenght Opportunity (SO)</th>
<th>Weakness Opportunity (WO)</th>
<th>Threats (T)</th>
<th>Strenghts Threats (ST)</th>
<th>Weaknesses Threats (WT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong (S)</td>
<td></td>
<td>1. The initial funds for the materials is not really high</td>
<td>1. Completing the required fund by borrowing from a Bank in Madagascar (Bank of Africa)</td>
<td>1. Non availability of the ragi tempe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. New kind of Business in Madagascar</td>
<td>2. Launch of Business that produce soybean tempe in Madagascar</td>
<td>2. Soybean tempe don’t last more than 3 days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. The future shareholders are motivated and interested</td>
<td>3. Creation and introduction of a fresh new product in the Malagasy market</td>
<td>3. Low competence in Management and Organization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weakness (W)</td>
<td></td>
<td>1. Non availability of the ragi tempe</td>
<td>2. Importation of tempe yeast from Indonesia</td>
<td>4. No competence in processing soybean into tempe</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>2. Soybean tempe don’t last more than 3 days</td>
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<td>3. Low competence in Management and Organization</td>
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<td></td>
<td></td>
<td>4. No competence in processing soybean into tempe</td>
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<td></td>
<td></td>
<td>5. Support for small scale industry by the Malagasy Government</td>
<td></td>
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</tr>
</tbody>
</table>

1. Decrease of production of soybean in Madagascar
2. The consumers may not like the taste as there is no food additif, apart from the tempe yeast
3. The quality of the soybean tempe may not be really good
4. The corruption and the administrative processes in Madagascar may slow down the launch of the business
Financial Feasibility Study

1. Estimated Investment

Based on the local price of the materials and the raw materials in Madagascar, the average cost needed for the launch of a small scale business of soybean tempe is estimated at Rp 3,409,500. In this analyze, it is considered that the producer already had a fund of Rp 5,000,000. However, for the launch of the product, the variable and fixed cost of the first month of production had to be included in the initial operational investment. In fact, the operational investment is estimated at Rp 14,661,638 for a production of 40 kg of soybean per day. The producer of soybean tempe, should in fact make a loan of Rp 9,661,638. The reimbursement is expected to be over within 3 years, which is an advantage as the estimated time for project is five years.

2. Estimated production cost

The estimated variable cost per year is estimated at Rp 124,221,600 per year. The price of soybean (Rp 110,160,000) is the most important spending. The expected fixed cost is Rp 10,804,050 per year. That spending is mainly due to the cost of workforce which is evaluated at Rp 10,560,000 or 94.74% of the total fixed cost. The rest is attributed to the depreciation of the materials.

3. Estimated Revenue

The small business is expected to produce 300 soybean tempe per day. Knowing that it is difficult to find banana leaves in Madagascar, the packing used will be plastic bag only. Each soybean tempe is expected to be sold at Rp 1,500 with only one size. In fact, the estimated total revenue per year is Rp 145,800,000.

4. Cash flow

The initial investment is estimated at 14,661,638. The company’s operating cost (Rp 145,025,656) and operating revenue (Rp 145,800,000) during five years are expected to be constant. The loan (Rp 3,793,598) is expected to return after three years. The taxes are evaluated at 35%. The Net Income Cash flow is Rp 4,781,535 for the first three years and increase to Rp 7,247,374 from the fourth year. The depreciation of the materials were calculated by supposing that the materials loss 5%, 10% and 20% of their initial values per year, respectively.

Criteria investment Analysis

For a project to be feasible, the NPV > 1, Net B / C > 1 and IRR > discount rate are the main conditions. The Net Benefit Cost ratio of the company will be 2.66, which means that the project is feasible and is able to generate about more than twice the value of the initial investment within five years. The net present value is estimated at Rp 22,455,634. This means that the small soybean
The tempe company can provide this amount within five years, in fact, the project is feasible. The Internal Rate of Return is estimated at 65% which is greater than the current interest rate of 15% per year, the project is feasible. The Payback period is 1.64 years. This period is obviously shorter than the project duration, which is five years. This means that the project is feasible and the company may reach his objective that is extending the business after five years and if possible, moving to a middle scale.

**Sensitivity Analysis**

3 scenarios have been taken into account for the sensitivity analysis. For the first scenario, the price of soybean is expected to increase 10%, while for the second scenario, the production decrease of 10% and for the third scenario, an increase of soybean price plus a decrease of 10% of the production is expected. According to Table 5, in those 3 scenarios, the NPV will be respectively negative, which means that the project cannot survive.

**Table 2. Sensitivity Analysis**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV</td>
<td>-15,471,686</td>
<td>-27,418,767</td>
<td>-64,346,108</td>
</tr>
</tbody>
</table>

**Conclusion**

The average total cost of soybean tempe industry in Surakarta is Rp 13,751,786 per month. The average revenue earned is Rp 15,917,067, the average profit earned by soybean industry is Rp 2,165,281 per month. The profitability of domestic soybean tempe industry in Surakarta is 15.74%, which means the soybean tempe industry business is profitable. The efficiency value is more than one that is equal to 1.16. The situation analysis shows that there is 5 main opportunities and 4 potential threats for the launch of soybean tempe in Madagascar but all of the indicators used in the financial analysis highlighted that the launch of soybean tempe business in Madagascar is feasible. The Net Benefit Ratio is greater than 1, which equals to 2.66; Internal Rate of Return is greater than the current interest rate (15%) , which is equal to 64.51% ; The Net Present Value is positive, which is equal to Rp 22,455,634 and the payback period equals to 1.64 years which is shorter than five years. The sensitivity analysis shows that the company cannot resist to an increase of 10% of the soybean price, or a decrease of 10% of the production or both situation simultaneously.

**References**


