The Journal of Social Sciences Research
ISSN(e): 2411-9458, ISSN(p): 2413-6670
Vol. 6, Issue. 2, pp: 167-172, 2020
URL: https://arpgweb.com/journal/journal/7
DOI: https://doi.org/10.32861/jssr.62.167.172

Academic Research Publishing Group

Original Research Open Access

Business Feasibility of Mocaf Flour Products, Cassava Starch, Purple Sweet Potato and Yellow Yams

Etty Soesilowati*
Faculty of Economics, Semarang State University, Indonesia

Nana Kariada Tri Martuti
Faculty of Mathematics and Science, Semarang State University, Indonesia

Octavianti Paramita
Faculty of Technics, Semarang State University, Indonesia

Abstract

Feasibility analysis of tuber flour production business aims to determine its profitability. The study used a quantitative approach with a sample of SME UD. Berkah, Semarang. The variables include investment costs, working capital, and profits. Data were analyzed using Cost & Benefit Ratios, Payback Period, Net Present Value, and International Rate of Return. The results show that to produce 4,000 kg/month of tuber into flour requires an investment cost of IDR. 120,800,000. With depreciation of IDR. 671,083,- per year, the income of IDR. 9,150,000 per month can be earned or 23.8% per year. The payback period is estimated to be 1.1 years with an internal rate of return of 84.28%. Hence, it can be concluded that the business of producing mocaf flour, cassava starch, cassava, purple yam flour and yams is feasible. Flour producers should increase the production capacity by building business networks ranging from tuber farmers to the users.

Keywords: B/C ratio; Payback period; NPV; IRR; Tuber flour.

1. Introduction

Over recent decades, trends in food production per capita have been generally positive across most regions. Growth rates in Indonesia have been higher for the last 20 years (Pocketbook, 2015). The consumption of wheat flour in Indonesia continues to increase which is in line with the growth of instant noodle consumption, bread, biscuits and cookies. Over recent decades, trends in food production per capita have been generally positive across most regions. Nearly 95% of food made from wheat flour is actually an "introduction" type of food meaning that it is not original from Indonesia. The growth of wheat flour consumption figures for ten years from 2006-2015 reached 4% per year. Further, the import of wheat as a raw material for wheat flour for the past 4 years has risen 25% from 6.46 million tons in 2012 to 8.1 million tons in 2016.

As a matter of fact, wheat is 100% imported by Indonesia. Data from Statistic Central Agency (Badan Pusat Statistik) showed that import of wheat and meslin as of April 2017 reached 934.7 thousand tons with value of US $ 214.04 million. The imports increased substantially compared to the same month's imports of the same commodity. Meanwhile in March 2017, imports of wheat and meslin only reached 741.3 thousand tons with value of US $ 167.2 million. This means there was an increase of 193.4 thousand tons.

The dependence of the Indonesian people on imported flour has created a fear of the shifting consumption towards the local food besides rice. Local carbohydrate sources that can actually function strategically as food reserves, so that, it can support national food security, namely tubers. Central Java's Institute of Agricultural Technology (BPTP) has succeeded in finding 13 types of potential genetic resources for potential non-rice food crops in Central Java in which 10 types of tubers have not been utilized optimally, including cassava, purple sweet potato and yellow yams. This can be seen from the quality of food consumption of the people of Central Java province from 2008-2013. It showed that the PPH- *Pola Pangan Harapan*- of tubers tends to always be below the standard score of 2.5. In fact, the PPH score is one indicator of the food security success in Central Java from the consumption aspect (BPTP, 2014).

Local tubers are widely available in Indonesia, however, its availability is not yet used optimally. Besides containing high carbohydrates, these inferior local tubers also contain a number of bioactive compounds that have physiological effects as antioxidants. Bioactive compounds found in the inferior local tubers are dioscorin, diosgenin, and phenol. These three types of bioactive compounds have been shown to have the ability to ward off free radicals.

The results of Revealed Comparative Advantage (RCA) analysis for Indonesian cassava commodities have a value of 0.7 meaning that Indonesian cassava does not have a comparative advantage compared to other countries. However, the result of the analysis of Privat Cost Ratio (PCR) shows that cassava farming has a competitive advantage because it has a PCR value of 0.36. Meanwhile, the private benefits are positive indicating the results of supernormal Indonesian cassava farming and it is possible for expansion (Fahrisa *et al.*, 2017).

*Corresponding Author

The efficiency of the production process of making tuber flour affects product marketing. Drying time until raw materials are ready to be milled takes 3-4 days in normal conditions with sufficient sunlight. Therefore, tuber drying technology is important to be developed to increase the capacity of tubers flour products. Efficiency in production is a ratio of output and input related to achieving maximum output with a number of inputs. It means that if the output ratio is large, then the efficiency is higher.

Feasibility analysis of tuber flour production business is needed as a basis for someone to make an investment and also look at the prospects for the future. In particular, the business feasibility analysis has a short-term goal of "profit maximization", while the long-term goal is for "wealth maximization". In general, business feasibility analysis has the aim of reducing wheat imports through the use of local food as substitute goods

2. Literature Review

Flour is a form of material processing carried out by minimizing the size of the raw material using the method of grinding or sealing. In the milling process, the size of the material is reduced by means of being crushed by the mechanical force of the grinder. The difference with the starch flour process lies in the extraction process by pressing, settling to separate the starch. The process of making tuber flour can be done in a dry or wet process.

The method was crystallization by utilization of blower system to accelerate the process of water content reduction. The data were analyzed using proximat analysis. Water content was 5.61-15%, ash content was 0.4-5.31%, carbohydrate content was 82-88%, protein content was 0.67-6.32%, and fat content was 1-7%. Meanwhile, tubers flour is worthy to be used as raw materials for food industry (Etty *et al.*, 2018).

Cassava-based flour does not contain gluten. Gluten is an amorphous mixture of proteins contained starch in the endosperms of some cereals, especially wheat, rye, and barley. Wheat has the highest gluten content among the three oats. The content of gluten can reach 80% of the total protein in flour, and consists of gliadin and glutenin proteins. Sweet potato flour also has a low Glycemic Index and has the potential as a functional food as a substitute for staple rice for diabetics.

There are six advantages of cassava flour compared to wheat flour, namely: (1) The texture is denser so that its use is more economical; (2) Lower water content so that the cake quickly cooked when steamed; (3) Higher sugar content so that more efficient use of sugar or other sweetening ingredients; (4) the taste is neutral so that it is easy to absorb any additional flavor; (5) Cheaper price; (6) After being processed into cakes, the durability is longer than those made from flour.

Cassava flour produced through the fermentation process known as mocaf flour to be used as raw material for food products having a softer, more blooming, sweet, and not flavorful texture which is like wheat flour. In some dried food processed products such as cookies, cheese sticks, cork eggs, and processed cakes and traditional cakes such as *lapis legit*, steamed bread, *dodol*, *candil* porridge, and *klepon*, mocaf flour can substitute 50-100% use of flour and / or sticky rice flour. While for bread, pastry, and noodle preparations, it can substitute 30-40% for the use of flour, crackers and *pempek* replace 100% tapioca.

A good mocaf can be produced from cassava having age of 8-12 months. The cassava used must be of good quality to produce a good quality mocaf. Damage to cassava can cause the produced mocaf to be brownish black. For raw materials derived from dry chips, some quality requirements should be met; white, its smell and aroma are not musty, and has a moisture content below 14%. Therefore, this problem has to be solved immediately. There should be some improvement in production processes, be it in working method, personnel capacity, and equipment used in the production process (Chumaidiyah, 2017).

Processed cassava products that have developed commercially include crackers, chips, and mocaf or modified cassava flour (modified cassava flour) in Central Berangas Village, Alala Subdistrict. However, there were only about 3.6% of farmers process cassava for traditional food products and they did it for additional household income in which it had a low contribution, only 1% of off-farm activities.

This household scale industry is generally a secondary activity of farmers or villagers as a source of additional income and this activity is seasonal. However, household scale industries are in fact needed to provide employment opportunities and at the same time for income distribution.

The Study of A Modelling Framework of Sustainable Supply Chain Management for Organic Vegetables in Rural Area with Narrow Land: An Action Research in Indonesia showed that the proposed supply chain management model is proven as an appropriate model to secure supply chain of organic vegetables in rural area. Using this model, organic vegetables cultivation sustainably maintains the family's food self-sufficiency and lead to semi-commercial needs of the surrounding communities (Margunani, 2018).

3. Methodology

The research is casuistic and specific with samples of cassava flour, purple sweet potato, yams and their derivatives produced by UD Small and Medium Enterprise of Berkah Semarang, Indonesia. This research employs a quantitative approach (Pandey and Pandey, 2015). Data were taken through questionnaires and interviews. The basis of the business feasibility analysis used includes financial aspects, namely investment costs, production costs, variable costs, revenue from business income, and profit and loss.

The business feasibility analysis is a technique of analyzing cost and benefit involving estimation and evaluating benefit associated with alternative acts which will be performed (Schniederjans *et al.*, 2004). Cost Benefit Analysis is employed to predict loss and profit of a program. It calculates cost and benefit obtained from carrying out the program. Furthermore, it can be used to detect how good and hazardous a program is.

Society Investment Cost is a cost that can be used in a relatively long run. Investment costs are related to the construction or development of physical infrastructure and production capacity (production equipment). In this study, investment costs are calculated per year in rupiah (IDR).

The stages of the financial feasibility analysis of the scale of small and medium enterprises include:

1. Total costs (TC), is the sum between fixed costs and variable costs. Variable costs are variable costs based on changes in the number of products produced. As it is calculated per unit of output, the greater the volume of the products produced, the greater the costs to be incurred (Gupito, 2014b).
2. Acceptance. Acceptance analysis uses the formula: TR = Q x P; TR = total revenue (total revenue), Q = number of products (quantity), P = price (price). Revenue is money obtained from the sale of goods or output.
3. Profit is the total revenue (TR) obtained by the producer minus the total cost (TC) thus it makes net income or benefits (B) obtained by the producer.
4. Analysis of receipts of costs (R / C ratio), is the ratio of revenue to production costs (R / C ratio) used to measure the level of relative profit, meaning that from the ratio number can be known whether a business is profitable or not (Normansyah *et al.*, 2014).

Several measures used as the basis to decide the tuber flour production business' feasibility are Payback Period, Net Present Value, and Internal Rate of Return. Payback Period is used to measure how long the investment capital will be reused which is used to purchase fixed assets. If the investment capital returns before the economic value of the asset ends, the investment is received. Likewise, if the asset age is shorter than the return value of our investment, then the investment should be rejected. The Payback Period is calculated using the formula:

$$Payback\ Period = \frac{\text{Number of Investment}}{\text{Net Income}} x\ 1\ year$$

Net Present Value (NPV) is the present net value of cash flows or the difference between the NPV of an investment and its present value. The method process is by calculating the present value with the expected results on the basis of the specified discount rate. Then, the present value is added up and reduced by the value of the investment. The difference from the sum of the present value with the investment value is called NPV. If the NPV value obtained is marked positive, it means the investment is accepted, and vice versa, if the NPV obtained is marked negative, then the investment should be rejected.

Internal Rate of Return (IRR) is a method to complete the NPV method with an internal rate of return. In other words, the IRR functions to show the interest of the flour business can create compared to the generally accepted bank interest rate (market interest rate or Minimum Attractive Rate of Return (MARR). The step taken to do this analysis is to compare the prevailing interest rates with the generated interest. If the amount of NPV obtained is still high from the investment value, so that the interest rate will be increased. Conversely, if the NPV value obtained is small from the investment value, the interest rate is lowered. This process is continuously conducted until the NPV number is equal to to Rp. Zero or close to zero rupiah to close to zero. The amount of the interest level showed the amount of the rate of return on the investment proposal.

IRR has three values having certain meanings of the investment criteria, namely:

1) IRR <Social Opportunity Cost of Capital, this means that the business or project is not financially feasible.
2) IRR = Social Opportunity Cost of Capital, this also means that the business or project is in a break-even point.
3) IRR> Social Opportunity Cost of Capital, this means that the business or project is financially feasible.

4. Result and Discussion

4.1. Cost and Benefit Analysis

The industry of mocaf flour, cassava starch, cassava, purple sweet potato and yams is the result of processing various varieties of sweet potatoes which are then packaged and marketed. Therefore, to run the business, the initial investment costs are needed to buy various assets and business equipment. Business equipment needed includes chopper machines, drying machines, flour machines, sealer, freezers, and manufacturing of production rooms. The biggest component of investment costs is manufacturing machinery which is more than 50% of the total cost. The investment is needed to increase added value while maintaining the nutritional content of tuber flour. After estimating the required costs and calculating the depreciation value, then the value of the initial investment is IDR 120,800,000 and the depreciation value is IDR 8,053,000 per year or Rp. 671,083, - per month as illustrated in table 1.

Table-1. Business Investment Cost

No	Description	Unit	Unit price (IDR)	Total (IDR)
1	Drying Machine	1	20,000,000	20,000,000
2	Flour Machine	2	13,500, 000	27,000,000
3	Chopper Machine	2	7,500,000	15,000,000
4	Sealer Machine	1	300,000	300,000
5	Small Scales	1	1,000,000	1,000,000
6	Big Scale	1	6,000,000	6,000,000
7	Gas Stove	1	1,000,000	1,000,000
8	Freezer	1	3,500,000	3,500,000
9	Production Room	1	50,000,000	50,000,000
10	Storefront	1	2,000,000	2,000,000
Total Investment				120,800,000
Depreciation Costs Per Year				8,053,000
Depreciation Costs Per Month				671,083

Meanwhile, the variable costs needed to produce tuber flour include the costs of raw materials such as cassava and sweet potatoes and other operational costs such as electricity, water, gas, labor and packaging costs. It is found that by processing 4,000 kg of cassava per month, it requires variable costs of Rp 35,500,000 as in table 2

Table-2. Business Variable Cost

No	Description	Unit Price (Rp)	Unit	Total (IDR)
1	Cassava	6,300	2000 kg	12,600,000
2	Tuber	5,500	2000 kg	11,000,000
3	Electricity	500,000	1 m	500,000
4	Gas	500,000	25 kg	500,000
5	Water	100,000	1 month	100,000
6	Labor	1,000,000	3 people	3,000,000
7	Packaging	1,950	4000 pc	7,800,000
Total Cost (TC)				35,500,000

The biggest component of production costs for processed cassava products is the cost of materials (Table 2), including raw materials for cassava & sweet potatoes, and supporting material such as packaging costs. The proportion of material costs is more than 65% of the total costs, supplied from surrounding farmers.

The tuber flour business is able to produce various kinds of flour including *mocaf* flour, cassava starch, cassava and sweet potato flour. Each product's price is different, where the price of sweet potato flour is Rp. 45,000 / kg; mocaf Rp. 12,000 / kg, cassava starch flour and cassava is Rp 10,000 / kg. It is also found that packaging is an obstacle for craftsmen in marketing their cassava products. The simple appearance of the packaging in the form of a plastic film does not allow the resulting mocaf flour to be sold at a higher price than Rp. 12,000 / packaging because it is difficult for the market to accept. The use of more attractive packaging (aluminum foil and boxes) increases the price of mocaf flour to Rp. 25,000 / pack or has more than double price of mocaf flour itself. The results of the sale of products with various variants obtained total revenues in a month of Rp, 44,650,000, as in table 3

Table-3. Business Revenue

No	Description	Number of Production (kg)	Price per Unit (Rp)	Total Price (Rp)
1	Mocaf	1,000	12,000	12,000,000
2	Cassava starch	5	10,000	50,000
3	Cassava	1,000	10,000	10,000,000
4	Sweet potato	500	45,000	22,500,000
5	skin	50	2,000	100,000
Total Revenue (TR)				44,650,000

Mocaf flour, cassava starch, cassava, and sweet potato flour are produced based on orders because of the limited supply of raw materials, especially during the dry season. Its marketing area includes Java, Bali, and the capital to produce is fully independent,

Table 4 illustrates the monthly income from flour production business, where working capital of Rp, 35,500,000 can earn income of Rp, 44,650,000 so that the total profit in a month can be obtained at Rp, 9,150,000 or 109,800,000 per year, Then, it means that the annual profit is reduced by depreciation per year by Rp, 8,053,000 so that the net income to be received each year is 101,747,000,- (23,8%),

Table-4. Estimated Profit and Loss

No	Description	Amount
1	Total Revenue	44,650,000
2	Total Cost	35,500,000
Gross profit Per month		9,150,000
Gross profit Per year		109,800,000
Net Profit Per year		101,747,000

4.2. Business Feasibility Analysis

There are several measures that can be used as a basis for decision making to state whether a business plan or investment activity is feasible or not including Payback Period, and Net Present Value. In tuber flour business, an initial investment of Rp, 120,800,000 is needed, where each year, the value of assets is depreciated by Rp, 8,053,000, so that the net investment value is Rp, 112,747,000.

To calculate the payback period, the net investment value is divided by the receipt of net income per year. As illustrated in Table 4, the net income of the tuber business is IDR. 101,747,000,- per year so that the payback period value is obtained at IDR 1,1081113. This figure shows that in a period of 1 year over 1 month the investment value will return before the economic period of the asset purchased is finished. The economic value of assets in this business is expected to run out within 15 years so that it shows that investment is visible,

The calculation of the feasibility of making tuber flour is as follows:

Analysis of *Payback Period* (PP)

$$Payback\ Period = \frac{\text{Amount of Investment}}{\text{Net Profit}} x\ 1\ Tahun$$

Initial Investment = IDR 120,800,000

Depreciation Per Year= IDR 8, 053,000

Net Investment = IDR 120,800,000 - Rp 8,053,000 = IDR 112,747,000

$$Payback\ Period = \frac{\text{Rp } 112{,}747{,}000}{101{,}747{,}000} x\ 1\ Tahun = 1{,}1081113$$

4.3. Analysis of Net Present Value (NPV)

Net Present Value is the present net value of the cash flow or the difference between the Present Value of the investment and the present value. The calculation of the NPV method is conducted by calculating the present value with the expected results on the basis of the specified discount rate. Then, the present value is added up, and then reduced by the value of the investment. The difference from the sum of the present value with the investment value is called net present value (NPV). If the NPV value obtained is marked positive, the investment is received, whereas if the NPV obtained is marked negative, then the investment should be rejected,

In this business, the economic value of the investment is estimated to be around 15 years and the incoming cash flow is estimated to be constant. With a discount rate of 15%, an NPV value of 474,152,265, 43 is obtained. The calculation shows that the amount of PV is greater than the value of the investment so that the NPV value is positive. This shows that business investment in tuber flour is feasible or acceptable.

4.4. Analysis of Internal Rate of Return (IRR)

The results of the analysis of the Internal Rate of Return (IRR) in tuber flour business obtained an IRR value of 84.28%, The amount of the IRR indicates that the interest rate for obtaining the PV amount to the investment value is zero, then the interest rate given is 84.28%, This means that the business of making tuber flour is financially feasible.

To increase the added value of tuber products not only made flour but can also be used as crackers and chips. The business of making crackers and chips from tubers has a B / C ratio of 1.7 and added value and profit rates respectively 63.1% and 90.8%. It means that cassava crackers and cassava chips are worth to develop (Dian and Nila, 2018).

The technology of making cassava flour is not widely known by rural communities, Technology is one of the factors supporting the success of agro-industrial system development with appropriate aspects, efficiency and is easy to implement. The development of cassava flour which is an intermediate product both in the form of granules and flour can extend storage capacity, save storage space, increase its use value, easily processed and formulated into composite flour, Cassava flour has high competitiveness as a substitute for wheat flour (Heny, 2010).

Furthermore, the research results of Fahrisa *et al.* (2017), shows that Revealed Comparative Advantage (RCA) for Indonesian cassava commodities have a value of 0.7 or below one, which means Indonesian cassava does not have a comparative advantage compared to other countries with the same commodity. However, on the other hand, the Private Cost Ratio (PCR) of cassava farming in Indonesia has a competitive advantage because it has a PCR value of 0.36 or less than one, which means that to get the added value of cassava farming output by one unit, additional domestic factor costs are needed, from one unit which is equal to 0.36. While the private benefits are positive, it shows that the indications of the results of Indonesian cassava farming are supernormal and should lead to expansion in the future, except if the agricultural area in Indonesia cannot be expanded or there are more profitable substitute crops privately,

Various critical aspects of institutions need to be considered in the process of traditional institutional transformation. Agro-industry development is supposed to be related to the diversity and level of market demand,

accompanied by a complete set of regulations that supports farmers who produce raw materials. With the improvement and development of processing technology, a comparative and high quality flour can be achieved. In addition to the relatively lower price comparison, various aspects related to the quality of flour need to be standardized. The development of labor institutions in the form of coaching and training to improve knowledge and skills in the manufacture of processed products is needed in supporting the development of rural agro-industries. Entrepreneurial quality and business success depend heavily on personal characteristics of business people (in this study are women), not on any formal education system (Loh and Dahesihsari, 2013). The study also found that many women were able to develop a strategy of anticipating a strong business failure.

5. Conclusion

With a B / C ratio of 1,25 and a value-added ratio and profit rate of 23,8%, the UD Berkah flour processing industry in Semarang, Central Java, is feasible to develop. Investment is expected to return 1.1 years with an internal rate of return of 84.28%. Based on the results of the study, the researcher suggests that to improve the added value for local food, the government should maintain and control the amount or volume of imports through the development of other flour-based products sourced from domestic agricultural products to minimize dependence on imported wheat. Then, for tuber flour producers, it is recommended to develop the supply chain from upstream to downstream. The scope of the supply chain includes farmers, collectors, tuber processors and food industries using flour. While the supply chain of various tuber-based foods can be developed both within regions and outside the region even between islands. The management of tuber supply chains starting from farmers as members of the most upstream supply chain to the food industry using tuber flour as the most downstream member needs to establish a strong partnership pattern. Existing institutions need to be strengthened by the use of technology so that efficiency, quality, quantity and continuity of products are guaranteed.

This research is a case study and is carried out on the scale of MSMEs. Hence, the results of this study will be different if applied to large scale industries. Further, the research does not take into account the transportation costs and supply chains for raw materials from farmers to consumers.

References

BPTP (2014). *The role of agricultural technology innovation in the development of sustainable bioindustry to realize food sovereignty.* Central Java: Proceeding of BPTP.

Chumaidiyah, E. (2017). Value chain map of small agricultural product-processing enterprises in Bandung, Indonesia. *International Journal of Supply Chain Management*, 6(4): 76-82.

Dian, A. and Nila, P. (2018). Financial feasibility and added value analysis of cassava processing in barito koala, South Kalimantan. *Penelitian Pertanian Tanaman Pangan*, 2(2).

Etty, S., Nana, K. and Octavianti, P. (2018). Improvement of nutritional quality of tuber flour as local food resource. *Jurnal Kesehatan Masyarakat*, 14(1): 411-17.

Fahrisa, S. P., Endang, S. R. and Agustono (2017). Analysis of indonesian cassava competitiveness in international markets. *SEPA*, 14(1): 1-7.

Gupito, R. W. d. (2014b). Analysis of factors affecting sorghum farmer income in gunungkidul regency. *Agro Ekonomi*, 24(1): 66-75.

Heny, S. (2010). Kajian rantai pasokan dan penganekaragaman konsumsi pangan berbasis produk umbi-umbian : Studi kasus jawa barat. Study of supply chain and diversity of food consumption based on tubers. *Buletin Litbang Perdagangan*, 4(1): 31-62.

Loh, J. M. and Dahesihsari, R. (2013). Resilience and economic empowerment: a qualitative investigation of entrepreneurial Indonesian women. *Journal of Enterprising Culture*, 21(01): 107-21.

Margunani (2018). A modelling framework of sustainable supply chain management for organic vegetables in rural area with narrow land: An action research in Indonesia. *International Journal of Supply Chain Management*, 7(2): 75-83.

Normansyah, D. S., Rochaeni, d. A. and Humaerah, D. (2014). Analysis of vegetable farming income in jaya farmer groups, ciaruteun village, cibungbulang district, bogor regency. *Journal of Agribusiness*, 8(1): 29-44.

Pandey, P. and Pandey, M. M. (2015). *Research methodology; tools and techniques.* 1st edn: Printed in Romania: Bridge Center.

Pocketbook, F. S. (2015). *World food and agriculture*. Rome: Food and agriculture organization of the united nations.

Schniederjans, M. J., Hamaker, J. L. and Schniederjans, A. M. (2004). *Information technology investment: Decision-making methodology*. World Scientific.