

Financial Feasibility Analysis of Manufacturing Body Scrub from Coffee Waste

Adrinoviarini¹, Ririn Fatma Nanda^{1*}, Syifa' Robbani¹, Taufik Abdillah¹

¹Department of Agro-industrial Technology, Nahdlatul Ulama University, Central Jakarta, Indonesia *Corresponding author: ririnfatma08@unusia.ac.id

ABSTRACT

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Coffee grounds, a residual product stemming from the processing of coffee beverages, manifest as a compelling resource for economic exploitation in the manufacturing realm, particularly in the creation of diverse processed commodities such as body scrubs. The utilization of coffee grounds as the principal ingredient for body scrub fabrication epitomizes a proactive strategy aimed at ameliorating the surplus waste generated during coffee processing endeavors. Consequently, undertaking a meticulous financial evaluation of the coffee grounds scrub manufacturing enterprise emerges as an indispensable step towards facilitating business expansion. This comprehensive study meticulously examines the financial viability associated with establishing a specialized venture dedicated to the production of body scrub derived from coffee waste. Employing a multifaceted approach, the investigation harnesses both primary and secondary data sources in conjunction with sophisticated quantitative analysis techniques. The research methodology incorporates a series of empirical experiments conducted within the production framework, utilizing coffee grounds procured from the esteemed Laiyo Coffee Roaster. Through rigorous financial computations, the analysis unveils a favorable Net Present Value amounting to IDR184,709,323, coupled with an impressive internal rate of return standing at 45%. Furthermore, the assessment delineates a succinct payback period of 1.6 years, alongside a commendable benefit-cost ratio of 1.7, contingent upon the realization of predefined assumptions. The adherence to these stringent investment benchmarks unequivocally underscores the practical feasibility of embarking upon coffee grounds scrub production endeavors, provided the project attains anticipated revenue milestones, encompassing IDR491,666,667. Additionally, the venture anticipates post-tax profits totaling IDR195,607,667, correlating with a substantial profit margin of 39.78%.

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1. Introduction

Coffee, esteemed for its high economic value, plays a pivotal role in Indonesia's exports, serving as a significant contributor to foreign currency earnings (Akbar *et al.*, 2021). Beyond its potential for export, there exist substantial opportunities within the domestic market as well. Notably, coffee grounds constitute 45% of the waste generated during coffee bean processing (Purwaningtyas *et al.*, 2022), underscoring the need for their optimal utilization. Indeed, coffee grounds can find applications across various agro-industrial products, particularly in skincare

formulations such as body scrubs. These grounds possess the ability to exfoliate dead skin cells, brighten the skin, and potentially reduce the risk of skin cancer (Tiadeka *et al.*, 2022).

Extensive research has documented the antioxidant properties of coffee beans and their potential biological effects, suggesting promising avenues for supporting health and potentially preventing chronic and degenerative diseases. These benefits stem primarily from naturally occurring polyphenol antioxidants such as chlorogenic acid, caffeine, and trigonelline (Varady *et al.*, 2022; Nerurkar *et al.*, 2023). Furthermore, investigations into other biologically active compounds present in coffee beans, including minerals, vitamins, and phytosterols, reaffirm their nutritional significance and potential as functional ingredients (Nzekoue *et al.*, 2022).

Body scrubs typically contain abrasive components aimed at exfoliation, alongside essential ingredients such as fats and emulsifiers (Desi *et al.*, 2021). Coffee grounds can serve as a substitute for traditional abrasive agents like salt or silica, while their antioxidant content can enhance the product's efficacy (Tokimoto *et al.*, 2005), thereby increasing the economic value of coffee grounds.

Laiyo Coffee Roaster, situated in East Jakarta, is among the coffee shops producing coffee grounds. These grounds contain beneficial substances for the skin, including flavonoids and polyphenols in significant concentrations (Mariana *et al.*, 2018). Additionally, caffeoylquinic and chlorogenic acids present in coffee beans can act as potent free radical scavengers (Purwaningtyas *et al.*, 2022).

The transformation of coffee grounds into body scrubs for commercial sale necessitates thorough financial analysis and the development of a robust business model. However, a common challenge faced by entrepreneurs is the meticulous evaluation of the financial feasibility of such ventures, encompassing aspects such as production costs, equipment expenses, profit and loss projections, capital requirements, and payback periods. The nature of the business venture significantly influences the financial feasibility assessment, particularly for nascent enterprises. Inadequate preparation of a business process model can jeopardize the continuity of operations.

Academic interest in relative financial feasibility analysis spans various industrial sectors (Kusuma, 2012), including the manufacturing industry (Firmansyah *et al.*, 2006) and agrobased enterprises (Rantala *et al.*, 2009). This research adopts the NPV, BEP, and IRR methods for feasibility analysis (Hamidah, 2023). Despite limited scientific literature on the financial analysis of coffee grounds body scrubs, the importance of assessing the feasibility of manufacturing such products is evident. This research endeavors to fill this gap, providing valuable insights for consumers, producers, and scientific advancement.

2. Methodology

2.1. Materials and Tools

The principal material employed in this investigation comprised coffee grounds procured from the Laiyo Coffee Roaster establishment situated in East Jakarta. Additional constituents encompassed distilled water, cetyl alcohol, propylene glycol, glycerin, stearic acid, and triethanolamine (TEA). The instrumental apparatus utilized comprised hot plates, analytical scales, beakers, magnetic stirrers, measuring cups, and various glass implements.

2.2. Mechanism of Making Body Scrub From Coffee Grounds

Body scrub preparations involve the amalgamation of aqueous and oil phases. The aqueous phase encompasses 5 mL of propylene glycol, 5 mL of glycerin, 100 mL of distilled water, and 1.2 mL of triethanolamine (TEA), which are blended and heated to 75°C with continuous stirring. Meanwhile, all oil phase constituents, comprising 1 g of cetyl alcohol and 15 g of stearic acid, are combined and liquefied at the same temperature. Subsequently, 1 mL of phenoxyethanol is incorporated to produce a cream, with the intention of prolonging the product's shelf life. The mixing of coffee grinds is initiated upon the attainment of a thick cream consistency, with the concentration of coffee grinds added set at 3%. Finally, the luxurious scrub products are packaged as the concluding step in the process.

2.3. Data Collection Techniques

The methodology employed in this study entails the systematic examination of power collection processes within the context of body scrub manufacturing, utilizing coffee grounds sourced from Laiyo Coffee Roaster. This investigation aims to delineate the requisite resources encompassing raw materials, machinery, power consumption, water usage, and other pertinent variables influencing the production cycle. The insights gleaned from this experimental production endeavor are pivotal for assessing the financial viability of the enterprise. Crucial parameters such as semi-variable costs, capital outlay, fixed expenses, production overheads, and variable expenditures are integral components in evaluating the feasibility of establishing a business venture focused on the production of body scrubs utilizing coffee residue.

2.4. Data Analysis Technique

The data undergoes transformation into tabulations, following which it is subjected to quantitative evaluation employing various financial metrics, including the Incremental Rate of Return (IRR), Breakeven Point (BEP) analysis, B/C ratio calculations, Payback Period, and Net Present Value (NPV). The determination of total production cost or overall cost involves the utilization of fixed costs and variable cost data, computed according to the formula outlined by Fisu *et al.* (2020):

Where:

- TC = Total Cost
- VC = Variable Cost
- FC = Fixed Cost

Assumptions have been identified to aid in data analysis, the determination of the Cost of Goods Manufactured (COGS), and cash flow projections. These assumptions encompass factors such as the number of team working days, the selling price of the product, the projected increase in production capacity, the cost of raw materials, and the duration of the project.

In the computation of investment expenses, fixed costs, semi-variable costs, and other associated expenses are meticulously considered. Investment costs represent the capital outlay or expenditure required to establish or enhance a business venture. Variable costs are incurred routinely by all companies engaged in production, varying in accordance with the

(1)

quantity of products manufactured. Conversely, fixed costs remain constant irrespective of production capacity.

The determination of installed or actual COGS capacity involves establishing the selling price among producers and calculating revenue utilizing a prescribed equation (Idham, 2010).

$$COGS = \frac{Total cost}{Actual capacity}$$
(2)

Revenue=Selling price x total production

Ascertain the potential trajectory of financial inflows through the calculation of cash flow. The assessment of financial feasibility encompasses the examination of several investment criteria. Break-even point (BEP) delineates the level of production or sales necessary to cover expenses, or the juncture at which small and medium-sized enterprises (SMEs) cease to generate profit. BEP is determined through the application of the subsequent formula (Fisu *et al.*, 2020):

BEP Unit =
$$\frac{FC}{P-VC}$$
 or BEP Rupiah = $\frac{FC}{1-(\frac{VC}{P})}$ (4)

Where:

FC = Fixed Cost P = Selling price per unit VC = Variable Cost per unit

An evaluation of net present value entails conducting a thorough analysis of net present worth to accommodate fluctuations in currency values. Net Present Value (NPV) is derived from the summation of the discrepancy between present income and costs, computed using a discount rate as outlined by Widyasari *et al.* (2022):

$$NPV = \sum_{t=1}^{n} \frac{(Bt - Ct)}{(1+i)^{t}}$$
(5)

Where :

Bt = t-year gross receipts

N = Economic age

Ct = t-year gross cost

I = interest rate

Criteria used:

NPV > 0, the business is feasible to run NPV = 0, the business returns the same amount of money invested NPV < 0, the business is not feasible to run

The discount rate that indicates the present value (NPV) of the entire project investment is termed as the investment return rate or IRR. A business proposition is deemed economically viable when the Internal Rate of Return (IRR) surpasses the Marginal Average Revenue Return (MARR). The MARR can be calculated utilizing the subsequent formula (Fisu *et al.*, 2022):

MARR = (1 + i) (1 + f) - 1

(3)

Where :

i = Investment interest rate

f = The highest infalanation

The projected repayment duration for an investment within an industry can be determined through the payback time computation. This period represents the minimal timeframe necessary to recoup the initial investment through cash inflows derived from total revenues minus all associated costs. The calculation of the Payback Period (PBP) is conducted utilizing the formula outlined by Fisu *et al.* (2020):

$$PBP = \frac{\text{initial investment}}{\text{payback period}} \times 1 \text{ year}$$
(7)

If the payback period for a business is equal to or less than the investment period, the viability of the firm is confirmed. The assessment of the value of receipts collected per unit of currency spent entails a comparison of total receipts against total expenses. A project is deemed feasible when the Benefit-Cost (B/C) ratio is less than 1. The B/C ratio is calculated using the following formula (Fisu *et al.*, 2020):

$$\frac{B}{C}$$
Ratio $\sum_{t=1}^{n} (Bt - Ct)/(1 + IRR)^{t}$

Where :

Bt = t-year gross receipts

N = Economic age

Ct = t-year gross cost

3. Results and Discussion

3.1 Assumption

An assessment of financial feasibility has been conducted to determine the profitability of investing in a company specializing in the production of body scrubs made from coffee grounds. This evaluation was carried out based on the assumptions outlined in Table 1.

3.2 Prices

Financial feasibility analysis focuses on evaluating the resources necessary for initial startup expenses. This entails estimating costs and potential revenues, as well as determining the essential financial reserves required to mitigate losses until reaching the breakeven point, which may extend over several years (Berry & Shabana, 2020). The costs associated with the production process of coffee grounds body scrub include fixed costs, investment, and variables. Investment costs encompass equipment and machinery essential for supporting business operations. Ongoing expenses in this venture involve both fixed and variable costs that must be paid annually over a five-year period. Variable costs, among these expenses, consist of expenditures related to raw materials and ancillary supplies (Savitri *et al.*, 2021).

(8)

No	Assumption	Unit	Value/Amount
1	Payback Period	Year	5
2	Working Month of the Year	Month	12
3	Working days in a month	Day	14
4	Output, Production, and Prices		
	a. The average production of Body scrub coffee		
	grounds per year	Box	10,000
	b. The average production of Body scrub coffee		
	grounds per year	IDR/Box	50,000
	c. Long wait for earnings	Month	2
5	Average labor requirement per month	Labor	4
6	Use of inputs and prices		
	a. The average need for coffee grounds per		
	year	Kg	250
	b. Average purchase price of raw materials	IDR/kg	1,000
7	Interest rate per year	%	14
8	Capital proportion:		
	a. Credit	%	40
	b. Owber's equity	%	60
9	Term of Investment Credit	Year	3
10	Term of working capital credit	Year	1

Table 1	Assum	ntions o	of Coffee	Body	Scrub	Business
	. Assum	puons c		Douy	Ocrub	Dusiness

Variable costs include raw materials, auxiliary materials, packaging, electricity, and water. Fixed costs in the form of labor wages or salaries. These costs can be seen in Table 2.

Table 2. Annual Cost

Prices	Value (IDR)	
Investments Cost	388,000,000	
Variable Cost	110,240,000	
Fixed Cost	84,000,000	

3.3 Production and Income

The body scrub enterprise utilizing coffee grounds will operate year-round, spanning 12 months. Drawing upon conducted experiments, it has been determined that the body scrub venture using coffee grounds has the capacity to process up to 250 kilograms of coffee grounds annually. This quantity of coffee grounds enables the production of 10,000 boxes of body scrub, each weighing 250 grams. These boxes are priced at IDR50,000 per unit, yielding a profit margin of 40%. Consequently, the venture garners an annual revenue of IDR500,000,000. Detailed projections regarding production, operational income, and sales prices are delineated in Table 3.

Table 3. Projections of production and operating income

Product	Amount/years
Total Product (box)	10,000
Price per box (IDR)	50,000
Total (IDR)	500,000,000

3.4 Bussines Profit and Loss Projection and Breakeven Point (BEP)

Based on the anticipated profit and loss outcomes, the extraction of body scrub from coffee grounds is estimated to yield an average annual profit of IDR195,607,667, with an average profit margin on annual sales of 39.78%. Detailed profit and loss projections are provided in Table 4.

No	Description	Average per year
1	Revenue (IDR)	491.666.667
2	Expenditures (IDR)	261.540.000
3	Profit/Loss before tax (IDR)	230.126.667
4	Tax (15%) (IDR)	34.519.000
5	Profit after tax (IDR)	195.607.667
6	Profit on sales (%)	39.78%
7	BEP: IDR	224.571.111
8	BEP: %	46.11

When analyzing expenditures concerning both total revenue and variable costs, this company reaches its Break-Even Point (BEP) at sales averaging IDR224,571,111, representing 46.11% of its projected capacity. The breakeven threshold at 46.11% of estimated capacity highlights a significant dependency on maintaining substantial sales volumes, a challenge particularly pronounced in competitive or volatile markets. Nevertheless, this business model presents considerable potential owing to its substantial profit margin of 39.78%. The presence of fixed costs plays a crucial role in sustaining profitability and mitigating financial risks associated with unpredictable fluctuations in costs (Maulida & Andriani, 2022)

No	Criteria	Value	Feasibility of justification
1	NPV (14%)	IDR184.709.323	>0
2	IRR	45%	>14%
3	Net B/C ratio	1.7	>1
4	Pay Back Period	1.6	< 3 years

Table 5. Feasibility of Processing Body scrub coffee grounds

3.5 Projection of Cash Flow and Project Feasibility

Financial feasibility analysis focuses on evaluating the initial expenditures necessary for initiating a venture and formulating strategies for securing funding not only during the commencement phase but also throughout ongoing operations until reaching the breakeven point. The primary objective of the four-part feasibility analysis is to meticulously assess the viability of a business concept, proactively identify and address potential issues before they escalate, and implement solutions during the nascent stages of the startup process (Scarborough, 2012).

When examining projected data concerning the production of a body scrub from coffee grounds, cash flow encompasses both outflows and inflows of cash. Revenue for one year was generated from the sale of body scrubs. Cash outflows include investments, variable and fixed costs, such as principal and interest payments, and income tax. The profitability of this business plan has been evaluated utilizing the business feasibility criteria of Net B/C Ratio and NPV (Net *et al.*). The results of the business feasibility analysis are presented in Table 5.

The capital invested in this company can be recouped before the project's completion in less than three years, or the business can be sustained with a Pay Back Period (PBP) of 1.6 years.

4. Conclusion

After conducting a feasibility study with financial analysis on the coffee grounds scrub product, it was found to have a positive Net Present Value of IDR184,709,324 and a rate of return of 45%, surpassing the stipulated bank interest rate. With a payback period of less than two years and a B/C ratio greater than one, the coffee pulp body scrub business plan appears financially viable. Recommendations for further research include diversifying the product line to encompass other eco-friendly beauty products to mitigate market fluctuation risks, improving cost efficiency through streamlined production processes and sourcing more cost-effective raw materials, enhancing the marketing strategy to establish a stronger brand presence and customer loyalty by highlighting unique selling propositions like eco-friendliness, and conducting continuous market research to remain abreast of consumer trends and preferences, potentially identifying new markets or segments for expansion. These strategies aim to solidify the business's financial standing and ensure its long-term success.

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