



## Techno-Economics Analysis for The Yogurt Business Development for Mustahik of Productive Zakat

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### ABSTRACT

The purpose of this study was to analyze the feasibility studies on the production of yogurt from raw materials of pure milk, sugar, flavor, and the addition of lactobacillus. We conducted the techno-economic analysis, which can be used by zakat mustahik for 20 years, including Total Investment Cost (TIC), Gross Profit Margin (GPM), Internal Rate of Return (IRR), Payback Period (PBP), Cumulative Net Present Value (CNPV), Break Even Point (BEP) and sales ratio to investment. The results of the study show that the CNPV/TIC analysis is a graph that tends to increase although not significantly in each period, the project in an ideal time of 20 years. This illustrates that Yogurt production is very prospective because it shows the feasibility of a profitable project. Yogurt entrepreneurs from productive zakat can support the main program of productive zakat, namely mustahik becoming muzakki in the future. The impact of this study is to provide an estimate of yogurt production as a prospective business unit for productive zakat mustahik.

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## 1. INTRODUCTION

Yogurt is a dairy product produced through a fermentation process using lactic acid bacteria, such as *Lactobacillus bulgaricus* and *Streptococcus thermophilus* [1,2]. This product is not only popular because of its distinctive taste and texture, but also because of its scientifically proven health benefits, especially in supporting digestive health, increasing endurance, and maintaining the balance of intestinal microflora. As public awareness of healthy eating patterns increases, the demand for yogurt as a functional food has increased significantly. Yogurt is rich in protein, calcium, vitamin B, and probiotics that contribute to the body's immune system [3]. In addition, yogurt can also be consumed by various age groups and is available in various variants, ranging from plain yogurt, fruit yogurt, to low-fat yogurt, making it flexible as part of a healthy lifestyle.

The development of the yogurt business is one of the potential businesses for productive zakat recipients. This is reflected in the increasing trend of yogurt consumption in Indonesia as a healthy food and beverage industry [4]. There is a great opportunity for the development of yogurt products based on local raw materials, including the use of fresh cow's milk and other natural additives [5]. This article aims to discuss the potential of yogurt as a functional food, its production process, and its contribution to public health. Techno-economic research has been widely carried out as in **Table 1**.

**Table 1.** Previous research of techno-economics analysis

No	Title	Ref.
1	Cost and Engineering Analysis for The Production of Paper from Waste Paper for Education Media	[6]
2	Eco-Brick Paving Block-Based Plastic Waste as an Alternative for School Facilities and Infrastructure Development to Support Sustainable Development Goals (SDGs): Technology and Cost Analysis	[7]
3	Particle Board from Rubber Woods: Concept, Technology, Cost Analysis, And Application for Teaching Aids in Science Subjects in Elementary Schools	[8]
4	Social-Economic Evaluation of Dye Processing from <i>Indigofera Tinctoria</i> Linn in The Ammatoa Kajang Indigenous Cultural Community	[9]
5	Production of Charcoal Briquettes from Coconut Shell Waste to Improve Community Economy: Technology and Cost Analysis	[10]
6	Production of Smart Wheel Educational Props from Mahogany Waste: Technology and Cost Analysis	[11]
7	Financial Feasibility Analysis of the UMKM Scale Yogurt Industry	[12]
8	Comparative quality analysis and economic feasibility of solar assisted yogurt processing unit for decentralized dairy value chain.	[13]
9	Functional fermented whey carrot beverage-qualitative, nutritive and techno-economic analysis	[14]
10	Techno-economic evaluation of a strawberry ice cream production plant proposal in Cuba	[15]
11	Toward carbon-neutral power generation in Indonesia: A techno-economic assessment of renewable ammonia co-firing in combined cycle power plants	[16]
12	Techno-economic household-scale solar power plants in support of the policy of presidential regulation number 112 of 2022 concerning the acceleration of renewable energy development	[17]
13	Techno-economic evaluation of gold nanoparticles using banana peel ( <i>Musa Paradisiaca</i> )	[18]
14	Techno-economic analysis of the business potential of recycling lithium-ion batteries using hydrometallurgical methods	[19]
15	Techno-economic feasibility and bibliometric literature review of integrated waste processing installations for sustainable plastic waste management	[20]

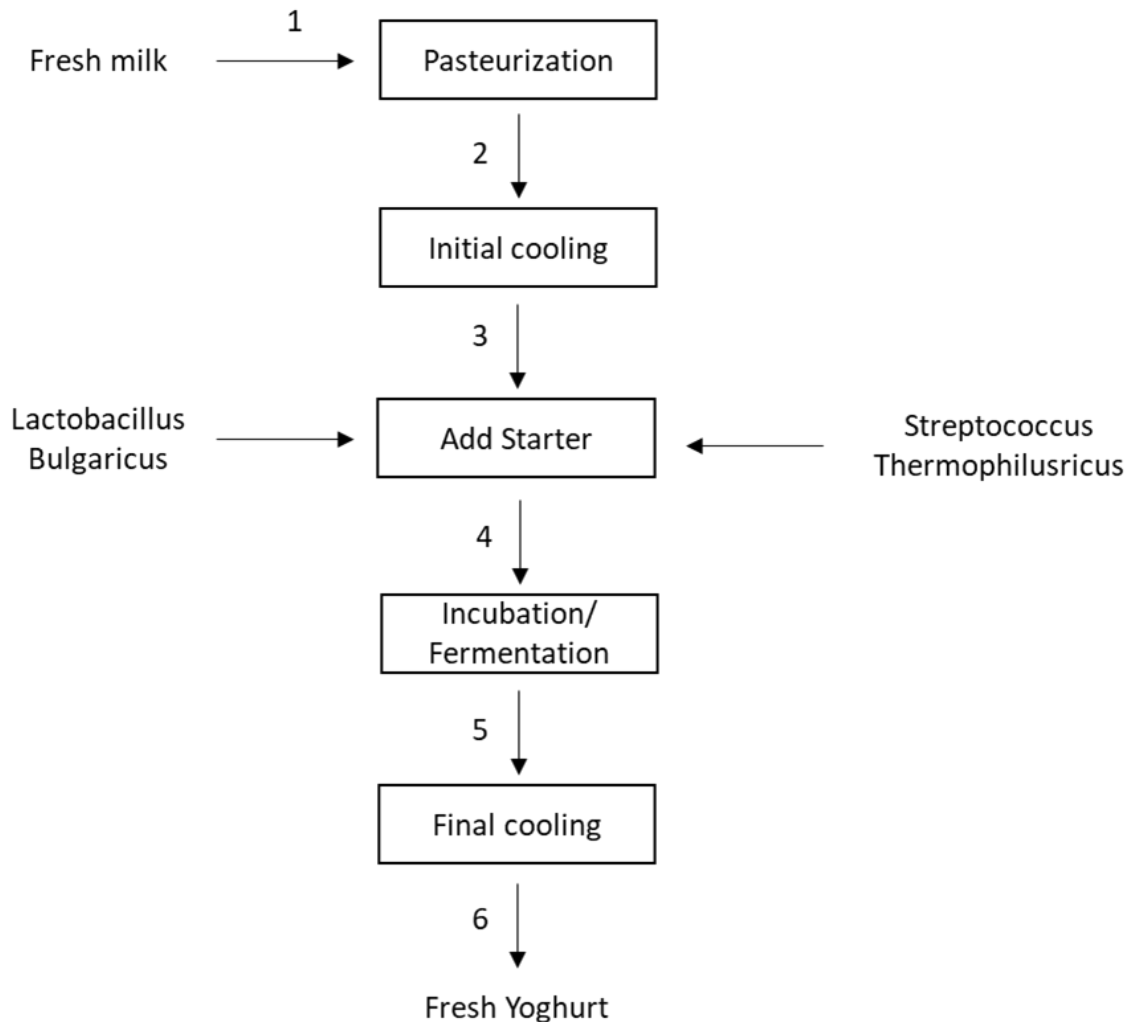
**Table 1 (continue).** Previous research of techno-economics analysis

No	Title	Ref.
16	Production of wet organic waste ecoenzymes as an alternative solution for environmental conservation supporting sustainable development goals (SDGs): A techno-economic and bibliometric analysis	[21]
17	Techno-economic analysis of production ecobrick from plastic waste to support sustainable development goals (SDGs)	[22]
18	Techno-economic analysis of sawdust-based trash cans and their contribution to Indonesia's green tourism policy and the Sustainable Development Goals (SDGs)	[23]
19	Computational bibliometric analysis on publication of techno-economic education	[24]
20	Techno-economic analysis for the production of LaNi5 particles	[25]
21	Techno-economic analysis of solar panel production from recycled plastic waste as a sustainable energy source for supporting digital learning in schools based on Sustainable Development Goals (SDGs) and science-technology integration	[26]
22	Techno-economic feasibility of educational board game production from agro-industrial waste in support of Sustainable Development Goals (SDGs) through science and technology integration	[27]
23	Resin-based brake pad from rice husk particles: From literature review of brake pad from agricultural waste to the techno-economic analysis	[28]
24	Techno-economic evaluation of biodiesel production from edible oil waste via supercritical methyl acetate transesterification	[29]

The purpose of this study is to analyze the Techno-Economics of Making Yogurt Products for Productive Zakat Mustahik. The benefits of yogurt can be explained from various aspects, both economically, health-wise, and product development-wise, including Providing Nutritious Food Products, Increasing the Added Value of Milk, Business Opportunities and Economic Empowerment, Answering Consumer Demand for Functional Products and Innovation of Local Food Products. The novelties in this study are (i) Integration of Islamic Economic Concepts and Food Product Development, (ii) Use of Zakat Funds to Empower Mustahik in Yogurt Business, (iii) Techno-Economic Approach to Mustahik Business, (iv) Innovation of Value-Added Products, (v) Zakat-Based Social Business Model.

## 2. LITERATURE REVIEW

The production of yogurt follows 6 stages of production (see **Figure 1**). The Yogurt Production Process has the following steps: the first stage is Preparation of Raw Materials with the main ingredient being fresh milk, namely the milk pasteurization process. Heating the milk at a temperature of 85-90°C for 15-30 minutes with the aim of killing pathogenic microbes and modifying the protein so that it is easy to ferment. The second stage is Initial Cooling, which lowers the temperature of the milk to around 43-45°C, this is the optimal temperature for adding starter (fermentation bacteria). The third stage is Adding Starter, where lactic acid bacteria such as *Lactobacillus bulgaricus* and *Streptococcus thermophilus*, this purpose is to start the fermentation process in yogurt. The fourth stage is Incubation or Fermentation, the mixture of all ingredients is stored at a temperature of 43-45°C for 4-6 hours, bacteria convert lactose into lactic acid and milk curdles into yogurt. The fifth stage is Final Cooling, after fermentation is complete, the temperature is lowered to 4°C to stop bacterial activity and maintain the quality of the yogurt. The sixth stage is the final stage which shows the yogurt is produced with the best quality.



**Figure 1.** Yogurt Production Process.

### 3. METHODS

The research method is an economic analysis of the Yogurt Business for 20 Years. Economic analysis to calculate the production potential of Yogurt, including Total Investment Cost (TIC), Gross Profit Margin (GPM), Internal Rate of Return (IRR), Payback Period (PBP), Cumulative Net Present Value (CNPV), Break Even Point (BEP) and sales ratio to investment. The data used in this study are the average prices of products available online on online shopping websites. Data analysis uses simple mathematical calculations to produce business projections and prospects, labor costs, raw material purchase capital, and interest rates.

### 4. RESULTS AND DISCUSSION

Economic analysis is conducted based on the assumptions used, such as: (i) economic analysis using USD with currency 1 USD = 15,800, (ii) price of pure milk Rp. 15,000/L, Sugar Rp. 6,000/Gram, Probiotics Rp. 10,000/Gram, flavor Rp. 20,000/Gram. (iii) Equipment prices are based on commercial prices for online shopping, (iv) calculation of total capital investment is calculated from direct cost, indirect cost and starting up fee, (v) production costs can be projected from the beginning of the project, (vi) labor wages per production, (vii) operating period is 20 years. The techno-economic simulation is depicted in **Table 2** containing information on the calculation of estimated production costs.

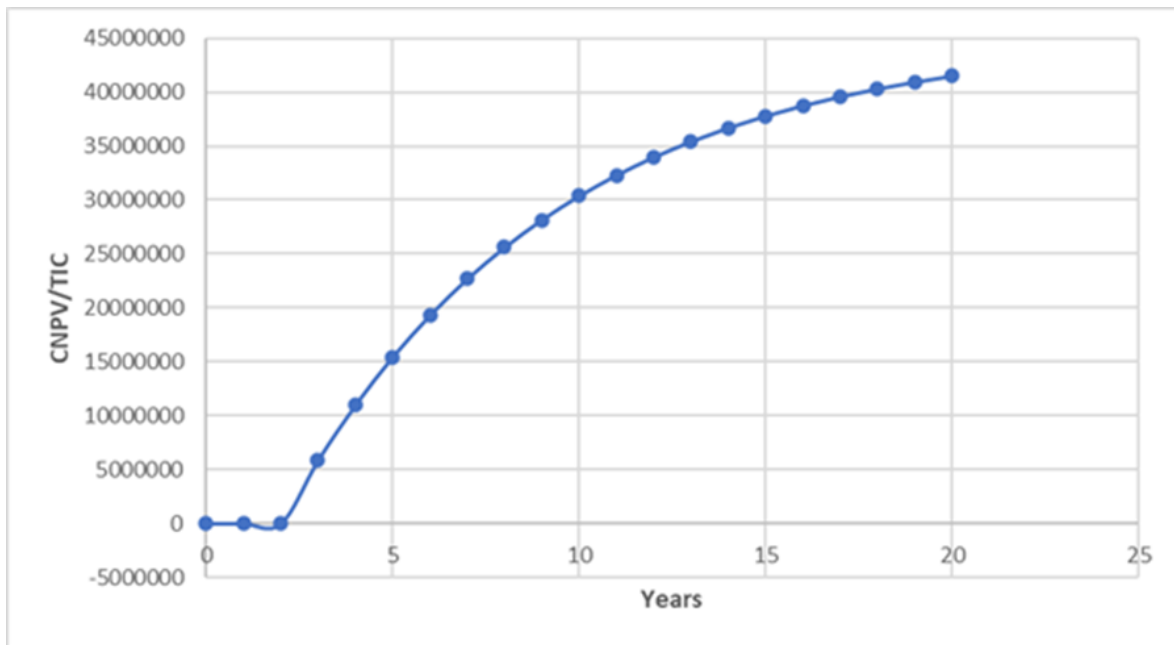
**Figure 2** shows the CNPV/TIC analysis is a graph that tends to increase although not significantly in each period, the project in an ideal time of 20 years. These results indicate that yogurt production has a good opportunity to support the productive zakat mustahik business. The development of a yogurt business can be an option for mustahik to utilize productive zakat. This opportunity can be utilized by productive zakat managers in distributing to prospective mustahik so that the business run from productive zakat funds can be sustainable. In addition, this opportunity can support the productive zakat program which aims to transform mustahik to muzakki.

Techno-economic analysis of the development of a yogurt business from pure milk by utilizing productive zakat has promising prospects. This type of business can be used as an alternative for the productive zakat distribution program to the mustahik. The yogurt business has a good opportunity to be the choice of productive zakat mustahik in order to achieve the program's goal, namely that the mustahik become muzakki in the future. This techno-economic analysis helps zakat managers to make policies in the distribution of productive zakat in choosing prospective types of businesses.

Economically, the yogurt business has a more promising potential and allows business actors to survive and successfully change the financial conditions of productive zakat recipients. This potential can also help local dairy farmers to increase productivity in producing pure milk as a raw material for yogurt. These reciprocal benefits are interrelated so that yogurt business actors who source from productive zakat can develop, as well as local dairy farmers can increase their productivity to support providing raw materials for yogurt.

**Table 2.** Parameters of economic evaluation results.

Parameter		Cost (IDR)
Loan Interest		
Capital Related Cost	Rp	233.822.990,70
Fixed cost+Depresiasi		
<b>Depreciation</b>	Rp	17.673.025,50
<b>Fixed Cost less depreciation</b>		
<b>Total Fixed Cost</b>	Rp	251.496.016,20
Raw material	Rp	1.298.925.000.000,00
Utilities	Rp	10.095.000,00
Operating Labor (OL)	Rp	420.000.000,00
Labor Related Cost	Rp	126.000.000,00
Sales Related Cost	Rp	420.000.000.000,00
<b>Total Variable Cost</b>	Rp	1.719.481.095.000,00
Sales	Rp	6.000.000.000.000,00
Manufacturing Cost	Rp	1.719.714.917.990,70
Investment	Rp	189.430.605,00
Profit	Rp	0,71
<b>Profit to Sales</b>	Rp	22.595,53
Unit		240000000
Fixed Cost	Rp	251.496.016,20
Variable cost	Rp	1.719.481.095.000,00
Variable cost	Rp	0,00
sales	Rp	6.000.000.000.000,00
sales	Rp	0,00
<b>BEP</b>		14100,87077
Percent Profit on Sales		0,713380847
Return on Investment		24219,31141
Pay Out Time		4,12892E-05



**Figure 2.** CNPV/TIC with various economic evaluation parameters in the ideal condition.

Techno-economic analysis shows that Yogurt Production as a business for productive zakat mustahik is one of the effective and sustainable economic empowerment strategies. Utilizing zakat capital for productive activities such as making yogurt, mustahik not only obtains a source of steady income, but also improves skills and economic independence. In addition to having high economic value, yogurt also has broad market prospects thanks to the increasing public awareness of healthy food products. With good management, starting from technical training, strengthening business management, to marketing access, this program can transform mustahik into muzakki in the long term. Thus, yogurt production not only has an impact on increasing individual income, but also strengthens the economic resilience of the community collectively. Finally, this study adds new information regarding food and beverage technology, as reported elsewhere [30-34].

## 5. CONCLUSION

Based on the economic analysis conducted, it shows that the production of yogurt business is very prospective. The development of the Yogurt business using the economic analysis method for 20 years shows that Yogurt Production as a business for productive zakat mustahik is one of the effective and sustainable economic empowerment strategies. Utilizing zakat capital for productive activities such as making yogurt, mustahik not only obtains a source of fixed income, but also improves skills and economic independence. In addition to having high economic value, yogurt also has broad market prospects thanks to the increasing public awareness of healthy food products. With good management, starting from technical training, strengthening business management, to marketing access, this program can turn mustahik into muzakki in the long term. Thus, yogurt production not only has an impact on increasing individual income, but also strengthens the economic resilience of the community collectively.

## 6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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