Design Planning of Hand Sanitizer Dispenser and First Aid Kit on Bus

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Abstract

PT. SKEAL Indonesia is a company located in Cakung, East Jakarta, producing Handisfirst, a hand sanitizer dispenser and first aid kit product on bus. Considering resident health and hand hygiene in public places, especially in public vehicles such as Jakarta transportation buses, the product was made to meet public transportation users' needs. This product design study begins with a survey of the need for market research and a collection of product design concepts included in the market to compare the product that is planned to be designed. Based on the forecast done using the linear regression method, PT SKEAL Indonesia will produce 22 units a day, with each price Rp. 1.900.000,00. It is essential to produce this quantity, and it is calculated that PT. SKEAL Indonesia will need 18 office workers and 32 factory workers. To ensure efficient production, PT. SKEAL Indonesia uses a plant layout strategy to make the layout. The financial planning result shows that the total fund needed to support the company is Rp 2.953.574.731,00. To reach the breakeven point, PT. SKEAL Indonesia has to reach 26982 units or in the 3,75th year since the company started. Based on the sensivity analysis, PT. SKEAL Indonesia's business won't be worth running if the raw material price increases more than 21,81% or the sales decreases more than 7,32%.

Keywords
Hand Sanitizer Dispenser, First Aid Kit Box, Product Design, Plant Layout, Financial Analysis

1. Introduction
Public transportation is a vehicle system such as buses and trains that operate at regular times on fixed routes and are used by the public. One of the public transportations that we usually use is buses. Inside the bus, we often contact other people that we don't even know, either directly contacts or indirectly through the things inside the bus. To prevent coronavirus transmission, when outside, people always bring hand sanitizers. Also, the government has always advised people to keep their hands clean. Hand sanitizers can sterilize our hands to prevent viruses to not stick in our hands. Sanitation can be defined as an effort to prevent disease by eliminating or regulating environmental factors related to the disease transmission chain (Purnawijayanti, 2001). It is essential to preserve people's sanitation, hand sanitizers are provided in various areas, especially public places, such as in public transportations. As a passenger, we should be careful and prepared for something that can happen suddenly, for example, an accident. So. It is essential to prepare medicines and bandages when driving for first aid if an accident suddenly occurs. Usually, people put them in a box called the first aid kit box. Therefore, we propose a product design of "Hand Sanitizer Dispenser and First Aid Kit on Bus," intending to maintain health and safety on the bus.

1.1 Objectives
In this research will focus on innovate the existing hand sanitizer dispenser and first aid kit. So, we create a new product design based on the results of market research and the urgency that has hit. Also this research will focus on the feasibility analysis of PT SKEAL Indonesia as the production of Hand Sanitizer Dispenser and First Aid Kit on Bus. Analysis will be carried out from several aspects such as marketing, technical, technological, legal, social

environmental and finansial aspects. The analysis carried out to meet the standard and feasibility of producing Hand Sanitizer Dispenser and First Aid Kit on Bus.

2. Literature Review

2.1 Business Feasibility Analysis

According to Soemantri (2015), a business feasibility study is an activity that studies in-depth about a business activity that will be carried out to determine whether a business is feasible or not.

2.2 Product Design and Development

Product design and development is a study that studies the stages of product design and development in terms of cost, quality, development and cost capability. Product design and development is also the process of creating product ideas or following up on products introduced to the market.

2.3 Financial Aspect

The financial aspect of a business feasibility study is a study that studies and assesses company finances, such as acquisition of sources of funds, estimates income, type of investment, costs incurred during investment and financial report projections consisting of an income statement, balance sheet and cash flow. According Suliyanto (2010), feasibility aspect in finance is calculating the Payback Period, Net Present Value, Profitability Index, Average Rate of Return and Internal Rate of Return.

2.4 Ergonomics

Ergonomics is the study of the interaction between people and machines and the factors that affect the interaction. Its purpose is to improve the performance of systems by improving human machine interaction. This can be done by 'designing-in' a better interface or by 'designing-out' factors in the work environment, in the task or in the organisation of work that degrade human–machine performance.

2.5 Market Research and Analysis

Market research is the scientific study of markets or marketing methods in broad, general way. Market analysis, on the other hand, is the scientific study of the markets or marketing methods for a specific product or services, the results of which are to be used as the basis for the policies, plans, and operations of an individual firm. Market research and market analysis apply scientific methods in the solution of problems relating both to the markets and the means of reaching markets used by business organizations.

3. Methods

Research begins with a literature review to identify and find out various problems or needs desired by society regarding a problem or product in a particular field. With the identification of needs, the products designed can be in accordance with the needs of the society and have the functions desired or needed by the society. From this step, innovation was obtained to redesigned a combination product of hand sanitizer dispensers and a first aid kit. After doing a literature review, then analyze several aspects to determine the business feasibility study which is aspects of marketing, technical and technological aspects, managerial and human resources aspects, social, legal, and environmental aspects, and financial aspects. The next stage is data collection, the data collected is the result of identifying the needs and importance scale. Then the data is tested by the appropriateness and adequacy also processed by validity and reliability test. After that, analyze the data that has been processed and conclude the results of the analysis and find out the feasibility of the business that has been designed. The flowchart of the methods can be seen in the Figure 1.

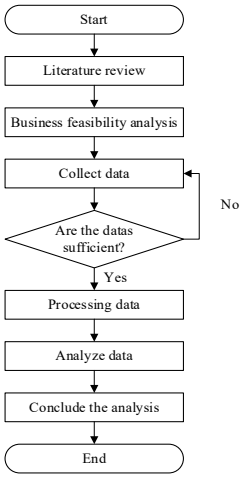

Figure 1. Flowchart of Methods

4. Data Collection

Based on identify the people's need for this product, the authors make the survey in the form of a questionnaire with a total of 100 respondents The aim of charting questionnaire data is to make it easier for readers to see the data results. The bar chart of the questionnaire can be seen in Figure 2.

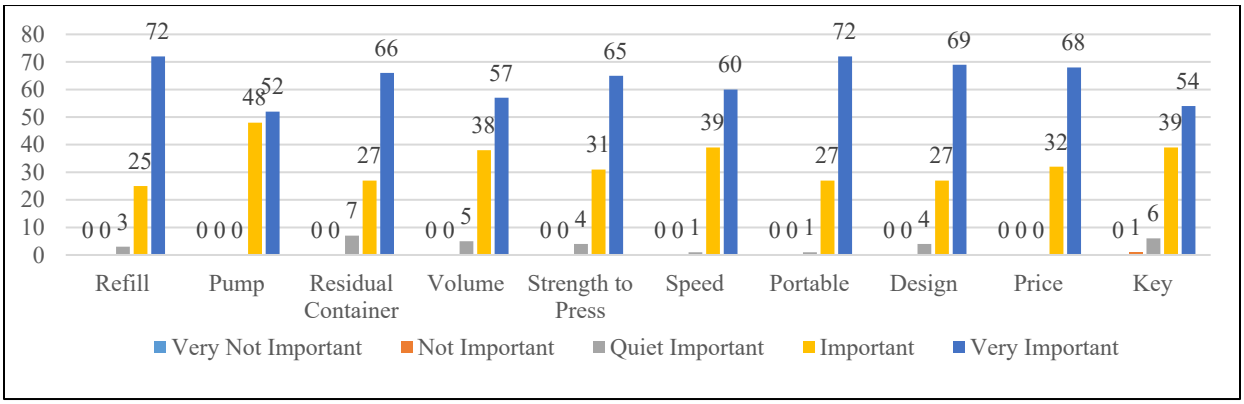

Figure 2. Bar Chart of Importance Scale of Product in the Questionnaire

In the figure above, we can see from the questionnaire that people think many aspects for the new design of hand sanitizer dispenser and first aid kit are very important, such as refill, pump, residual container, volume, strength to press, speed, portable, design, price, and key.

The validity test on the questionnaire test uses a significance level of 0.05 by conducting a two-sided test. There are several criteria to determine whether the data is valid. And then in the reliability test, if the Cronbach's alpha value is greater than the r table, it can be stated that the data collected by the questionnaire is reliable. Results of the validity and reliability test can be seen in Table 1.

Table 1. Result of Validity and Reliability Test

No	Variable	R Calculate	R Table	Result	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	Refill	0,750	≥0,195	Valid	41.33	6.708	.654	.661
2	Pump	0,265	> 0,195	Valid	41.50	8.232	.098	.743

3	Container	0,592	≥ 0,195	Valid	41.43	6.975	.429	.696
4	Volume	0,672	> 0,195	Valid	41.49	6.757	.537	.677
5	Power	0,468	> 0,195	Valid	41.41	7.517	.299	.717
6	Speed	0,409	≥ 0,195	Valid	41.44	7.784	.249	.723
7	Price	0,441	> 0,195	Valid	41.34	7.762	.301	.715
8	Portable	0,618	> 0,195	Valid	41.31	7.246	.503	.688
9	Key	0,602	> 0,195	Valid	41.56	6.855	.430	.696
10	Design	0,525	≥ 0,195	Valid	41.37	7.347	.367	.706

		N	%
Cases	Valid	100	.725
	Excluded[a]	0	.0
	Total	100	100.0

Cronbach's Alpha	N of Items
.725	10

By observing the calculation of the validity test using the SPSS application, it can be seen from the number of questionnaire data which is 100, the R table value used is 0,195. From these calculations, it can be seen that the calculated R for each variable is greater than the R table, so it can be stated that the variables from the questionnaire are valid. Beside that, from the results of the calculation of the reliability test, the value of Cronbach's alpha is 0,725, so this value is greater than the value of r table at N = 100 with a significance level of 5%, which is 0.195. Thus, it can be concluded that the data collected using the questionnaire is reliable or trustworthy.

5. Results and Discussion

5.1 Additional Features

These additional features are considered from the requirements obtained from identifying needs so that these aspects can develop products according to market needs. Additional features can be seen in Table 2.

Table 2. Additional Features

No	Needs	Additional Features
1	Ease of refilling hand sanitizer liquid	Designing the exit and entry door of the hand sanitizer that is easy to close and open
2	The product that is flexible and not easily damaged	Using a strong and tough material, so the product is durable and not easily damaged
3	No residual liquid scattered	Designing a container to accommodate the residual of hand sanitizer liquid
4	The hand sanitizer dispenser delivers a consistent volume's liquid	Designing a pump hand sanitizer so that the volume output can be consistent
5	Ease of pressing the hand sanitizer pump	Using a spring in the pump hand sanitizer, which is more elastic, so it is easy to press
6	Hand sanitizer liquid that is dispensed quickly	Designing a hand sanitizer pump to dispense hand sanitizer fluid quickly
7	Portable first aid kit	Design a detachable first aid kit
8	Safe first aid kit	Using a lock on the first aid kit design
9	Design	Designing products to look beautiful
10	Product Price	Using quality but cheap materials in the manufacture of products

To find data of needs for the new design of hand sanitizer dispenser and first aid kit, the identification of needs is used to find out various problems or needs. Based on the identification of needs, the products designed can be in accordance with the needs of the people and have the functions desired or needed by the people.

5.2 Forecast Result

The method that has the smallest error value is the linear regression method. Thus, the method used in forecasting demand for hand sanitizer and first aid kits is a linear regression method. Based on the calculated demand forecast, it

can be assumed that the market share is 1%. Demand forecasting will be calculated from 2020 to 2029, shown in Table 3 until Table 5.

Table 3. Data Bus in Jakarta

Year	Amount of Buses in Jakarta
2010	519738
2011	520695
2012	526151
2013	528963
2014	534782
2015	537600
2016	540499
2017	542123
2018	543202
2019	544010

Hand sanitizer dispenser and first aid kits will be marketed in DKI Jakarta. In forecasting the demand for hand sanitizer dispenser and first aid kit, data on the number of buses in DKI Jakarta is needed which is accessed from the BPS (Central Statistics Agency) website from 2015 to 2019 that we can see in the Table 3. The data use for the calculation of forecasting demand from 2020 – 2024 with the linear regression method because this method has the smallest error value. The result of the calculation with linear regression method can be seen in Table 4.

Table 4. Error Calculation with Linear Regression Method

Error Method	Linear
MAD	1588,10
MSE	3621312,10
SDE	2005,91
MAPE	0,30
ME	0,50
MPE	0

Thus, the method used in forecasting the demand for hand sanitizer dispenser and first aid kit is a linear regression method. Forecasting the demand will be calculated from 2020 to 2029 which can be seen in Table 5.

Table 5. Result of Forecast

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Forecast	5503	5533	5562	5592	5622	5652	5682	5712	5742	5772

Based on the calculated demand forecast, it can be assumed that the optimistic level of product sales in the market is 1% because this product is a new product for bus transportation, so it is still very rare for bus owners to want to install this product on their buses. So, in the PT. SKEAL Indonesia will produce 22 units a day.

5.3 Morphology Product

Product design is a process that begins with the discovery of the human need for a product to completion by drawings and design documents based on the manufacture of the product (Ginting, 2010). Before designing a product design concept, a concept morphology is needed to describe the product structure. The morphology product can be seen in Table 6.

Table 6. Morphology Product

Item	Aspect	Alternative 1	Alternative 2	Alternative 3	Alternatif 4	Alternatif 5
A	Material	Hollow Aluminium	Acrylic			
B	Pump press system	Press on the front, the principle of use is to press	Press on the top, the principle of use is to press	Press on the front, the principle of use is to use the on/off switch		
C	Shape of first aid kit	Cuboids	Trapezoid	Cylinder	Parallelogram	Combination
D	Shape of *hand sanitizer*	Cuboids	Trapezoid	Cylinder	Half cylinder	Combination
E	Type of key	cylinder lock	Slide Lock	Latch lock	Turn lock	Lock&lock

The chosen concept was made in the form of a hand sanitizer dispenser like a block with two doors and a partition. In the part of hand sanitizer dispenser, there is a pump that is used by pressing and has a door at the top and also the hand sanitizer is used to fill the liquid that must be lifted up so that the door can be opened, and there is also a container for the residual of the liquid to accommodate the residual liquid of the hand sanitizer. The residual liquid container is used to collect the residual liquid and another special function is that the container is removeable when you want to remove the residual liquid. In addition, the first aid kit in this concept is made in a simple way with the shape of a box that has hinges and lock components like in a cupboard in general, which must be turned to lock the first aid box.

5.4 Product Hand Sanitizer Dispenser and First Aid Kit (Ergonomic)

In the hand sanitizer dispenser and first aid kit, several components will be designed and manufactured with various ergonomic aspects. Ergonomics is studying human aspects in the work environment in terms of anatomy, physiology, psychology, engineering, management, and design (Nurmianto, 1991) (Ersyahni and Yudiarti, 2019). The ergonomic measurements for each component of this product are obtained from ergonomic calculations using anthropometric data. The figure of hand sanitizer dispenser and first aid kit with a specific size made through 3D modeling can be seen in Figure 3.

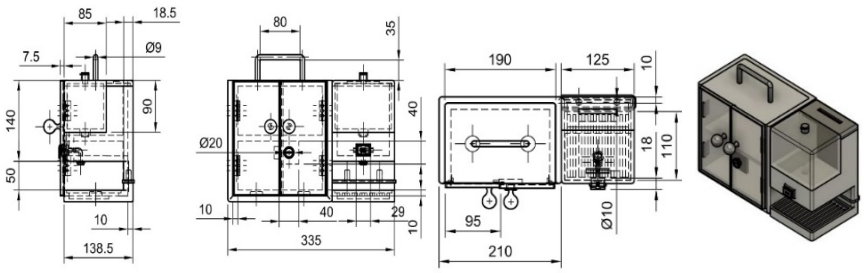

Figure 3. Hand Sanitizer Dispenser and First Aid Kit

In the designing hand sanitizer dispenser and first aid kit, there are several components that will be designed and manufactured by considering the various ergonomic aspects. Ergonomics measures for each component of this product are obtained from the results of ergonomic calculations using data of anthropometric. The data will be used to determine the size of the components for products where hand sanitizer dispenser and first aid kits are made so that they are ergonomic to be used by all people.

5.5 Organizational Structure

Organizational structure is a system that outlines how certain activities are directed to achieve the goals of an organization. The organizational structure of PT. SKEAL Indonesia can be seen in Figure 4.

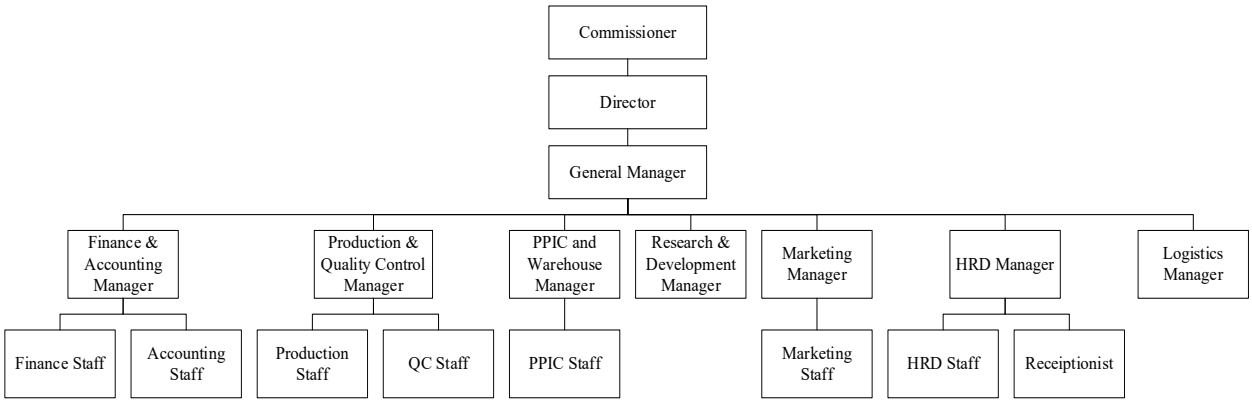

Figure 4. Organizational Structure

The structure will clearly describe the position, function, rights and obligations of each position within the scope of the company. Furthermore, every component in the company can function optimally, and the wheels of the company can always move effectively and efficiently. In the figure above, PT. SKEAL Indonesia has the organizational structure. Every company usually has an organizational structure that is functional and flat type, with 5 divisions as Marketing, Production, Quality, Research, Development, Finance, Logistic, and Human Resources. The person in the office consists of 18 people and 32 people in the factory.

5.6 Factory's Layout Result

Factory Layout is defined as the layout or arrangement of facilities, machinery, and factory equipment owned by the company (James, 1990). Factory Layout of PT. SKEAL Indonesia can be seen in Figure 5.

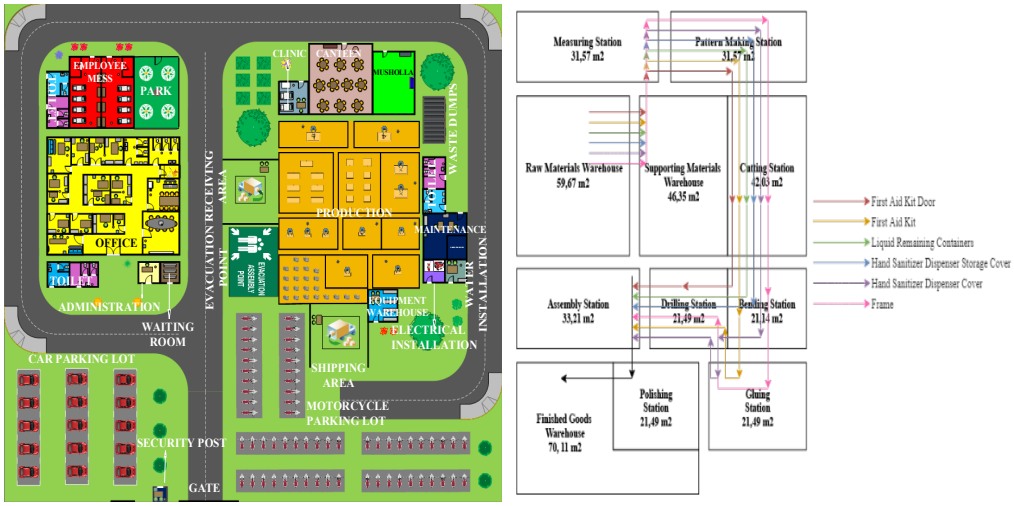

Figure 5. Factory Layout and Material Flow of PT. SKEAL Indonesia

The purpose of layout planning is to get the most optimal layout of the production facilities available within the company. With the optimal layout arrangement, it is expected that the implementation of the production process can run efficiently and smoothly.

5.7 Finance

A business feasibility analysis can be carried out based on a financial calculation by looking at the cash flow calculation or its cash flow. Cashflow and the result of financial analysis can be seen in Table 7.

Table 7. Cashflow

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Profit Loss											
Sales		Rp 10.446.017.456	Rp 10.465.043.279	Rp 10.484.333.450	Rp 10.503.893.410	Rp 10.523.728.777	Rp 10.543.845.351	Rp 10.564.249.125	Rp 10.584.946.289	Rp 10.983.239.742	Rp 11.004.543.101
Other Income		Rp 19.810.800	Rp 20.117.988	Rp 20.223.432	Rp 20.332.512	Rp 20.441.592	Rp 20.550.672	Rp 20.659.752	Rp 20.768.832	Rp 20.877.912	Rp 20.986.992
Total Income		Rp 10.465.828.256	Rp 10.485.161.267	Rp 10.504.556.882	Rp 10.524.225.922	Rp 10.544.170.369	Rp 10.564.396.023	Rp 10.584.908.877	Rp 10.605.715.121	Rp 11.004.117.654	Rp 11.025.530.093
Fixed Cost		Rp 2.896.511.972	Rp 2.930.056.416	Rp 2.964.180.574	Rp 3.002.539.117	Rp 3.037.871.536	Rp 3.100.938.320	Rp 3.141.914.722	Rp 3.179.191.373	Rp 3.217.154.064	Rp 3.261.062.627
Variable Cost		Rp 4.178.406.982	Rp 4.186.017.311	Rp 4.193.733.380	Rp 4.201.557.364	Rp 4.209.491.511	Rp 4.217.538.141	Rp 4.225.699.650	Rp 4.233.978.515	Rp 4.393.295.897	Rp 4.401.817.240
Cost of Sales		Rp 7.074.918.954	Rp 7.116.073.727	Rp 7.157.913.954	Rp 7.204.096.482	Rp 7.247.363.047	Rp 7.318.476.461	Rp 7.367.614.372	Rp 7.413.169.888	Rp 7.610.449.961	Rp 7.662.879.867
Gross Profit		Rp 3.390.909.302	Rp 3.369.087.539	Rp 3.346.642.928	Rp 3.320.129.441	Rp 3.296.807.323	Rp 3.245.919.563	Rp 3.217.294.505	Rp 3.192.545.233	Rp 3.393.667.693	Rp 3.362.650.226
Costs											
Advertising Cost		Rp 156.987.424	Rp 157.277.419	Rp 157.568.353	Rp 157.863.389	Rp 158.162.556	Rp 158.465.940	Rp 158.773.633	Rp 159.085.727	Rp 165.061.765	Rp 165.382.951
CSR Cost		Rp 104.658.283	Rp 104.851.613	Rp 105.045.569	Rp 105.242.259	Rp 105.441.704	Rp 105.643.960	Rp 105.849.089	Rp 106.057.151	Rp 110.041.177	Rp 110.255.301
Total Cost		Rp 261.645.706	Rp 262.129.032	Rp 262.613.922	Rp 263.105.648	Rp 263.604.259	Rp 264.109.901	Rp 264.622.722	Rp 265.142.878	Rp 275.102.941	Rp 275.638.252
Total Operating Profit		Rp 3.129.263.595	Rp 3.106.958.508	Rp 3.084.029.006	Rp 3.057.023.793	Rp 3.033.203.063	Rp 2.981.809.662	Rp 2.952.671.783	Rp 2.927.402.355	Rp 3.118.564.752	Rp 3.087.011.973
Taxes											
Earning Before Tax		Rp 3.129.263.595	Rp 3.106.958.508	Rp 3.084.029.006	Rp 3.057.023.793	Rp 3.033.203.063	Rp 2.981.809.662	Rp 2.952.671.783	Rp 2.927.402.355	Rp 3.118.564.752	Rp 3.087.011.973
Tax		Rp 391.157.949	Rp 388.369.813	Rp 385.503.626	Rp 382.127.974	Rp 379.150.383	Rp 372.726.208	Rp 369.083.973	Rp 365.925.294	Rp 389.820.594	Rp 385.876.497
Earning After Tax		Rp 2.738.105.646	Rp 2.718.588.694	Rp 2.698.525.381	Rp 2.674.895.819	Rp 2.654.052.680	Rp 2.609.083.454	Rp 2.583.587.810	Rp 2.561.477.060	Rp 2.728.744.158	Rp 2.701.135.477
Cashflow											
Earning After Tax		Rp 2.738.105.646	Rp 2.718.588.694	Rp 2.698.525.381	Rp 2.674.895.819	Rp 2.654.052.680	Rp 2.609.083.454	Rp 2.583.587.810	Rp 2.561.477.060	Rp 2.728.744.158	Rp 2.701.135.477
Residual Value		Rp -	Rp -	Rp -	Rp -	Rp 134.364.000	Rp -	Rp -	Rp -	Rp -	Rp 208.066.097
Investment	-Rp 10.161.420.683										
Nett Cash Flow	-Rp 10.161.420.683	Rp 2.738.105.646	Rp 2.718.588.694	Rp 2.698.525.381	Rp 2.674.895.819	Rp 2.788.416.680	Rp 2.609.083.454	Rp 2.583.587.810	Rp 2.561.477.060	Rp 2.728.744.158	Rp 2.909.201.573
Cash Accumulation	-Rp 10.161.420.683	-Rp 7.423.315.037	-Rp 4.704.726.343	-Rp 2.006.200.962	Rp 668.694.857	Rp 3.457.111.537	Rp 6.066.194.991	Rp 8.649.782.801	Rp 11.211.259.862	Rp 13.940.004.019	Rp 16.849.205.593

Furthermore, by calculating the cash flow of PT. SKEAL Indonesia, it can provide the results of financial analysis which can be seen in Table 8.

Table 8. Result of Finance Analysis

MARR	15%
NPV	Rp2.953.574.731

IRR	23%
BEP	26982
B/C Ratio	1,29
Payback Period	3,75

From the financial analysis that has been calculated when the market share is normal, it can be seen that the NPV value is more than 0, the IRR value is greater than the MARR value, and the benefit-cost (B/C) is more than 1, where these things state that PT. SKEAL Indonesia deserves to be established.

5.8 Sensitivity Analysis

Sensitivity analysis is carried out to determine the level of business feasibility in the face of price changes in the future (Sartono, 2008). Sensitivity analysis can be seen in Table 9.

Table 9. Sensitivity Analysis

No	Information
1	Raw Material Price Increase 21,81%
2	Sales Decrease 7,32%
3	Raw Material Price Increase ≥ 5% when Sales Decrease ≥ 5,64%
4	Raw Material Price Increase ≥ 10% when Sales Decrease ≥ 3,96%
5	Raw Material Price Increase ≥ 15% when Sales Decrease ≥ 2,28%
6	Raw Material Price Increase ≥ 20% when Sales Decrease ≥ 0,61%
7	Sales Decrease ≥ 2% when Raw Material Price Increase ≥ 15,85%
8	Sales Decrease ≥ 4% when Raw Material Price Increase ≥ 9,89%
9	Sales Decrease ≥ 6% when Raw Material Price Increase ≥ 3,92%

According to the table, PT. SKEAL Indonesia's business won't be feasible if the raw material price increases more than 21,81% or the sales decreases more than 7,32%.

6. Conclusion

As a result of this research, it can be concluded that:

1. Based on the reliability test results, each variable of the respondents' importance level is reliable. The validity survey of 100 respondents with an R-value more than 0,195and the reliability value of 0,725
2. The total of products produced in the first year was 5503 units obtained by the method that used in forecasting, which is a linear regression method
3. The chosen design is variant no 2 (circle shape).
4. The company organization structure is functional and flat type, with 5 divisions as Marketing, Production, Quality, Research, Development, Finance, Logistic, and Human Resources. The person in the office consists of 18 people and 32 people in the factory.
5. The facility layout with systematic layout planning based on the number of production demand, the number of machines needed, number of operator and employee, the warehouse needed for raw materials and supplies, From To Chart (FTC) operation, Activity Relationship Chart (ARC), and Diagram (ARD), Area Activity Diagram (AAD).
6. In normal conditions with a MARR of 15%, the NPV is Rp2.953.574.731, an IRR of 23%, a BEP 26982, a B/C Rasio of 1,29 and a payback period of 3,75.

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Biographies

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Lina Gozali is a lecturer at the Industrial Engineering Department of Universitas Tarumangara since 2006 and a freelance lecturer at Universitas Trisakti since 1995. She graduated with her Bachelor's degree at Trisakti University, Jakarta - Indonesia. She got her Master's Degree at STIE IBII, Jakarta – Indonesia, and she recently got her PhD at Universiti Teknologi Malaysia, Kuala Lumpur – Malaysia, in 2018. Her apprentice college experience was in the paper industry at Kertas Bekasi Teguh, shoe industry at PT Jaya Harapan Barutama and automotive chain drive industry at Federal Superior Chain Manufacturing. She teaches Production System and Supply Chain Management Subjects. She researched the Indonesian Business Incubator for her PhD. She has written almost 70 publications since 2008 in the Industrial Engineering research sector, such as Production Scheduling, Plant Layout, Maintenance, Line Balancing, Supply Chain Management, Production Planning, and Inventory Control. She had worked at PT. Astra Otoparts Tbk before she became a lecturer.

Wilson Kosasih was born in Medan, North Sumatra, Indonesia on 2nd Dec 1980, is a lecturer in the Department of Industrial Engineering at Faculty of Engineering, Universitas Tarumanagara. Since 2005 conducted teaching, research and has served as Industrial Engineering Undergraduate Chairman since 2018 until now. He completed his Undergraduate Mechanical Engineering Education at Universitas Tarumanagara, obtained a Master Degree in Industrial Engineering at the Universitas Indonesia and is currently taking a Doctoral Program at the Institut Teknologi Sepuluh Nopember with a concentration in Industrial Management. Holders of professional certification in the field of supply chain and logistics, Certified Supply Chain Manager (CSCM) and Certified Professional in Logistics Management (CPLM) from ISCEA, USA, certification for Professional Engineer (IPM) from PII, and ASEAN Engineer certification from AFEO. He worked in a multinational company in the FMCG field before becoming a full-time lecturer since 2009. He has professional experience and consultant in the field of Productivity and Quality Engineering. Since becoming a lecturer, he has been active in research, scientific publications and community service by obtaining grants from within and outside Untar, such as from the Ministry of Research, Technology and Higher Education. His research field are Lean Manufacturing, Quality Engineering, and Supply Chain Management. In addition, he is also active in professional organizations, currently as a member of the Industrial Engineering Professional Engineer Competency Appraisal Council at BKTI PII.

Carla Olyvia Doaly is a lecturer in the Industrial Engineering Department at Universitas Tarumanagara graduated with my bachelor's degree from Institut Teknologi Nasional Malang, which study the Industrial Engineering program, then continued my Master Degree at Institut Teknologi Bandung majoring in Industrial engineering and management and a special field of Enterprise Engineering. I am very interested in studying industrial engineering by doing research related to System Design and Engineering, Supply Chain Management, Operations Research and Analysis, Information System Management, Occupational Health and Safety, Facilities Engineering, Quality and Reliability Engineering

Agustinus Purna Irawan was born in Mataram - Musirawas, South Sumatera, August 28, 1971. Is a Lecturer at Universitas Tarumanagara and has served as Chancellor since 2016 until now. Obtained a Bachelor of Mechanical Engineering from the Faculty of Engineering, Gadjah Mada University (1995), a Masters in Mechanical Engineering from the Faculty of Engineering, University of Indonesia (2003), a Doctor of Mechanical Engineering from the Faculty of Engineering, University of Indonesia (2011), Professional Engineer (Ir) Mechanical Engineering from the Faculty of Engineering, Gadjah Mada University (2019) and Professor of Mechanical Engineering from the Ministry of Education and Culture (2014). The fields of scientific research and publication include: Product Design and Development, Strength of Materials, Natural Fiber Composites with implementation in the field of prosthesis and automotive components. Obtaining Research and Community Service Grants for Higher Education / Research and Technology BRIN / Untar / Others ≥ 100 titles; Patents: 7 and still in process: 4; Copyright: 9 books; Textbooks: 6 books; Book Chapter: 2 chapters; Scientific articles ≥ 100 titles. Obtained a Professional Certificate, namely the Educator Certificate, the Intermediate Professional Engineer Certificate (IPM) of the Indonesian Engineers Association (BKM PII) Vocational Engineer Association (BKM PII), and the ASEAN Engineer Certificate (ASEAN Eng.) From the ASEAN Federation Engineering Organizations (AFEO). He is active in education, various scientific activities, the world of business, professional associations, and various social activities. Received several awards: Best Graduate S2 UI GPA 4.00 cum laude (2003); First best Lecturer Kopertis Region III DKI Jakarta (2011); Best Presentation at the Seminar on Research Results of the Centralized Program, PUPT Dikti (2014); Honorary Member of The ASEAN Federation of Engineering Organizations, AFEO (2018); Best PTS Chancellor for the Academic Leader Award Program (2019).

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Frans Jusuf Daywin was born in Makasar, Indonesia on 24th November 1942. is a lecturer in the Department of Agricultural Engineering at Faculty of Agricultural Technology Bogor Agricultural University since 1964 conducted teaching, research, and extension work in the field of farm power and machinery and become a professor in Internal Combustion Engine and Farm Power directing and supervising undergraduate and graduate students thesis and dissertation and retired as a professor in 2007. In 1994 up to present as a professor in Internal Combustion Engine and Farm Power at Mechanical Engineering Program Study and Industrial Engineering Program Study Universitas Tarumanagara, directing and supervising undergraduate student's theses in Agricultural Engineering and Food Engineering Desain. In 2016 up to present teaching undergraduate courses of the introduction of concept technology, research methodology, and seminar, writing a scientific paper and scientific communication, and directing and supervising undergraduate student's theses in Industrial Engineering Program Study at the Faculty of Engineering Universitas Tarumanagara. He got his Ir degree in Agricultural Engineering, Bogor Agricultural University Indonesia in 1966, and finished the Master of Science in Agricultural Engineering at the University of Philippines, Los Banos, the Philippines 1981, and got the Doctor in Agricultural Engineering, Bogor Agricultural University Indonesia in 1991. He joined 4-month farm machinery training at ISEKI CO, AOTS, Japan in 1969 and 14 days agricultural engineering training at IRRI, Los Banos the Philippines, in March 1980. He received the honors "SATYA LANCANA KARYA SATYA XXX TAHUN" from the President of the Republic of Indonesia, April 22nd, 2006, and received appreciation as Team Jury from the Government of Indonesia Minister of Industry in Industry Start-Up 2008. He did several research and surveys in farm machinery, farm mechanization, agricultural engineering feasibility study in-field performance and cost analysis, land clearing and soil preparation in secondary forest and alang-alang field farm 1966 up to 1998. Up till now he is still doing research in designing food processing engineering in agriculture products. Up to the present he already elaborated as a conceptor of about 20 Indonesia National Standard (SNI) in the field of machinery and equipment. He joins the Professional Societies as a member: Indonesia Society of Agricultural Engineers (PERTETA); Indonesia Society of Engineers (PII); member of BKM-PII, and member of Majelis Penilai Insinyur Profesional BKM-PII.