

Optimisation Of Ice Cream Production (Case Study "X Ice Cream" Rimbo Kedui Village Seluma Selatan District Bengkulu Province)

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Abstract

This study aims to Determine the combination of optimal production of various types of ice cream products that generate profits that are maximal in business X ice cream and determine the maximum profit at the business X ice cream with the formulation of the optimisation model, as well as knowing the sensitivity of changes in input prices and output the optimal solution is generated. This research was conducted on the business of Ice Cream X in the Village of Rimbo Kedui, South Seluma district, Seluma Regency Bengkulu Province, held in September –October 2020. The Data in this research is primary data obtained through interviews with business owners. Data analysis was performed using the analysis tools of linear programming. The results of the research show the combination that produces the maximum profit in the form of a company should manufacture ice cream in 1350 packs, chocolate ice cream in 900 packs, ice cream mango flavour 960 wraps, ice cream flavours melon 1050 wrap, and chocolate ice cream-strawberry 745 wraps. Also, do not produce more flavours of vanilla ice cream-strawberry, ice cream, vanilla chocolate. By producing such a combination, the X ice cream business will get a maximum profit of Rp. 7.710.266, -

Keywords: Ice cream Business, Linear programming, Profit.

INTRODUCTION

In this modern era, people's needs are increasingly diverse and increasing, so it will be challenging to determine primary or secondary needs. The basic needs for

302

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humans, namely clothing, food and shelter, still rank at the top (Suryana, 2008; Gafar, S, 2008; Saksono L et al., 2020; Martinus et al., 2020). On the other hand, Ice cream is a processed product made from milk. Ice cream processing businesses have been carried out in various regions, not only because consumer needs have increased but also due to many other supporting factors. X Ice Cream has been established since 2013 and still survives because the public accepts it. This business is promising for further development, considering the number of similar companies is still small.

The "X Ice Cream" business must be more creative and innovative in making products, especially in planning activities in production. Moreover, do not forget that every business has the same goal: getting as much profit as possible with minimal costs. However, in achieving this, of course, limitations will emerge as obstacles that hinder the goals of a business.

In agro-industrial businesses, producers try to maximise their production in various ways. Linear programming is one way to increase industrial production by seeing which combination is more profitable in terms of the constraint function and achieving the goal. More correctly, *programming* is a technique that is related to the problem of resource placement in competing activities and is also related to other problems that have almost the same mathematical formulation. Determination of profit on production used linear *programming* by considering resources such as labour, machines, capital and the amount of demand to maximise profits (Agustina et al., 2018; Utami et al., 2020; Muzakki. 2012. Indrayanti. et al., 2012, Oladejo, et al., 2019, Sucitra, 2019). Therefore, as a means of solving problems to help maximise production quantities, it is necessary to optimise production by considering the objective function and constraint function (Mulyana, 2004, Anti and Ajat Sudrajat, 2021, Sriwidadi and Erni Agustina, 2013, Utami. et al., 2020, and Saryoko, 2016).

Thus, this research related to appropriate production planning with optimal resource use in the "X Ice Cream" business to obtain maximum profits.

RESEARCH METHODS

The research was conducted at the "X Ice Cream" business in Rimbo Kedui Village, South Seluma District, Seluma Regency, Bengkulu Province. The research was conducted in September – October 2020. The research uses primary and secondary data. The data is on raw materials, auxiliary materials, production data, raw material prices and



product prices, the number of workers and other resource data. All data was collected from "X Ice Cream" by directly interviewing the company owner and employees.

Data analysis is an important part of the scientific method because, by analysing data, we can provide useful meaning in solving research problems and producing ideas for future development. The data analysis method used consists of qualitative and quantitative analysis. qualitatively carried out to describe the state of the company. An analysis technique called qualitative descriptive analysis identifies recurring patterns in the data so that the findings can be investigated and interpreted quickly and effectively. This method explores facts with explanations that are appropriate to field phenomena. (Subandi, 2011. Abdussamad, 2021, and Rusandi, 2021). This research uses various analytical methods to achieve research objectives. The analysis method is

Analysis of Cost of Goods Production.

The COGS (Cost of Production) is calculated to analyse the profits obtained per unit for each product type produced from all production activities based on the costs incurred. Calculation of the cost of production report using the method of full *costing*: Maulani et al, 2017; Devi, 2018; Sirilius and Felesisima, 2021; Yunita et al., 2018; Soleha et al., 2022, and Ariyanti et al., 2018. In industry "X Es Cream". The calculation of Cost of goods sold (COGS) is closely related to linear *programming* because the resulting values will be entered into the linear programming model. The following table calculates the cost of production.



Table 1. Calculation of Cost of Goods Production Report

Cost of Goods Production Report		
Use of Raw Materials		
Initial Inventory of Raw Materials	Rp.xxx	
Purchase of Raw Materials	<u>Rp.xxx</u> +	
Direct Use of Raw Materials		Rp.xxx
Direct Labor Wages		Rp.xxx
Variable Overhead Costs		
• Cost of Auxiliary Materials		Rp.xxx
• Electricity Usage Fees	Rp.xxx	
• Fuel Costs	Rp.xxx	
• Packaging Costs	Rp.xxx	
Total Variable Overhead Costs		<u>Rp.xxx</u> +
Cost of goods sold		Rp.xxx

Source: (Halim, 2005)

Cost of Goods Sold Analysis

According to Wiratna (2016), the cost of goods sold is all costs incurred to obtain the goods sold or the acquisition price of the goods sold. This calculation was used by Anggraeni et al., 2014 Gunawan et al., 2016, Fahma, 2012, Ismayanti Andjauhar Arifin 2023, Panduwijaya et al., 2020 Wulandari, 2023, and Munawaroh and Muhammad Taufiq, 2022.

From calculating profits per type of ice cream, the profits obtained are entered into the model linear *programming*, calculated as capital costs and included in the constraint function in the model *linear programming*. The research uses the following calculation of the cost of goods sold:

Table 2. Cost of Goods Sold Report

Cost of goods sold:	
COGS	Rp.xxx
Indirect Energy Costs	Rp.xxx
Transportation costs	Rp.xxx
Beverages Akomondasi	Rp.xxx



Electrical Abdomen Costs	Rp.xxx
Equipment Depreciation Costs	<u>Rp.xxx +</u>
Total Cost of Production	<u>Rp.xxx</u>

Source: Lukman, 2013

Linear Programming Analysis

In determining the optimal combination that can maximise profits, it is necessary to allocate limited resources efficiently. A *linear program* is an analytical model applied to allocate limited resources to use competing resources to solve optimal solutions (Natalia et al., 2013). The same method was used in research by Dewi and Purnita, 2019; Sugiarto, 2014, Sri and Putri, 2012; Windarti, 2013; Wiratna and Wirdasari 2009, Akpan et al., 2016, Anggoro et al., 2019, Fagoyinbo. et al., 2017.; Dwijatenaya et al, 2018; Nasution et al., 2016).

In designing models from cases, linear *programming defined* the following variables ().

- Decision variables
- Objective function
- Limiting function (constraint)

The formulation of the objective function and constraint function is as follows:

- Determining decision variables.

Decision variables are variables that fully describe the decisions that will be made. The decision variables used in solving problems at Ice Cream Business X are

ES	= Strawberry Ice Cream (Wrapped)
EC	= Chocolate ice cream (Wrapped),
EMA	= Mango Ice Cream (wrapped),
EME	= Melon Ice Cream (Wrapped),
EVS	= Vanilla-strawberry ice cream (Wrapped),
EVC	= Vanilla-Chocolate Ice Cream (Wrapped),
ECS	= Chocolate-strawberry ice cream (Wrapped)

- Objective function

A function describes the target or objective in the problem linear *programming* related to the optimal use of resources to obtain maximum profits. The objective function of X Ice Cream Business is formulated as follows:

$$\text{WITH}_{\max} = m_1\text{ES} + \mu_2\text{EC} + \mu_3\text{EMA} + m_4\text{EME} + \mu_5\text{EVS} + \mu_6\text{EVC} + m_7\text{ECS}$$

306



Information:

Z = Objective function value / maximum profit (Rp)

m_{1-7} = Profit for each product (Rp/pack)

c. Constraint Function

A form of mathematical presentation of limited decision constraints to be optimally allocated to various objectives, which is formulated as follows:

1. Raw Material Constraints

$$B_1ES + B_2EC + B_3EMA + B_4EME + B_5EVS + B_6EVC + B_7ECS \leq B_0$$

Information:

B_{1-7} = Purchase of raw materials for each product (Liters)

B_0 = Maximum capacity of milk raw materials in the X Ice Cream industry (Liter)

ES = Amount of strawberry flavoured ice cream (packs)

EC = Number of Chocolate Flavored Ice Cream (Packs)

EMA = Number of mango flavoured ice cream (packs)

EME = Number of Melon Flavored Ice Cream (Packs)

EVS = Number of vanilla-strawberry flavoured ice cream (packs)

EVC = Amount of vanilla-chocolate ice cream (packs)

ECS = Number of chocolate-strawberry flavoured ice cream (packs)

2. Labour Constraints (Working hours)

$$T_1ES + T_2EC + T_3EMA + T_4EME + T_5EVS + T_6EVC + T_7ECS \leq T_0$$

Information:

T_{1-7} = Labor hour capacity for each product (Hour/Pack)

T_0 = Maximum labour capacity in the X Ice Cream industry (hours/pack)

3. Machine Production Constraints

$$M_1ES + M_2EC + M_3EMA + M_4EME + M_5EVS + M_6EVC + M_7ECS \leq M_0$$

Information:

M_0 = Maximum machine production capacity in the X Ice Cream industry (hours/pack)

M_{1-7} = Capacity of machine hours for each product (Hour/Pack)



4. Production Cost Constraints (Capital)

$$P_1ES + P_2EC + P_3EMA + P_4DO + P_5EVS + P_6EVC + P_7ECS \leq P_0$$

Information:

P_{1-7} = Total production costs for each product (Rp/pack)

P_0 = Maximum amount of capital in the X Ice Cream industry (Rp/pack)

After changing the objective function and constraints, the next step is to solve it using software *Production and Operation Management (POM)*. The stages required to manage POM to determine the optimal value are as follows:

1. Determine the mathematical model.
2. Determine the program formulation for software POM.
3. Read the results report from software POM

RESULTS AND DISCUSSION**Cost of Production**

The cost of production is the price spent on activities that produce processed ice cream. The cost of production is the cost that must be incurred to process and produce raw materials into finished goods. There are seven types of ice cream produced. Types of ice cream and the percentages produced, as well as the COGS, can be seen in the following table.

Table 3. Cost of Production of "X Ice Cream" Business

No	Product type (Ice Cream)	Percentage (%)	COGS (Rp/Bks)
1	Strawberry	10,07	253,48
2	Chocolate	8,73	263,48
3	Please	5,04	253,48
4	Melon	6,88	259,73
5	Vanilla-strawberry	17,37	999,01
6	Vanilla-chocolate	23,16	999,02
7	Chocolate-strawberry	28,75	991,87
Total		100.00	

Source: Primary data processed, 2021



Based on Table 3, it is known that the COGS for each type of product, the largest cost of production is for chocolate-strawberry flavored ice cream products, with a percentage of 28.75 percent. Meanwhile, the cost of production per product with the smallest value is mango-flavoured ice cream, with a percentage of 5.04 per cent.

Cost of goods sold (COGS)

The cost of goods sold is all costs that must be incurred to obtain the goods sold or the acquisition price of the goods sold (Mulyadi, 2008). The cost of goods sold in the "X Ice Cream" business includes all costs incurred when producing kim ice. The cost of goods sold for each type of ice cream at "X Ice Cream" is as follows:

Table 4. Cost of goods sold for each type of ice cream

No	Product type (Ice Cream)	Percentage (%)	COGSe (Rp/Bks)
1	Strawberry	10,45	272,1
2	Chocolate	9,03	282,1
3	Please	5,22	272,1
4	Melon	7,13	278,4
5	Vanilla-strawberry	17,09	1017,7
6	Vanilla-chocolate	22,79	1017,7
7	Chocolate-strawberry	28,29	1010,5
Total		100,00	

Source: Primary data processed, 2021

Based on Table 4, it can be seen that the cost of goods sold incurred by the " Meanwhile, the cost of goods sold per product with the smallest value is mango flavored ice cream, with a percentage of 7.13 percent. This situation is reflected in the large number of raw material costs used to produce the products produced, the greater the costs incurred.

However, if the product produced requires little raw material costs, these costs will be small. The cost of goods sold is obtained from the sum of the cost of production and the fixed BOP, which contains electricity subscription costs and depreciation costs for equipment in the "X Ice Cream" business. Subscription fees are the amount of money



that must be spent by a business to use electricity, in this case, the costs incurred when a business uses or does not use electricity, and these costs are usually paid a month later. In the "X Ice Cream" business, the fees paid are by the applicable PLN fee rates.

Depreciation expense is the amount an asset can depreciate over its useful life. Depreciation in the "X Ice Cream" business is the depreciation of equipment used in the production process, such as moulding mills, rolling machines, etc., used in the production process.

Business Revenue

Revenue is the multiplication of the production produced by the selling price in effect at the time of the research, which can be seen in the following table:

Table 5. Business Revenue "X Ice Cream"

No	Types of products	Production quantity (Pack)	Selling price (Rp/pack)	Percentage (%)
	Strawberry ice cream	960	2.000	23,19
	Chocolate Ice Cream	800	2.000	19,32
	Mango Ice Cream	480	2.000	11,59
	Melon Ice Cream	640	2.000	15,46
	Vanilla-strawberry ice cream	420	1.500	7,61
	Vanilla-chocolate ice cream	560	1.500	10,14
	Chocolate-strawberry ice cream	700	1.500	12,68
Total		4.560		100,00

Source: Primary data processed, 2021

Revenue is that all ice cream products produced are sold. Table 5 shows that the acceptance of strawberry-flavoured ice cream is the highest compared to other flavoured ice creams. The amount of revenue received is 23.19 per cent of the total revenue. Even though it has the same price as other stick-flavoured ice cream, the acceptance of strawberry ice cream is greater because of the larger production quantities. The smallest



revenue is for vanilla-strawberry flavoured ice cream, with a percentage of 7.61 per cent of the total revenue costs. This can be influenced by the production quantity of this flavoured ice cream product, which is less than ice cream with a similar selling price, namely Rp. 1,500, - per pack.

Profit Analysed

Profit in this study was the difference between the selling price and the total cost per existing ice cream product. The profit seen here is the amount of revenue less the cost of goods sold. This profit can be seen more clearly in the following table:

Table 6. Profits for Each Type of Ice Cream Business "X Ice Cream"

No	Types of products (It Cream)	Percentage (%)	Production Quantity (bks)	Profit (Rp/pack)
1	Strawberry	28,70	960	1.727,9
2	Chocolate	23,78	800	1.717,9
3	Please	14,35	480	1.727,9
4	Melon	19,06	640	1.721,6
5	Vanilla-strawberry	3,51	420	482,3
6	Vanilla-chocolate	4,67	560	482,3
7	Chocolate-strawberry	5,93	700	489,5
Total		100.00	4560	

Source: Primary data processed, 2021

Table 6 shows that the biggest profit is for strawberry and mango flavoured ice cream with a profit per pack of IDR 1727,90. In strawberry ice cream, the profit obtained per production is 28.70 per cent, the biggest profit in the "X Ice Cream" business compared to other flavoured ice creams. This is related to the initial assumption, namely that if all the products are sold, of course, the ice cream that is produced in large quantities will also make a large profit because if you look at the profit per pack of strawberry and mango flavoured ice cream, the profit value is the same. This happens because the production amount for mango-flavoured ice cream is smaller for strawberry ice cream.



Meanwhile, the smallest profit is for vanilla-strawberry ice cream and vanilla-chocolate ice cream, namely IDR 482.30 per product. Unsurprisingly, this flavour of ice cream has a small profit because the cost of goods sold for it is said to be the highest compared to other cups of ice cream.

Formulation *Linear Programming*

Model Estimation for the "X Ice Cream" Business

The "X Ice Cream" business uses raw materials, labour hours, machine hours and capital to produce ice cream. The products produced by the "X Ice Cream" business are strawberry, chocolate, mango, melon, vanilla-strawberry, vanilla-chocolate and chocolate-strawberry-flavoured ice cream. As for models *linear programming* complete is as follows

Objective Function:

$$\text{Max } Z = 1727,9 \text{ ES} + 1717,9 \text{ EC} + 1727,9 \text{ EMA} + 1721,6 \text{ EME} + 482,3 \text{ EVS} + 482,3 \text{ EVC} + 489,5 \text{ ECS}$$

Constraint function:

1. Milk raw materials = $0,031 \text{ ES} + 0,031 \text{ EC} + 0,031 \text{ EMA} + 0,031 \text{ EME} + 0,057 \text{ EVS} + 0,057 \text{ EVC} + 0,057 \text{ ECS} \leq 200$
2. Labor hours = $0.003 \text{ ES} + 0.003 \text{ EC} + 0.003 \text{ EMA} + 0.003 \text{ EME} + 0.007 \text{ EVS} + 0.007 \text{ EVC} + 0.007 \text{ ECS} \leq 27$
3. Machine hours = $0.003 \text{ ES} + 0.003 \text{ EC} + 0.003 \text{ EMA} + 0.003 \text{ EME} + 0.007 \text{ EVS} + 0.007 \text{ EVC} + 0.007 \text{ ECS} \leq 18$
4. Modal = $272,1 \text{ ES} + 282,1 \text{ EC} + 272,1 \text{ EMA} + 278,4 \text{ EME} + 1017,7 \text{ EVS} + 1017,7 \text{ EVC} + 1010,5 \text{ ECS} \leq 3.000.000$
5. Market demand for strawberry ice cream: $\text{ES} \leq 1350$
6. Market demand for chocolate ice cream: $\text{EC} \leq 900$
7. Market demand for Mango Ice Cream: $\text{EMA} \leq 960$
8. Market demand for melon ice cream: $\text{EME} \leq 1050$
9. Market demand for vanilla-strawberry ice cream: $\text{EVS} \leq 780$
10. Market demand for vanilla chocolate ice cream: $\text{EVC} \leq 840$
11. Market demand for chocolate-strawberry ice cream: $\text{ECS} \leq 1080$



Optimization Results with the Model *Linear Programming***Product Optimization Results**

The amount for each type of product produced is based on processed data *linear programming* from POM, which provides optimal solutions for product combinations that can maximise the level of profit that can be achieved with the use of limited resources. The same method was used by Sugiarto, 2014, Sri and Putri, 2012

Windarti, 2013 and Dewi and Purnita, 2019. Based on the analysis of the POM application, the level of product combination can be seen in Table 7 below.

Table 7. Optimal Production of Each Product in the "X Ice Cream" Business

No	Types of products	Production Rate (Package)		
		Current	Optimal	Difference
1	Strawberry ice cream	960	1.350	390
2	Chocolate Ice Cream	800	900	100
3	Mango Ice Cream	480	960	480
4	Melon Ice Cream	640	1.050	410
5	Vanilla-strawberry ice cream	420	0	420
6	Vanilla-chocolate ice cream	560	0	560
7	Chocolate-strawberry ice cream	700	745	45
		4.560	5.005	445

Source: Primary data processed, 2021

From Table 7. The five products that provide a solution are strawberry, chocolate, mango, melon and chocolate strawberry-flavoured ice cream. In contrast, two other ice creams do not provide a solution, namely vanilla-strawberry flavoured ice cream and vanilla-chocolate flavoured ice cream, so the production of this flavoured ice cream does not need to be continued.



Table 7 shows that the actual production amount of strawberry ice cream is 960 packs. Increasing the production level by another 390 packs is necessary to achieve optimal profits. Meanwhile, for chocolate-flavoured ice cream, it need to add 100 packs to get optimal profits. For mango ice cream, production needs to be increased 2x or 960 packs, and melon ice cream to increase to 1050 packs. The strawberry chocolate flavoured ice cream only increases by 45 packs for maximum profits.

Maximum profit results

If the owner of the business " The sales results that the business owner will get if he produces ice cream under optimal conditions can be seen in Table 8, which explains the data solution results from the linear programming analysis. *Then* it is known that if the business " and 745 packs of chocolate-strawberry ice cream and stopping production of the vanilla-strawberry flavour and vanilla-chocolate flavoured ice cream, a profit of IDR 7,710,266 will be obtained.

In optimal production conditions, of course, they have excess resources and can still increase production, as in slack 1, which represents the remaining raw materials of 25.4343 litres, which can still be used to produce more flavoured ice cream but will not reduce optimum profits. Then, with a slack of 2 working hours, where labour hours are only used for 18 hours, this means that labour hours still have an excess of nine more hours, which can, of course, be used to produce more ice cream because of the excess number of labour hours worked.

Table 8. Maximum Profit Data

Variable	Status	Value
IS	Basic	1.350
EC	Basic	900
MOTHER	NONBasic	960
DO	Basic	1.050
EVS	NONBasic	0
EVC	NONBasic	0
ECS	NONBasic	745,7142
Slack 1	Basic	25,4343
Slack 2	NONBasic	9



Slack 3	Basic	0
Slack 4	Basic	1.071.695,0
Slack 5	NONBasic	0
Slack 6	NONBasic	0
Slack 7	Basic	0
Slack 8	Basic	0
Slack 9	Basic	780
Slack 10	Basic	840
Slack 11	Basic	334,2858
Optimal Value (Z)		7.710.266

Source: Primary data processed, 2021

Slack 4 which represents capital, this means that if the business " But of course you need to pay attention if adding costs does not exceed the remaining capital limit of IDR. 1,071,695- because it will affect the optimal amount of profit and, of course, the optimal amount of product production.

Sensitivity Analysis (SA)

According to Siswanto, 2007 Kuntari et al, 2015; Panggabean et al., 2014 Noerhayati et al., 2017; Adria, 2017, sensitivity analysis explains to what extent the model parameters of linear *programming*, namely the coefficients of the objective function and the value of the right side of the constraint, can be changed without affecting the optimal solution.

1. Sensitivity of Objective Function Coefficients

Sensitivity analysis of the coefficient values of the objective function to determine the limit of increase or decrease in profits for each type of product. So, with the sensitivity analysis results, changes in the objective function coefficient values can be seen, influencing the optimal value. Table 9 shows that the objective function has changed in profits obtained by businesses on several types of ice cream products, such as strawberry-flavoured ice cream with a lower limit of IDR 209.7858 and an upper limit of infinity or unlimited and chocolate-flavoured ice cream has a lower limit of IDR 209.7858 and an upper limit that is unlimited or *infinity*.



Table 9. Sensitivity Analysis of Objective Function Coefficients

Was.	Types of products	Coefficient	Lower limit (Lower bound)	Upper limit (Upper bound)
IS	Strawberry Ice Cream	1727,9	209,7858	Infinity
EC	Chocolate Ice Cream	1717,9	209,7858	Infinity
MOTHER	Mango Ice Cream	1727,9	209,7858	Infinity
DO	Melon Ice Cream	1721,6	209,7858	Infinity
EVS	Strawberry-vanilla ice cream	482,3	-Infinity	489,5
EVC	Chocolate-Vanilla Ice Cream	482,3	-Infinity	489,5
ECS	Chocolate-Strawberry Ice Cream	489,5	482,3	4008,433

Source: Primary data processed, 2021

The lower limit for mango ice cream is IDR 209.7858 and above infinity. Melon-flavoured ice cream has a lower limit of IDR 209.7858 and an unlimited upper limit or infinity. This condition means that for the four types of ice cream, the permitted profit limit is no less than the lower limit. If the profit value increases or increases regardless of the amount.

2. Resource Sensitivities

This right-hand side sensitivity analysis covers all constraints consisting of raw materials, labour hours, machine hours and capital. Sensitivity analysis is carried out to determine the sensitivity of changes in production resources without changing the business's profits (Puspitasari, 2013). Explanation of resource sensitivity in the following table:



Table 10. Resource Sensitivity

Resource Type	Coefficient	Lower limit (Lower bound)	Upper limit (Upper bound)
Raw material	200	174,5657	Infinity
Labor	27	18,00	Infinity
Machine	18	12,78	20,34
Capital	3.000.000	1.928.305,0	Infinity

Source: Primary data processed, 2021

Table 10 shows a sensitivity analysis on raw material resources which have a lower limit of 174.5657 litres and an unlimited upper limit, machine resources which have a lower limit of 18 hours and an unlimited upper limit or *infinity*. Capital resources that have a lower limit of IDR 1,928,305 and an unlimited upper limit or infinity.

These three resources mean that the reduction in resources must not be less than the lower limit of each resource so that the combination remains in optimal condition. However, if they want to increase resources, there will be no changes to production, or it will remain at optimal conditions.

This research is different from the labour hours resource, which has a lower limit of 12.78 hours, which means that if the company want to reduce the use of labour hours, it cannot be less than 12.78 hours if they do not want to change optimal conditions, and the upper limit is 20.34 hours. It means that if the additional working hours of the workforce do not exceed the upper limit, the production combination remains at optimal conditions.

CONCLUSIONS AND SUGGESTIONS

Based on the research results, it can be concluded that:

1. The combination of the seven products must be produced by the "chocolate-strawberry 745 packs. It no longer produces vanilla-strawberry flavoured ice cream and vanilla-chocolate flavoured ice cream.
2. The maximum profit the "X Ice Cream" business obtains by formulating an optimisation model is Rp. 7.710.266,-
3. Changes in input and output prices will not affect optimal conditions if they want to reduce input and output prices to no less than the lower limit and if they want to increase input and output prices by no more than the upper limit.

317



Suggestion

1. Optimal production conditions in the form of producing 1350 ES + 900 EC + 960 EMA + 1050 EME + 745 ECS and no longer producing EVS and EVC should be implemented by business owners to achieve maximum profits.
2. With an image linear *programming*, we get several excess resources such as 25.43 litres of remaining raw materials, 9 hours of excess labour hours and capital of Rp. 1,071,695, - expected to be used more optimally to obtain maximum profits. for the "X Ice Cream" business.

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