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Review Article

Optimization Of Production Combination in Umah Lokal Coffee Roastery

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Abstract: Umah Lokal Coffee Roastery is a business engaged in the production and marketing of coffee beans. This study aims to optimize the production combination to maximize profits using the Linear Programming method. This method enables the company to determine the optimal production quantity for each type of product, namely Telek Beans, Barong Beans, Jauk Beans, Gerbera, and Daisy. The analysis results indicate that the optimal production combination includes producing 128 units of Telek Beans, 155 units of Jauk Beans, 85 units of Gerbera, and 189 units of Daisy, while the production of Barong Beans is discontinued. Implementing this strategy has the potential to increase profits by Rp1,124,417 or 6.4%. This research contributes to the development of more efficient production strategies in dealing with resource constraints.

Keywords: Linear Programming, Operations Management, Optimization, Production Combination, Profit Maximization,

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1. Introduction

Production planning is a series of activities involving determining the number of products to be produced, the completion time, and the materials used in the production process. Efficient production planning helps companies maximize profits (Mulyani & Purnawati, 2024). According to Putri and Nurcaya in Buana and Purnawati (2021), production planning involves organizing and planning resources such as personnel, materials, machinery, equipment, and capital to manufacture goods within a specified period based on projected forecasts. Companies must consider resource availability and constraints, including production costs, working hours, material usage, production time, and past sales data. These factors help companies address resource limitations to achieve an optimal production combination (Sinaga, 2016).

According to S.R. Singh (2013), determining the product mix within a given period is a crucial decision in production. A well-planned production combination ensures alignment with sales figures, minimizes raw material costs, prevents wasteful production, and maximizes profitability (Kim & Glock, 2018). One of the key factors in achieving maximum profits is determining the appropriate production quantity (Sari, 2015). Production involves processing raw materials into finished goods to meet consumer needs by adding value to the product (Rachma, 2020). Proper production quantity can be determined through production planning (Hilman, 2016). Production planning is a set of activities aimed at determining production quantities to meet future consumer demand (Eunike et al., 2021). Through effective production planning, businesses can decide what, how much, and when to produce to fulfill customer demand and ensure profitability (Yucesan, 2017).

When a company produces multiple products using the same raw materials while maximizing profits, it achieves an optimal production combination. The goal of an optimal production combination is to utilize limited resources efficiently to produce goods in line with production capacity and demand (Georgiadis et al., 2019). Companies facing resource constraints can analyze and determine optimal product combinations using linear programming applications (Woubante, 2017).

Devani & Kartika (2020) define linear programming as an optimization technique used to allocate available resources efficiently to either maximize profits or minimize costs through a linear objective function with linear constraints. Linear programming has two primary objectives: profit maximization and total cost minimization (Apriliyanti, 2018). According to Rahmi & Suryani (2016),problems suitable for linear programming include (1) objectives expressed as linear equations (either maximization or minimization), (2) multiple alternative solutions, and (3) constraints represented as linear inequalities. Several studies have applied profit maximization as an objective function, such as research by Daryani et al. (2024), Buana & Purnawati (2021), Devani & Kartika (2020), Aningke et al. (2020), and Krisnadewi & Setiawan (2018). Additionally, research by Rosmasari & Jatiningrum (2021) applied linear programming to minimize total costs.

Linear programming is not only used for optimizing production combinations but also applied in other fields. For example, Irsyad et al. (2020) utilized linear programming for employee scheduling, while Abidin et al. (2020) applied it to optimize product inventory. Studies by Sudjaja & Santoso (2018) and Ogbeide & Ejechi (2018) concluded that optimization models can be widely applied in engineering and economic problems. Linear programming is also used for optimizing distribution routes, as demonstrated by research from Sari et al. (2020).

Previous research indicates that linear programming benefits organizations and businesses by offering decision-making alternatives for resource allocation to either minimize costs or maximize profits.

Umah Lokal Coffee Roastery is a coffee producer based in Denpasar. Established in 2016, the business experienced rapid growth in 2018. Initially, Umah Lokal Coffee Roastery relied on other companies for production before eventually setting up its own production facility. Currently, it offers five coffee variations: Telek Beans, Barong Beans, Jauk Beans, Gerbera, and Daisy. These products require robusta and arabica coffee beans, along with roasting and sealing equipment before being marketed. The company operates with two employees, each working six hours per day. The average monthly sales (in kilograms) are as follows: Telek Beans (69 kg), Barong Beans (83 kg), Jauk Beans (129 kg), Gerbera (84 kg), and Daisy (190 kg). However, Umah Lokal Coffee Roastery determines its production quantities based on historical monthly demand without calculating the actual optimal combination required.

Table 1. Coffee Sales Data at Umah Lokal Coffee Roastery in 2023

MONTH	COFFE SALES (kg)				
	TELEK	BARONG	JAUK	GERBERA	DAISY
JANUARY	69	69	88	74	144
FEBRUARY	56	72	106	71	186
MARCH	59	68	103	92	176
APRIL	60	69	87	78	161
MAY	75	64	114	74	153
JUNE	71	86	126	73	202
JULY	74	86	165	97	179
AUGUST	74	96	167	76	196
SEPTEMBER	75	106	169	72	240
OCTOBER	83	108	163	113	221
NOVEMBER	69	89	146	111	215
DECEMBER	65	90	116	81	206
TOTAL	830	1003	1550	1012	2279

Source: Umah Lokal Coffee Roastery, processed data (2023)

Table 1 shows that Daisy is the most popular and best-selling product, as evidenced by its higher sales volume compared to other products. The price per kilogram is Rp220,000 for Telek Beans, Rp180,000 for Barong Beans, Rp130,000 for Jauk Beans, Rp185,000 for Gerbera, and Rp145,000 for Daisy. Since Umah Lokal Coffee Roastery relies heavily on coffee beans as the primary raw material in its production process, it is crucial to optimize resource allocation. The products require some of the same resources but yield different output quantities. Currently, the company bases its production on the average demand from the same month of the previous year without determining the optimal production combination needed to maximize profit. Therefore, the company needs to determine the optimal production mix using linear programming as a tool to identify the most profitable production combination while considering constraints.

2. Method

This study is a descriptive research using a quantitative approach to analyze the company's production issues and assess whether Umah Lokal Coffee Roastery in Denpasar has achieved optimal production. The research was conducted at Umah Lokal Coffee Roastery, a coffee production business located at Jl. Plawa No.88, Denpasar.

Umah Lokal Coffee Roastery faces a production mix phenomenon, where multiple product types are produced using the same production resources but with varying raw material requirements. The limitations of resources, such as raw materials and working hours, necessitate an analysis to determine the optimal production quantity for each product to maximize profit. This challenge is the main reason for selecting Umah Lokal Coffee Roastery as the research location.

For data analysis, the collected data is processed using linear programming, specifically the simplex method, to determine the optimal production mix. The calculations are performed using POMQM for Windows Version 5.2 software.

3. Research Findings and Discussion

Products and Their Characteristics

Umah Lokal Coffee Roastery produces two categories of coffee beans: Balinese Series and Regular Series. Telek Beans, Barong Beans, and Jauk Beans belong to the Balinese Series, while Gerbera and Daisy fall under the Regular Series. Telek Beans use Arabica coffee beans, Barong Beans use a blend of Arabica and Robusta beans, while Jauk Beans use Robusta coffee beans. The Balinese Series is made from Arabica coffee beans sourced from Kintamani and Robusta coffee beans from Pupuan. Gerbera, categorized under the Regular Series, is made exclusively from Arabica beans, while Daisy is a 50% Arabica and 50% Robusta blend. The key distinction between the Balinese and Regular Series lies in the origin of the coffee beans. The Balinese Series is available in 100g, 200g, 500g, and 1kg packaging, whereas the Regular Series is only available in 1kg packaging.

Equipment and Raw Materials

The production process at Umah Lokal Coffee Roastery involves the following raw materials:

- Robusta Coffee Beans: Robusta beans have a full-bodied texture, higher caffeine content, and a bold flavor with nutty and dark chocolate notes. Their distinctive aroma makes them ideal for espresso or signature blends.
- Arabica Coffee Beans: Arabica beans offer a complex flavor profile with fruity, floral, and chocolate hints. Their balanced acidity and medium body provide a smooth and refined coffee experience, making them ideal for manual brewing methods such as V60, Kalita, or French Press.

Production Process

The first step in the coffee bean processing at Umah Lokal Coffee Roastery is roasting. This involves heating raw green coffee beans to achieve the desired level of doneness, which significantly influences the flavor and aroma of the coffee. Each type of coffee bean has a different roasting profile, including light roast, medium roast, and dark roast, each delivering a unique flavor. Umah Lokal Coffee Roastery specializes in medium roast coffee.

After the roasting process, the next step is packing. The roasted beans are cooled, weighed, and packaged according to their category. The packaging is designed to maintain the freshness and flavor quality of the coffee. Most packages include a one-way valve to release gases emitted by the beans while preventing air from entering, ensuring optimal freshness until it reaches the consumer.

Linear Programming Model

Decision Variables

Decision variables represent the values to be optimized. Since the company produces five different products, the decision variables are defined as follows:

- X_1 = Telek Beans (kg)
- X_2 = Barong Beans (kg)
- X_3 = Jauk Beans (kg)
- X_4 = Gerbera (kg)
- X_5 = Daisy (kg)

Cost Classification

Table 2. Cost Classification According to Function and Cost Behavior in Rumah Lokal Coffee Roastery

Information	Fixed Costs	Variable Costs	Amount
1. Production cost			
a. Raw Material Cost		Rp. 75,226,800	Rp. 75,226,800
b. Direct Labor Cost		Rp. 2,800,000	Rp. 2,800,000
c. Factory Overhead Costs			
- Cost of auxiliary materials		Rp. 5,560,000	Rp. 5,560,000
- Indirect Labor Costs (Accounting Staff Salaries)	Rp. 2,000,000		Rp. 2,000,000
- Electricity cost		Rp. 200,000	Rp. 200,000
- Water/Water Supply Costs		Rp. 200,000	Rp. 200,000
- Gas Cost		Rp. 1,000,000	Rp. 1,000,000
- Depreciation Cost of Machinery and Equipment	Rp. 1,787,500		Rp. 1,787,500
- Venue Rental Fee	Rp. 1,000,000		Rp. 1,000,000
2. Administration and General Fees	Rp. 50,000		Rp. 50,000
Total	Rp. 4,837,500	Rp. 85,026,800	Rp. 89,864,300

*Source:*Umah Lokal Coffee Roastery, data processed 2023

Objective Function Formulation

This study aims to maximize profit. The objective function describes the contribution of profit per unit of product in each production cycle carried out by Umah Lokal Coffee Roastery. Profit per unit in one production is obtained from the difference between the selling price per unit and the production cost per unit.

The highest selling price per unit of product is the selling priceThe price per unit of Telek Beans is Rp220,000 while the lowest is Jauk Beans at Rp130,000. The selling price per unit of Barong Beans product is Rp180,000, the selling price per unit of Gerbera product is Rp185,000, and the selling price per unit of Daisy product is Rp145,000.

The production cost per unit of Telek Beans product (X1) is the highest production cost, which is Rp178,000, while the production cost of Jauk Beans product (X3) is the lowest, which is Rp98,000. The production cost per unit of Barong Beans (X2) is Rp154,000, the production cost per unit of Gerbera product (X4) is Rp148,000, and the production cost per unit of Daisy product (X5) is Rp118,000.

Profit per unit of Telek Beans product (X1) contributed the highest profit of Rp42,000 while the profit of Barong Beans product (X2) contributed the lowest profit of Rp26,000. Jauk Beans product (X3) contributed a profit of Rp32,000, Gerbera product (X4) contributed a profit of Rp37,000 and profit per unit of Daisy product (X5) contributed a profit of Rp27,000. The function of the objectives of Umah Lokal Coffee Roastery are as follows:

Maximize Z =$42000x_1 + 26000x_2 + 32000x_3 + 37000x_4 + 27000\,x_5$

Information:

Z = total profit (Rp)

C_1X_1= Profit for Telek Beans (kg)

C_2X_2= Profit for Barong Beans (kg)

C_3X_3= Profit for Jauk Beans (kg)

C_4X_4= Profit for Gerbera (kg)

C_5X_5= Profit for Daisy (kg)

Limitation Function Formulation

The constraint function consists of the constraint function of coffee raw materials, the constraint of the production process duration, the constraint of the production capacity of each product and the non-negative constraint function.

1) Raw material limitations

One unit (kilogram) of Telek Beans requires 1.2 kg of Arabica coffee beans as raw material. One unit (kilogram) of Barong Beans requires 0.84 kg of Arabica coffee beans and 0.36 kg of Robusta coffee beans. One unit (kilogram) of Jauk Beans requires 1.2 kg of Robusta coffee beans. One unit (kilogram) of Gerbera requires 1.2 kg of Arabica coffee beans and one unit (kilogram) of Daisy requires 0.6 kg of Arabica coffee beans and 0.6 kg of Robusta beans. The amount of raw materials in one month available for the Balinese Series product is 153 kg of Arabica coffee beans and 186 kg of Robusta coffee beans. For the Regular series, the amount of raw materials available is 215 kg of Arabica coffee beans and 114 kg of Robusta coffee beans. The function of the constraints for raw materials (coffee beans) becomes:

a). Arabica Raw Material (A) for Balinese Series

$$1{,}2X_1 + 0{,}84X_2 + 0X_3 + 0X_4 + 0X_5 \leq 153$$

b) Robusta Raw Material (A) for Balinese Series

$$0X_1 + 0{,}36X_2 + 1{,}2X_3 + 0X_4 + 0X_5 \leq 186$$

c) Arabica Raw Material (B) for Regular Series

$$0X_1 + 0X_2 + 0X_3 + 1{,}2X_4 + 0{,}6X_5 \leq 215$$

d) Robusta Raw Material (B) for Regular Series

$$0X_1 + 0X_2 + 0X_3 + 0X_4 + 0{,}6X_5 \leq 114$$

2) Limitations of auxiliary materials (packaging)

Details of the use of auxiliary materials, namely packaging for each product in one production for one month, namely 1 sheet for Telek Beans, while for Barong Beans it requires 1 sheet of packaging, for Jauk Beans it requires 1 packaging, for Gerbera it requires 1 packaging and for Daisy it requires 1 packaging. The average number of packages needed for one month is 556 packages. The function of the limitations for packaging is:

$$X_1 + X_2 + X_3 + X_4 + X_5 \;\; 556\leq$$

3) Production process time limits

Details of the roasting and packaging process for each product can be seen in Appendix 3. The total time required to convert green beans into one unit (kilogram) of Telek Beans product is 4 minutes. The time required to convert green beans into one unit (kilogram) of Barong Beans product is 4 minutes. The time required to convert green beans into one unit (kilogram) of Jauk Beans product is 4 minutes. The time required to convert green beans into one unit (kilogram) of Gerbera product is 4 minutes. The time required to convert green beans into one unit (kilogram) of Daisy product is 4 minutes. Meanwhile, the packaging of the product takes 1 minute/unit (kilogram). Therefore, each product (kilogram) takes 5 minutes of production time. The number of workers available at the production stage is 1 person, with 8 hours of working hours per day and 12 working days in one month. Thus, the total working hours available at the coffee product production stage at Umah Lokal Coffee Roastery are 1x8x12x60 = 5,760 minutes in one month, so that the limitation function for the product production time stage can be formulated as follows:

$$5X_1 + 5X_2 + 5X_3 + 5X_4 + 5X_5 \;\; 5{,}760\leq$$

4) Non-Negative Limits

$x_1, x_2, x_3, x_4, x_5, \geq 0$

4. Discussion of Research Results

Optimal Production Combination

Table 3. Results of Optimization of Production Combination (Linear Programming Results)

Product	Profit per unit (Rupiah)	Optimal Production Quantity		
		Unit	Rounded up	Rupiah
Telek Beans (X1)	Rp. 42,000	127.5	128	Rp. 5,376,000
Barong Beans (X2)	Rp. 26,000	0	0	Rp -
Green Beans (X3)	Rp. 32,000	155	155	Rp. 4,960,000
Gerbera (X4)	Rp. 37,000	84.83	85	Rp. 3,145,000
Daisy (X5)	Rp. 27,000	188.67	189	Rp. 5,103,000
Maximum Profit				Rp18,584,000

Source: Umah Lokal Coffee Roastery, data processed 2023

Based on the results of data analysis using POMQM for Windows software, the optimal solution to the production combination problem at Umah Lokal Coffee Roastery was produced in the 5th iteration (appendix 6). Based on table 3, the optimal production combination at Umah Lokal Coffee Roastery will be achieved when producing 128 units (kilograms) of Telek Beans products, not producing Barong Beans products, 155 units (kilograms) of Jauk Beans products, 85 units (kilograms) of Gerbera products and 189 units (kilograms) of Daisy products. The maximum profit that can be achieved by Umah Lokal Coffee Roastery from this production combination is Rp18,584,000.

Table 4. Result of Optimization of Production Combination (Ranging Variables)

	Dual Value	*Slack/Surplus*	*Original Val*	*Lower Bound*	*Upper Bound*
Constraint 1 (Arabica Balinese Series)	20833.3	0	153	152.2	266.2
Constraint 2 (Robusta Balinese Series)	12500	0	186	185.2	299.2
Constraint 3 (Arabica Regular Series)	16666.7	0	215	214.2	328.2
*Constraint*4 (Robusta Regular Series)	0	0.8	114	113.2	*Infinity*
*Constraint*5 (Auxiliary Materials)	17000	0	556	461.7	556.7
*Constraint*6 (Production Process Duration)	0	2980	5760	2780	*Infinity*

Source: Umah Lokal Coffee Roastery, data processed 2023

Table 4 shows the optimization result values consisting of dual value, surplus/slack value, lower bound value, and upper bound value of the constraint function. The dual value shows the additional profit from the constraint on business profit. The surplus/slack value shows the remaining value or the deficiency value of each constraint function. The lower bound value shows the lower limit value or the minimum value of each constraint function that the company must have. The upper bound value shows the upper limit value or the maximum value of each constraint function that can be used by the company in the production process.

The original value or the amount of Arabica (Balinese series) available for one month is 153 kg. The slack/surplus value is 0, this indicates that the amount of green Arabica beans (Balinese series) available is used up in the production process. The dual value of green Arabica beans (Balinese series) is 20,833.3, this indicates that the addition of one kilogram of green Arabica beans (Balinese series) will provide an additional profit contribution of Rp20,833.3. The lower bound and upper bound values of green Arabica beans (Balinese series) are 152.2 and 266.2. This indicates that the minimum green Arabica beans (Balinese series) that must be available for one month of the production process is 152.2 kg and the maximum amount of green Arabica beans (Balinese series) is 266.2 kg so as not to change the optimization results.

The original value or the amount of robusta (Balinese series) available for one month is 186 kg. The slack/surplus value is 0, this indicates that the amount of green beans robusta (Balinese series) available is used up in the production process. The dual value of green beans robusta (Balinese series) is 12,500, this indicates that the addition of one kilogram of green beans robusta (Balinese series) will provide an additional profit contribution of Rp12,500. The lower bound and upper bound values of green beans robusta (Balinese series) are 185.2 and 299.2. This indicates that the minimum green beans robusta (Balinese series) that must be available for one month of the production process is 185.2 kg and the maximum amount of green beans robusta (Balinese series) is 299.2 kg so as not to change the optimization results.

The original value or the amount of Arabica (regular series) available for one month is 215 kg. The slack/surplus value is 0, this indicates that the amount of green Arabica beans (regular series) available is used up in the production process. The dual value of green Arabica beans (regular series) is 16,666.7, this indicates that the addition of one kilogram of green Arabica beans (regular series) will provide an additional profit contribution of Rp16,666.7. The lower bound and upper bound values of green Arabica beans (regular series) are 214.2 and 328.2. This indicates that the minimum green Arabica beans (regular series) that must be available for one month of the production process is 142.2 kg and the maximum amount of green Arabica beans (regular series) is 328.2 kg so as not to change the optimization results.

The original value or the amount of robusta (regular series) available for one month is 114 kg. The slack/surplus value is 0.8, this indicates that the amount of green beans robusta (regular series) available is not used up in the production process or in other words, the amount of green beans robusta (regular series) available is more than needed. The dual value of green beans robusta (regular series) is 0, this indicates that the addition of one kilogram of green beans robusta (regular series) will not provide additional profit contribution. The lower bound and upper bound values of green beans robusta (regular series) are 113.2 and infinity. This indicates that the minimum green beans robusta (regular series) that must be available for one month of the production process is 113.2 kg and the maximum amount of green beans robusta (regular series) is infinity or unlimited so as not to change the optimization results.

The original value or the amount of auxiliary materials (packaging) available for one month is 556 units. The slack/surplus value is 0, this indicates that the amount of auxiliary materials (packaging) available is used up in the production process. The dual value of auxiliary materials (packaging) is 17,000. This shows that the addition of one unit of auxiliary materials (packaging) will contribute a profit of Rp17,000. The lower bound and upper bound values of auxiliary materials (packaging) are 461.7 and 556.7. This shows that the minimum amount of auxiliary materials (packaging) that must be available in one month of the production process is 461.7 units (rounded up to 462 units) and the maximum amount of auxiliary materials (packaging) that can be provided by the company for one month of the production process is 556.7 units (rounded up to 557 units) so as not to change the optimization results.

The original value or the number of working minutes in the production process available during one month of the production process is 5760. The slack/surplus value is 2980, this indicates that the total working time (minutes) available is not used up in the production process, or in other words the number of working minutes available is more than needed. The dual value is 0, this indicates that adding one minute of working hours will not provide additional profit contribution. The lower bound and upper bound values are 2780 and infinity. This indicates that the minimum number of working minutes that must be available in one production process is 2,780 minutes and the maximum number of working minutes that can be provided by the company for one month of the production process so as not to change the optimization results is infinity or unlimited.

Comparison of production and profit levels

Table 5. Comparison of Production and Profit Levels

Types of products	Profit per Unit	Before Optimization		After Optimization	
		Unit	Rupiah	Unit	Rupiah
Telek Beans	**Rp. 42,000**	**69**	**Rp. 2,905,000**	**128**	**Rp. 5,376,000**
Barong Beans	**Rp. 26,000**	**84**	**Rp. 2,173,166.67**	**0**	**Rp -**
Jauk Beans	**Rp. 32,000**	**129**	**Rp 4,133,333.33**	**155**	**Rp. 4,960,000**
Gebera	**Rp. 37,000**	**84**	**Rp. 3,120,333.33**	**85**	**Rp. 3,145,000**

Daisy	**Rp. 27,000**	**190**	**Rp. 5,127,750.00**	**189**	**Rp. 5,103,000**
Total Profit			Rp. 17,459,583		Rp. 18,584,000

Source: Umah Lokal Coffee Roastery, data processed 2023

Big increase in profits = Rp18,584,000 –Rp17,459,583
= Rp1,124,417

Percentage increase in profit $= \frac{\text{Rp1.124.417}}{\text{Rp17.459.583}} \text{x } 100\%$

Percentage increase in profit = 6.4%

Table 5 presents a comparison of the production level of each type of product and the level of profit generated before and after the optimization process of the production combination. Based on Table 5, the production level of Telek Beans before the analysis of the optimal production combination was 69 units, while after the analysis of the optimal combination it was 128 units (kilograms) per month. The production level of Barong Beans products before the analysis of the optimal production combination was 84 units, while after the analysis of the optimal combination it was 0 units (kilograms) per month or not produced at all. The production level of Jauk Beans products before the analysis of the optimal production combination was 129 units (kilograms) and after the analysis of the optimal production combination it was 155 units (kilograms) per month. The production level of Gerbera products before the analysis of the production combination was 84 units (kilograms), while after the analysis of the optimal production combination it was 85 units (kilograms) per month. The production level of Daisy products was 190 units (kilograms) before the analysis of the optimal production combination, while after the analysis of the optimal production combination it was 189 units (kilograms) per month.

Based on table 5, it can be observed that there are several products whose production volume must be increased, namely Telek Beans, Jauk Beans and Gerbera. Meanwhile, Daisy products must be reduced in production and even for Barong Beans products, production must be stopped. This shows that previously Umah Lokal Coffee Roastery had not produced optimally with the existing resource capacity. The amount of profit increase that will be obtained by Umah Lokal Coffee Roastery if it implements the optimal production combination is Rp1,124,417 or if expressed as a percentage, the profit increase obtained reaches 6.4%.

5. Conclusion And Suggestions

Conclusion

The optimal production combination for Umah Lokal Coffee Roastery to achieve maximum profit is to produce 128 units of Telek Beans, 0 units of Barong Beans, 155 units of Jauk Beans, 85 units of Gerbera, and 189 units of Daisy. The increase in profit that Umah Lokal Coffee Roastery will obtain by implementing the optimal production combination is Rp1,124,417 or 6.4%.

Suggestions

1. Umah Lokal Coffee Roastery is advised to implement the linear programming concept in its production process while considering resource availability to achieve optimal profit.

2. Future research is recommended to apply the linear programming concept to companies facing resource constraints in producing multiple product types to maximize profit. Additionally, further studies are encouraged to conduct additional analyses by comparing the company's profit before and after implementing production combination optimization over a longer period.

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