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OPTIMIZATION OF PRICING AND COST PLANNING USING LINEAR FUNCTIONS: AN ECONOMIC MATHEMATICS PERSPECTIVE ON FINANCIAL STRATEGY AT CAKE MY DAY

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Abstract

Pricing and cost planning are critical aspects of business management, especially for small enterprises like the "Cakemyday" cake shop. Proper financial planning ensures sustainability and profitability in a competitive market. This study aims to analyze the financial feasibility of "Cakemyday" by calculating the Break-Even Point (BEP) and determining the optimal selling price based on cost structures and demand functions.A quantitative approach was employed, utilizing financial data, including fixed costs, variable costs, and demand function analysis. The BEP calculation determined the minimum number of units required to cover all expenses, while the demand function was derived from historical pricing and sales data to understand consumer behavior.The findings indicate that "Cakemyday" needs to sell 78 units to reach BEP, with a contribution margin of Rp 90,000 per unit. Furthermore, to achieve a profit target of Rp 3,000,000, an optimal selling price of approximately Rp 188,000 per unit was determined. The demand function analysis revealed a negative correlation between price and quantity demanded, supporting strategic pricing decisions.The study concludes that understanding financial metrics and consumer behavior is essential for sustainable business growth. It is recommended that "Cakemyday" implement targeted marketing strategies and monitor pricing dynamics to enhance profitability. Future research may explore external factors affecting demand and conduct comparative studies with similar businesses.

Keywords: Break Even Point, demand function, linear function, optimal selling price, financial sustainability

INTRODUCTION

In the era of increasing globalization and the density of information technology, the business world is now undergoing such a big change. MSMEs are the main pillar of the country's economy and make many important contributions to creating jobs and increasing income in the community (Supriyatna et al., 2024). Pricing and cost planning are crucial elements in a business's financial strategy, especially for small and medium enterprises (SMEs) such as Cake My Day. Errors in pricing strategies can lead to an imbalance between demand and supply, which can lead to a decrease in profitability and competitiveness in the market. Based on data from the Ministry

of Cooperatives and SMEs (2023), around 60% of MSMEs experience difficulties in optimal cost planning and pricing, which ultimately has an impact on the sustainability of their business. In addition, a report from the Central Statistics Agency (2022) shows that the culinary sector, including the cake and bakery industry, accounts for around 41% of the total food and beverage industry revenue in Indonesia, but still faces challenges in optimizing production costs and selling prices.

Several previous studies have discussed pricing strategies and cost planning using a variety of mathematical approaches. For example, Smith et al. (2018) examined a linear programming model in production cost management and showed an increase in cost efficiency by 15%. Jones and Kim (2019) developed a linear regression-based optimization model in the food industry, with the result that optimal prices can increase profit margins by up to 12%. Meanwhile, research by Wang et al. (2020) examines the role of machine learning in more accurate price prediction for SMEs.

In Indonesia, a study by Rahmawati (2021) shows that the application of regression analysis in pricing in the culinary business is able to increase sales efficiency by 18%. Sari and Prasetyo (2022) discussed linear function-based cost strategies for SMEs in the food sector and found that data-driven planning can increase production efficiency by up to 20%. In addition, research by Nugroho et al. (2023) highlights the importance of mathematical models in financial decision-making for MSMEs.

Although various studies have examined price optimization and cost planning using mathematical models, there are still few studies that specifically apply linear functions in strategic decision-making for SMEs in the culinary sector. Most research focuses on regression or machine learning models, while linear function-based analysis that is simpler and easier for small business owners to apply has not been widely studied. Therefore, this research will fill this gap by developing a linear function-based optimization model that can be used practically by Cake My Day.

This study aims to: Analyze the application of linear functions in price optimization and cost planning in Cake My Day, determine the optimal selling price and break-even point needed to achieve profitability.

This research makes academic and practical contributions in several aspects. Academically, this study enriches the literature on price optimization and linear function-based cost planning in the context of culinary business. Practically, the results of this research can be used by business owners, especially in the SME sector, to implement more optimal financial strategies. In addition, this research can also be a reference for policymakers in designing coaching programs for MSMEs related to pricing strategies and cost efficiency.

In today's highly competitive business life, price and cost planning is a crucial aspect that can affect the success of a business. The "Cakemyday" store, which is engaged in the sale of cakes and sweets, faced the challenge of determining a competitive pricing strategy while optimizing operational costs. One approach can be mapped to overcome this problem by using linear functions (Siregar et al., 2023).

Cakemyday is a small and medium business engaged in the culinary field of cakes and various types of cakes at a time when the competition is getting fiercer. This research aims to determine the optimal selling price and determine the *break-even point*. This research involves collecting birthday cake sales data at the Cakemyday Shop. This data includes information about product prices and the impact of seasonality on sales. This journal aims to explore the application of linear functions in price and cost planning in the "Cakemyday" store. Through systematic analysis, it is hoped that innovative solutions can be found to improve the efficiency and competitiveness of the food industry (Manuho et al., 2021).

One of the methods to be applied is the linear function, which is a mathematical concept that describes how to determine the *break-even* antipoint and
determine the optimal price, because in the current era, MSMEs often have difficulty in determining the minimum sales target so as not to suffer losses and the importance of determining the optimal selling price so that prices are not too high, customers are reduced, and if it is too low, profits will be insufficient (Fauzi et al., 2024).

METHODS

In this study, the method used to determine the *break-even point* and optimal price in the "CakeMyDay" store involves several systematic steps as follows:

1. Break-Even Point Analysis

Break Even Point (BEP) is when the money received in a certain period of time is equivalent to the amount spent to produce the product (Marentek & Febryiantoro, 2018). The break-even point is calculated to find out the number of units that must be sold so that the total revenue is equal to the total cost. The formula used is:

$$Break\ even\ point\ (units) = \frac{fixed\ face}{Selling\ Price\ per\ unit\ -variable\ cost\ per\ unit}$$

Where:

Fixed Fees	=	Fixed operational costs andcan't changed regardless of the number of productssold.
Sell Price PerUnit	=	The price set for selling oneunit Product
Variable CostPerUnit	=	This fee varies according to the amount products manufactured and sold.

2. Determination of the Optimal Selling Price

Determining the optimal selling price is the process of finding a price that will maximize the profit of a product (Marentek & Febryiantoro, 2018). This process involves analyzing various factors that affect demand and costs, so that business owners can set prices that are not only attractive to customers but also profitable for companies.

uses a linear function that relates the price to the amount of the request. The functions used can be expressed as:

$$Qd = a - bp$$

Where:

Q_d	=	Number of requests
P	=	Price
a	=	intercept(total number of requests when the priceis zero)
b	=	coefficients that show changes in demand againstprice changes.

After obtaining the demand function, the optimal selling price can be determined by optimizing profit (Maruta, 2018), which is calculated as the difference between total revenue

and total costs, using the formula:

$$profit = (P\ x\ Qd\ ) -\ Fixed\ Cost + Variable\ Cost\ x\ Qd$$

This process involves taking derivatives from the profit to price formula and looking for the maximum value to determine the price that will maximize profits (Hardina et al., 2022).

3. Decision Making

Determining the optimal selling price is a way to set the price of a product that will maximize its profits (Mentari, 2019). In determining the optimal price, Cakemyday stores must consider various factors, including production costs, market demand and competitor strategy (Sholihah & Jailani, 2023).

Based on the results of the break-even point analysis and determination of the optimal selling price, the management of the "Cakemyday" store will formulate a price strategy and cost policy to be implemented (Zuhroh & Pratiwi, 2014). Recommendations will be given for implementation in daily practice. The Steps:

a. Request Function

Describe the relationship between the price and also the quantity of therequested goods:

$$Qd = a - bP$$

Where:

Q_d = Number of requests

P = Price

a = intercept(total number of requests when the priceis zero)

b = coefficients that show the change in demand for price changes.

b. TotalRevenue

This is the result of the selling price multiplied by the number of goods sold:

$$Total\ Revenue = P \times Qd$$

c. Total Costs

Summing between fixed costs and variable costs:

$$Total\ Cost = Fixed\ Cost + (Variable\ Cost\ per\ Unit \times Qd)$$

d. Profit

Profit is the difference between total revenue and total costs (Tiswiyantietal., 2018), the formula is:

$$Profit = Total\ Revenue - TotalCosts$$

e. Profit Optimization

To find the selling price that maximizes profit, we need to calculate the derivative of the profit function and set it equal to zero:

$$\frac{d(Profit)}{Dp} = 0$$

f. Profit Formula in Quantity Form

The profit formula in the form of quantity is a method to calculate the profit generated by a business based on the number of units sold (Sutopo Sutopo et al., 2021).

$$Profit = (P - Variable\ CostPer\ Unit) \times Q - Fixed\ Fees$$

Where:

P	=	Selling price per unit
Variable CostPerUnit	=	Fees incurred for eachunit Produced or sold
Q	=	Number of units sold
Fixed Fees	=	The cost does not change regardless of the number of units sold (such as rent, salary permanent employees, etc.)

RESULTS AND DISCUSSION

This pricing and cost planning is an important aspect of business management, especially for small businesses like the "Cakemyday" cake shop. In this study, we analyzed using data regarding the demand function, fixed costs, variable costs and also the selling price (Siregar etal., 2016). The requested function usedis

Qd = 600–0.002P where Qd is the number of birthday cakes sold and P (*Price*) is the selling price of the cake. The fixed fee is set at Rp. 7,000,000 per month, and the cost per cake is Rp. 60,000

In an effort to understand financial sustainability and achieve profitability (Magu et al., 2022), this study analyzed the "Cakemyday" store using Break Even Point (BEP). BEP is the time when total receipts are balanced with total expenses, so there is no profit or loss. To calculate BEP, it is necessary to consider several key factors: fixed cost, selling price per unit, and variable cost per unit. In this analysis, several important data are used. The fixed cost incurred by the "Cakemyday" store reaches Rp 7,000,000, the selling price per unit of the product is also set at Rp 150,000, and the variable cost per unit is Rp 60,000. With this information, after that it begins to calculate the contribution margin per unit, which is the difference between the selling price and the variable cost (Dwi Laela Rachmawulan & Prasetyo, 2017).

By doing the calculation, it was found that the contribution margin per unit was Rp 90,000. This means that the money sold gives a contribution comparable to Rp90,000to cover fixed costs and generate profits. Furthermore, to calculate BEP, the study uses a formula that relates fixed costs to the contribution margin per unit. The results of the calculation show that

the "Cakemyday" store needs to sell about 78 units to break even. This figure indicates that by selling 78 units of products, all fixed and variable costs incurred will be covered, and the store will not experience any profits or losses (Hidayah et al., 2022). This knowledge is invaluable for management in planning sales strategies and managing future costs.

In this study, an in-depth analysis was also conducted to determine the optimal selling price at the Cakemyday store from the products offered. Knowing the right selling price is the key to achieving business sustainability and maximizing profits (Susanti, 2021). In the "Cakemyday" store, this study calculates the contribution margin per unit. This contribution margin is the disparity between the selling price and the cost, the variable, which shows how much contribution each unit sold is to cover fixed costs and generate profit. It was found that the margin contributed per unit was Rp 90,000, which means that each store sells one unit of product, amounting toRp
90,000 will contribute to cover fixed costs and contribute to profits (Nugraha, 2024).

To determine the optimal selling price, the "Cakemyday" store sets a profit target to be achieved. Suppose the expected profit target is, IDR 3,000,000. With this profit target, management calculates the total costs that need to be borne to achieve the profit. The total cost to sell 78 units (which is the figure from the previous Break Even Point analysis) is calculated to be Rp 11,680,000. By adding the profit target to the total cost, the management found that the total revenue required was IDR 14,680,000. To find out the optimal selling price per unit, this total revenue is divided by the number of units sold. As a result, the optimal selling price that must be set is around IDR 188,000 per unit.

In increasing knowledge about consumer behavior and also formulating an effective marketing strategy for Cakemyday cake shops, this study conducted an analysis to determine the demand function of the products it offers. The demand function is an important tool that reflects the interaction between the price of a product, and the number of goods demanded by consumers (Nugraha, 2024). Some basic data is collected. issued by the store was recorded at Rp 7,000,000, while the selling price per unit of product was set at Rp 150,000. In addition, the variable cost per unit associated with the production and sale of products is IDR 60,000. With this information, management can develop a demand function that will help them in sales planning.

In compiling the demand function, in this study it is necessary to collect data that shows how price variations can affect the number of goods requested. For example, based on previous data, when the selling price is set at Rp 150,000, the requested amount is 300 units. But when the price increases to Rp 180,000, the requested amount will drop to 250 units. Where this data provides an initial picture of consumer behavior towards price changes.

To compile the demand function, for the study it is necessary to collect historical data that shows how price variations affect the quantity of goods requested. For example, based on previous data, when the selling price was set at Rp 150,000, the amount requested was 300 units. However, when the price increased to Rp 180,000, the requested amount dropped to 250 units. This data provides an initial picture of consumer behavior towards price changes.

From the data, this researcher will calculate the slope of the request function. By using two data points, such as one point at a price of Rp 150,000 with a demand of 300 units and one point at a price of Rp 180,000 with a demand of 250 units. This "Cakemyday" store has found that every Rp 30,000 increase will reduce the requested amount by 50 units. From this calculation, a slope value of -0.00167 is obtained, which reflects that there is a negative relationship between price and the amount of demand.

After that, the study also calculates the intercept of the request function. Here use one of the existing points, when it finds that intercept a is about 400. With the values of a andb that have been calculated. Then the function of the request can be arranged in mathematical form asQd = 400−0.00167P. This request function shows that if the price of the product is Rp 150,000, the requested amount will reach about 300 units. However, with the increase in price, the amount requested will decrease, reflecting the general nature of demand in the market (Anwar, 2014).

CONCLUSION

Through this analysis, "Cakemyday" can have a clearer picture of the financial risks that must be faced. By understanding how many units need to be sold to achieve BEP, research can formulate realistic sales targets and optimize marketing strategies. With the right steps, it is hoped that this store can improve its performance and achieve better profits in the future. "Cakemyday" is also expected to increase its competitiveness in the market, attract more

customers, and ultimately, achieve better profits. With the right strategic measures, this store can ensure sustainability and future growth. The "Cakemyday" store not only gained a deeper perception of consumer behavior, but also gained invaluable information to formulate more effective pricing and promotion strategies. By understanding the demand function, management can make more informed decisions to increase sales and achieve the financial goals that have been set. With the strategic steps taken, it is hoped that this store can grow and develop in an increasingly fierce market competition.

References

Anwar,H.(2014).ProsesPengambilanKeputusanuntukMengembangkanMutuMadrasah. *Nadwa: Jurnal Pendidikan Islam*, *8*(1), 37–56. https://doi.org/10.21580/nw.2014.8.1.569

Badan Pusat Statistik. (2022). Statistik Industri Makanan dan Minuman. Jakarta: BPS

Dwi LaelaRachmawulan,&Prasetyo,T.(2017).PengaruhBiayaVariabelTerhadapMargin Kontribusi (Penelitian Pada Cv. Pratama Cipta Sejahtera). *Jurnal Wawasan Dan Riset Akuntansi*, *5*(1), 16–26.

Fauzi, A., Rukmayani, E., Estevani, G., Gumelarasati, N., & Fahrezi, M. K. (2024). Analisis Break Even Point (BEP) Sebagai Alat Perencanaan Laba. *Jurnal Bisnis Dan Ekonomi*, *2*(1), 83–102.

Hardina, N. T., Istikhoroh, S., & Sulistiawan, E. (2022). Analisis Penetapan Harga Jual Untuk Optimalisasi Laba Sepatu Sandal Hilmi Fashion. *Journal of Sustainability Business Research*, *3*(4), 104–109.

Hidayah,A.A.,Harahap,E.,&Badruzzaman,F.H.(2022).OptimasiKeuntunganBisnisBakery Menggunakan Program Linear Metode Simpleks. *Jurnal Matematika*, *21*(1), 77–83.

Jones, M., & Kim, S. (2019). Price Optimization in the Food Industry: A Linear Regression Approach. *Journal of Business Economics*, 45(2), 102-118.

Kementerian Koperasi dan UKM. (2023). Laporan Tahunan UMKM Indonesia. Jakarta: Kemenkop UKM.

Magu, A. D. P., Alexander, S. W., & Gerungai, N. Y. T. (2022). Penerapan Break Even Pointdan Margin of Safety Untuk Perencanaan Laba di Perusahaan Umum BULOG Kantor Wilayah Sulut & Gorontalo. *Jurnal LPPM Bidang EkoSosBudKum (Ekonomi, Sosial, Budaya, Dan Hukum)*, *6*(1), 287–298.

Manuho,P.,Makalare, Z.,Mamangkey, T.,& Budiarso,N.S. (2021). AnalisisBreakEven Point (Bep). *Jurnal Ipteks Akuntansi Bagi Masyarakat*, *5*(1), 21.

Marentek, T. K. W. Y., & Febryiantoro, M. T. (2018). Penentuan Fungsi Linear yang Ideal Pada Model Ekonomi Fungsi Penawaran. *Eksis: Jurnal Riset Ekonomi Dan Bisnis*, *13*(1), 11– 24.

Maruta, H. (2018). Laba, Perencanaan Manajemen, Bagi. *Jurnal Akuntasi Syariah*, *2*(1), 9–28.

Mentari,L.(2019).AnalisisPenentuanHargaJualDenganMenggunakanMetodeCostPlus PricingPadaUmkmKacangSembunyiPakMulyatno.*JurnalAkuntansiBiaya*, 1–7.

Nugraha, Y. S. (2024). Penerapan Konsep Fungsi Linear Dalam Ekonomi Dan Bisnis. *Al-Aqlu: Jurnal Matematika, Teknik Dan Sains*, *2*(1), 36–45.

Nugroho, T., Putri, D., & Lestari, A. (2023). Mathematical Models for Financial Decision Making in

Small Enterprises. *Indonesian Journal of Business Studies*, 12(1), 45-62..
Rahmawati, S. (2021). Regression Analysis in Pricing Strategies for Culinary Business. *Jurnal Manajemen dan Bisnis Indonesia*, 9(3), 75-89.
Sari, R., & Prasetyo, H. (2022). Cost Planning Strategies Using Linear Functions for Small Businesses. *Journal of Economic Mathematics*, 14(2), 120-135.jp
Sari,U.D.,Tenggerejo, T.,Lamongan,K., Tani, S.,Usaha,M.,&Usaha, L.(2016). *Mohammad rizal nur*. *I*(2), 75–82.
Sholihah, N., & Jailani, H. (2023). Analisis Cost-Volume-Profit dalam Menentukan Harga Jual pada Restoran Sushi Syakira Sekarteja. *Pekobis: Jurnal Pendidikan, Ekonomi, Dan Bisnis*, *8*(1), 33. https://doi.org/10.32493/pekobis.v8i1.p33-47.29967
Siregar, T. M., Anshari, F., Pratiwi, B., Pelawi, D. C., & Silalahi, J. D. G. (2023). Model Optimasi Himpunan Fuzzy Untuk Menentukan Harga Jual Optimal Pada Daging Sapi. *INNOVATIVE: Journal Of Social Science Research*, *3*, 3263–3275.
Siregar, T. M., Naibaho, E., Ginting, S., Gilbert, S., Sormin, L., & Siregar, B. S. (2016). *Pengaruh Fungsi Permintaan Dan PenawaranTerhadap Keseimbangan Pasar*. *8*, 222– 232.
Smith, J., Brown, K., & Wilson, L. (2018). Optimization Models for Cost Efficiency in Small Businesses. *International Journal of Financial Management*, 10(4), 78-92.
Supriyatna, A., Irma Purnamasari, A., & Ali, I. (2024). Analisis Penjualan Produk Umkm Di Shopee Pada Toko Agung0Na9 Menggunakan Model Algoritma Regresi Linear. *JATI (Jurnal Mahasiswa Teknik Informatika)*, *8*(2), 1911–1915.
Susanti, N. I. (2021). Penerapan Sub Pokok Fungsi Linier Pada Matematika Ekonomi Terhadap Analisis Break Even Point (Analisis Impas). *Jurnal Ekonomi Syariah Darussalam*, *2*(I), 2745–8407.
Sutopo Sutopo, Enny Istanti, & Moch Rachmandany Firmansyah. (2021). Peranan Prinsip Konsistensi Dalam Metode Pengakuan Pendapatan Terhadap Laporan Laba Rugi Pada Pt. Indo ZincDiecasting DiGresik. *Jurnal Akuntansi, Ekonomi Dan Manajemen Bisnis*, *1*(3), 83–92.
Tiswiyanti, W., Desriyanto, D., & Sari, R. Y. (2018). Pemahaman Makna Laba dan Penentuan Laba Bagi Pedagang Kaki Lima (Depan Kampus Universitas Jambi Mendalo). *Accounthink : Journal of Accounting and Finance*, *3*(02), 589–601.
Wang, X., Chen, L., & Zhao, Y. (2020). Machine Learning Approaches to Price Prediction. *Computational Economics Journal*, 18(3), 145-160.
Zuhroh, D., & Pratiwi, C. (2014). Penentuan harga jual stratejik terhadap produk dengan strategi biaya rendah dan diferensiasi. *Jurnal Siasat Bisnis*, *18*(1), 133–142.