Predictive Analysis of Retail Promotion Strategies in the Context of Consumer Shopping Behavior

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Abstract

In this paper, we examine the impact of various promotional strategies on consumer shopping interest, focusing on the Alfamart retail chain in Lhokseumawe City, Indonesia, which saw rapid expansion from five to fifteen stores between 2017 and 2023. Despite this growth, expected sales increases have not been met, raising concerns about the effectiveness of current promotional tactics. Utilizing multiple linear regression analysis, we investigate the influence of three specific strategies, Promo Spesial Mingguan, Serba Gratis, and Tebus Murah on shopping interest across the 15 stores. Findings reveal that Tebus Murah is the most effective strategy in boosting shopping interest, showing the smallest error margin between predictive and actual sales figures. This study provides comprehensive insights into the broader effects of promotional strategies on consumer interest, highlighting the need for Alfamart to focus on optimizing the Discounted Redemption approach to maximize sales. The predictive system developed serves as a strategic tool for identifying effective promotions, forecasting sales, calculating return on investment, and analyzing consumer behavior. Our results underscore the value of predictive analysis in refining promotional strategies, enabling Alfamart to adopt a more targeted and efficient marketing approach to enhance sales performance.

Keywords: Predictive Analysis, Promotional Effectiveness, Shopping Interest, Multiple Linear Regression, Consumer Behavior

Introduction

The retail industry in Indonesia has experienced rapid growth over the past decade, driven by increased consumer demand and fierce competition among retail chains. With nearly 3.98 million retail units established across the country by 2022 [1], minimarkets have become a focal point in this expansion. Alfamart, one of the leading retail chains, has seen significant growth in the Lhokseumawe area, increasing its number of outlets from 5 to 15 between 2017 and 2023. Despite this growth, some outlets have not achieved the expected sales targets, raising concerns about the effectiveness of promotional strategies employed.

Promotion has a crucial role in driving consumer shopping interest and sales, yet not all promotions yield the same results. Alfamart has implemented various promotional strategies, such as Weekly Special Promo (PSM), Serba Gratis, and Tebus Murah, to generate consumer interest. However, these promotions do not have the same impact in every location. Variations in consumer preferences and local demographic conditions affect the effectiveness of each type of promotion. The study concludes that sales promotion strategies, particularly discounts and coupons, significantly influence consumer buying behavior in the industry [2]. Therefore, it is very important for Alfamart to understand which type of promotion is most effective in each of its operational areas to optimize sales.

To optimize the effectiveness of promotions, it is necessary to apply a predictive model that can evaluate the impact of promotional campaigns. These models utilize historical transaction data from various stores to predict the outcome of future promotions, allowing management to design more targeted, efficient, and scalable strategies in attracting consumers. One of the relevant methods to use is multiple linear regression, which analyzes the effect of multiple independent variables, such as promotion type, on a single dependent variable, such as revenue or shopping interest. Previous research indicates that multiple linear regression analysis effectively analyzes and predicts sales, providing valuable insights for strategic planning and enhancing customer experience [3]. By analyzing data from Alfamart stores in Lhokseumawe City, this method can identify the type of promotion that is most effective in increasing sales.

Through the use of multiple linear regression in building this predictive model, this research is expected to help Alfamart to design more efficient and effective promotional strategies, while strengthening competitiveness in an

increasingly competitive retail market. The resulting recommendations will be a concrete guide for management in optimizing promotions and increasing consumer loyalty.

Literature Review

1. Promotion

Promotion is an essential part of marketing strategy and plays a major role in influencing consumer behavior. In the retail industry, well-executed promotions can increase customer interest, attract more visits, and drive sales. Kotler and Keller (2020) define promotions as short-term incentives, such as discounts, coupons, and loyalty programs, aimed at encouraging product purchases [4]. This strategy not only generates quick sales but also increases brand awareness and customer loyalty.

Alfamart, a leading minimarket chain in Indonesia, uses various promotional strategies like Promo Spesial Mingguan, Serba Gratis, and Tebus Murah, which provide discounts on select items with minimum purchases. These strategies are aimed at price-sensitive consumers, thus encouraging repeat visits. However, the success of these promotions may vary depending on local factors such as demographics and competition. Research indicates that sales promotions play a significant role in capturing consumers' attention, motivating them to try new products, and boosting impulse purchases in Indonesia [5]. This makes such strategies essential for retailers like Alfamart to remain competitive and attract more customers.

Although promotions can increase short-term sales, over-reliance on price-based promotions can undermine brand loyalty, as customers may focus more on the discount than the brand itself. To avoid this, Alfamart needs to design promotions with strong product quality and customer service to build long-term loyalty, as such strategies directly affect not only direct sales but also brand loyalty and long-term consumer retention.

2. Consumer Buying Interest

Consumer buying interest is influenced by several factors such as product quality, price, packaging, product variety, and service quality. Buying interest, as defined by Kotler and Keller (2011), is a behavior that reflects a consumer's response to stimuli, indicating their intention to make a purchase. This means that buying interest represents a consumer's readiness or desire to buy a product, influenced by perceived value and effective marketing strategies [6]. In the retail industry, this interest can be driven by promotional activities, product attractiveness, competitive pricing, and the overall shopping experience. Several key factors influence consumer buying interest:

- Price : Price is often the most visible and immediate factor affecting purchasing decisions. Competitive pricing attracts price-sensitive consumers by offering perceived value, thus significantly increasing their buying interest.
- Packaging : The design and functionality of packaging can shape consumer perceptions of a product's value and quality. Visually appealing packaging helps distinguish a product from its competitors, making it more attractive to consumers.
- Product Quality : High-quality products that meet or exceed consumer expectations are more likely to spark interest. Quality contributes to satisfaction and repeat purchases, with studies showing a strong positive impact of product quality on buying interest, especially in competitive markets.
- Product Variety : Offering a wide range of product options increases the chances of meeting diverse consumer preferences, thus enhancing satisfaction and boosts consumer loyalty.
- Service Quality : Excellent customer service can greatly enhance the shopping experience, encouraging purchases and fostering repeat visits. Efficient, attentive, and friendly service builds trust and loyalty, which are vital for long-term business success.

Consumer buying interest is shaped by a combination of factors—product quality, price, packaging, product variety, and service quality. Retailers must effectively balance these elements to meet consumer expectations, drive sales growth, and build customer loyalty.

3. Predictive Analysis

Predictive analysis is a data-driven approach that employs statistical techniques and modeling to forecast future outcomes, which is highly valuable in the retail sector for understanding consumer behavior, predicting sales trends, and evaluating the effectiveness of marketing strategies. Predictive analytics leverages historical and transactional data to identify risks and opportunities, enhancing decision-making, refining strategies, and supporting data-driven business transformation [7]. As a result, companies can make more informed decisions to maximize sales and marketing efficiency.

Two of the most commonly used models in predictive analysis are classification models and regression models [8]. Classification models are used to predict qualitative outcomes, such as whether a promotion will succeed or fail. Meanwhile, regression models, particularly multiple linear regression, are employed to predict quantitative outcomes, such as sales volume or consumer interest, based on several independent variables. In this context, multiple linear regression is often used to assess the impact of factors like price, product quality, product variety, and service quality on sales performance.

Forecasting, driven by predictive analysis, is crucial for strategic decision-making. By utilizing historical data [9], businesses can anticipate future conditions, spot emerging trends, and prepare for challenges. Forecasting helps companies identify market trends and align strategies with future demand. It is essential for strategic decision-making by optimizing inventory, refining production schedules, and operational efficiency, leading to quicker and more accurate business decisions [10]. Retailers like Alfamart can use predictive analysis to combine historical transaction data with predictive

models, generating accurate forecasts and identifying the most effective promotions to boost consumer interest.

The application of predictive analysis allows companies to optimize various operational aspects, such as inventory management and customer targeting. This analysis enables businesses to understand consumer shopping trends, adjust marketing campaigns, manage inventory more efficiently, and plan more effective promotional strategies. Ultimately, this process helps improve business performance while providing a stronger competitive advantage in the market.

4. Return on Investment (ROI) in Retail Promotions

Return on Investment (ROI) is a crucial financial metric for assessing the success and profitability of retail promotional strategies [11,12]. It allows businesses to identify which campaigns yield the highest returns relative to their costs, providing a clear basis for making more informed decisions in future marketing efforts. By analyzing the revenue generated versus the cost of each promotion, Alfamart can determine the effectiveness of its promotional campaigns and refine its marketing investments accordingly.

In addition to measuring immediate profitability, ROI analysis helps optimize long-term strategies by revealing which promotions contribute the most to sustained revenue growth and customer retention. Regular assessments of ROI enable Alfamart to efficiently allocate marketing budgets, focusing on campaigns that deliver both increased sales and stronger customer loyalty. This approach ensures that resources are directed toward the most impactful promotional activities.

Integrated into the predictive system, ROI calculations offer real-time insights into the performance of various promotional efforts. Visual metrics, such as bar graphs and pie charts, help interpret ROI results, making complex data easier to understand and act upon [13]. By leveraging this analysis, Alfamart can make well-informed decisions on where to invest its promotional resources to maximize both profitability and operational efficiency, ensuring that each marketing initiative aligns with the company's broader strategic goals.

Materials & Methods

Materials

This research is based on sales and transaction data collected from 15 Alfamart stores in Lhokseumawe, utilizing both primary and secondary sources. Primary data were gathered through direct observations at various stores and interviews with store managers and marketing personnel, while secondary data were obtained from Alfamart's transaction records covering a one-month period across the 15 stores. The research focuses on sales performance across five months, analyzing the impact of four promotional strategies: Weekly Special Promo (PSM), Serba Gratis, Tebus Murah, and non-promotional transactions, which served as a control for comparison. The data include total sales revenue, number of products sold, and customer transaction counts, allowing for a comprehensive evaluation of sales performance during both promotional and non-promotional periods.
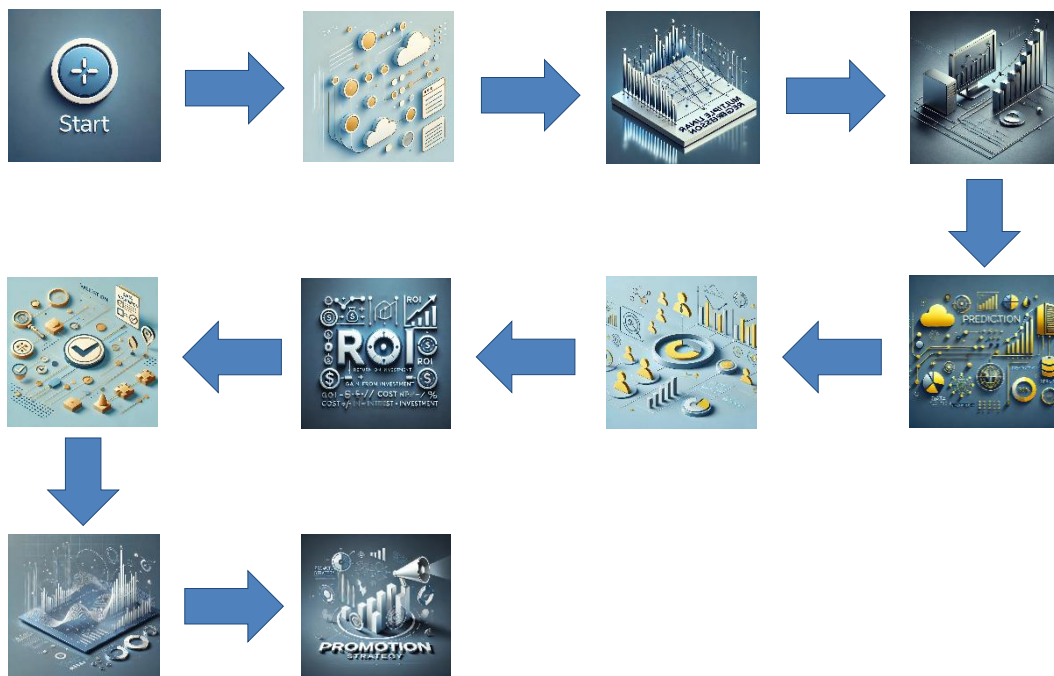

Figure 1. System Schema

This study developed a predictive analysis system to evaluate the effectiveness of promotional strategies and analyze consumer behavior at Alfamart stores, using Multiple Linear Regression to forecast sales and gain insights into consumer shopping patterns. The system integrates both promotional and non-promotional data, offering valuable predictions on

how different strategies impact sales and consumer interest.

1. Data Input : The system collects detailed sales and promotional data from 15 Alfamart outlets, including sales volume, number of products sold, customer transaction counts, and information on active promotions. Non-promotional transactions are also used as a baseline to assess the additional impact generated by promotions.

2. Regression Analysis Engine : At the core of the system is a Multiple Linear Regression model that evaluates the effect of different promotional strategies—Promo Spesial Mingguan (PSM), Serba Gratis, and Tebus Murah—as well as non-promotional periods. This model predicts the impact of each strategy on consumer shopping interest, quantified by total sales and transaction volume.

3. Consumer Behavior Analysis: The system enables a deep analysis of consumer behavior by tracking how different promotions affect shopping patterns. It identifies shifts in consumer interest between promotional and non-promotional periods, providing insights into which strategies are most effective in attracting and retaining customers. This analysis helps managers understand not only which promotions drive sales, but also how they shape long-term consumer loyalty.

4. ROI Calculation : The system includes a dedicated Return on Investment (ROI) module, which calculates the financial returns for each promotional campaign. This feature enables Alfamart managers to measure the profitability of each promotion, helping to determine which strategies offer the best value for money. By analyzing the ROI, managers can prioritize promotions that deliver the highest financial returns and allocate resources more effectively for future campaigns.

5. Prediction Output: The system generates sales predictions by combining the results from the Multiple Linear Regression model with real-time sales data [14]. An interactive user interface displays these predictions, allowing managers to:
   - Compare predicted sales with actual sales over time, enabling the assessment of system accuracy in forecasting outcomes.
   - Visualize sales performance through detailed charts and graphs, helping managers track trends and identify which promotions are likely to succeed in the future.
   - Leverage the predictive insights to make informed adjustments to ongoing and future promotional strategies, ensuring data-driven decision-making in real time.

Methods

Multiple linear regression (MLR) is a statistical method used to predict the outcome of a dependent variable by incorporating multiple independent variables. The main goal of MLR is to establish and assess the linear relationships between these independent variables and the dependent variable [15]. In this study, Multiple Linear Regression (MLR) is applied to evaluate the effectiveness of various promotional strategies used by Alfamart stores in Lhokseumawe. This approach enables the analysis of the relationship between multiple independent variables (promotions) and the dependent variable (shopping interest), represented by total sales, providing insights into the impact of each promotional strategy on consumer behavior. The dependent variable in this study is shopping interest, measured by total sales volume across promotional and non-promotional periods. The independent variables include the following:

1. Promo Spesial Mingguan (PSM): Weekly promotions offering discounts on selected items.
2. Serba Gratis: Buy-one-get-one-free promotions.
3. Tebus Murah: Discounts offered when customers meet a minimum spending threshold.
4. Non-Promotional Transactions: Sales data from periods without active promotions, used as a control for comparison.

The Multiple Linear Regression (MLR) model is defined by the following equation:

$$Y = a + b1X1 + b2X2 + ... + bnXn \quad (1)$$

Where:
- Y is the predicted value (sales growth),
- a is the intercept,
- $X_1, X_2, ..., X_n$ are the independent variables (promotional types),
- $b_1, b_2, ..., b_n$ are the coefficients that represent the influence of each independent variable on the dependent variable [16].

The objective of using this regression model was to quantify the effectiveness of each promotional strategy in increasing sales and consumer shopping interest. By comparing promotional periods to non-promotional periods, the analysis identified which promotions were most impactful in driving sales across Alfamart stores in Lhokseumawe.

Results and Discussion

Data Testing Selected Stores

The following table presents the actual sales data collected from multiple Alfamart stores, along with the number of promotional activities for each store:

Table 1. Data Store

Store	X1	X2	X3	X4	Y

Listrik	548	786	147	5,756	350,403,115
Cunda	586	707	166	4,952	289,976,056
Darussalam	1,364	1,154	237	13,270	720,697,096
Merdeka	389	596	220	4,193	268,945,396
Samudera Baru	447	597	157	4,626	275,527,727
Bukit Rata	636	730	264	6,434	363,782,504
Simpang Kandang	566	612	115	4,576	317,862,979
Punteuet	661	961	340	4,527	389,040,108
Hagu Selatan	756	793	178	4,779	334,022,437
Batuphat	952	1,004	317	10,114	576,800,953
Pase	654	768	210	3,042	246,834,945
Simpang Buloh	391	393	71	3,218	190,359,741

This table shows the foundational data that was used to validate the predictive model. Each store's promotional activity is represented by the independent variables (X1, X2, X3, X4), and the total actual sales (Y) is provided for comparison with predicted sales.

Regression Analysis Results

The regression analysis reveals that the **Tebus Murah** promotional strategy had the most significant impact on shopping interest, with a statistically significant coefficient. Both Promo Spesial Mingguan (PSM) and Serba Gratis showed positive effects, though their contributions were less pronounced compared to Tebus Murah. The regression model for predicting sales based on promotional strategies is expressed as follows:

$$Y = -20325240{,}33 + 31856{,}90417\,X1 + 193059{,}074\,X2 + 66530{,}18524\,X3 + 34491{,}72956\,X4$$

Where:
- X1 = Promo Spesial Mingguan (PSM)
- X2 = Tebus Murah
- X3 = Serba Gratis
- X4 = Non-Promo Transactions

Based on the coefficients in the regression equation, **Tebus Murah (X2)** is the most effective promotional strategy among those analyzed. Its coefficient of 193.059,07 is significantly higher than those of the other promotions, indicating that Tebus Murah has the strongest positive impact on increasing total sales revenue. This suggests that focusing on Tebus Murah promotions would likely yield the highest return in terms of sales growth for Alfamart stores in Lhokseumawe.

Validation of Predictive Analysis for Selected Stores

For example, the sales prediction for one of the Gampong Panggoi outlets based on this equation was calculated as follows:

Y = -20,325,240.33 + 31,856.90 (496) + 193,059.07 (508) + 66,530.19 (172) + 34,491.73 (3833)
Y = 237,199,785

To validate the predictive analysis developed in this study, further examination was performed on three selected outlets: Blang Pulo, Gampong Panggoy, and Blang Panyang. This analysis involved comparing actual sales with predicted sales for each store:

Table 2. Data Test

Variable	Actual Sales	Predicted	Difference	RMSE (%)
Blang Pulo	287.369.025	321.028.936,7	+33,659,911.7	11,7%
Gampong Panggoi	231.948.089	237.199.784,98	+5,251,695.98	2,3%
Blang Panyang	227.637.376	247.300.775,78	+19,663,399.78	8,6%

The Root Mean Squared Error (RMSE) values indicate that Gampong Panggoy had the most accurate predictions, with an RMSE of only 2.3%. Blang Pulo and Blang Panyang showed larger prediction errors, with RMSE values of 11.7% and 8.6%, respectively These results confirm the predictive model's capability to estimate sales outcomes with a reasonable degree

of accuracy, although variations in performance exist across different outlets.

Consumer Analysis

The consumer analysis was conducted through surveys distributed to Alfamart customers, aimed at gathering insights into their preferences, shopping behavior, and satisfaction with ongoing promotions [17]. The survey covered aspects such as the appeal of specific promotions, frequency of store visits, and overall customer satisfaction. The main factors revealed include:

1. Product Preferences: Consumers were most attracted to promotions offering a wide variety of essential items. Product quality and appealing packaging also played a significant role in their purchasing decisions during promotional periods [18].
2. Frequency of Store Visits: Stores running active promotions saw an increase in customer visits. Consumers indicated they were more likely to visit the store during promotional periods, particularly when essential products were featured.
3. Customer Satisfaction: Customer satisfaction was linked to relevant promotions. Consumers preferred promotions that addressed their daily needs, highlighting the importance of aligning offers with customer expectations [19].
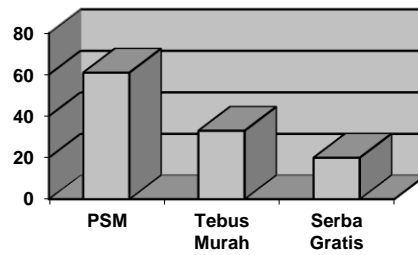

Figure 1. Consumer Analysis

Based on Figure 1, **Promo PSM (Promo Spesial Mingguan)** was the most attractive promotion for customers. However, the linear regression results showed that Tebus Murah was the most effective in boosting sales. Customer satisfaction is also a crucial factor for management, as maintaining customer loyalty depends on providing promotions that meet their needs. The survey indicated that customers gave positive feedback on the various promotions that had been implemented.

Return on Investment (ROI)

ROI (Return on Investment) in this predictive system serves a crucial role in evaluating the efficiency and profitability of promotional strategies implemented by Alfamart. ROI is used to measure how effectively the company can generate profit from the investments made in promotional campaigns. In this system, ROI calculations are integrated to help managers determine which promotions provide the best return on their investment, enabling data-driven decision-making. In this context, the ROI formula is used as follows:

$$\text{Return On Investment} = \frac{EAT\ (\textbf{Laba Bersih})}{\textbf{Total Aktiva}}\ \textbf{x 100 \%}$$

The predictive system allows for the input of Alfamart's sales data, including profits, total assets, and industry standards. Based on this input, the system computes ROI, comparing the results to industry benchmarks to evaluate whether the promotional campaigns are financially viable. This comparison helps identify promotions that exceed the 5.08% industry-standard ROI, indicating a successful investment [20].
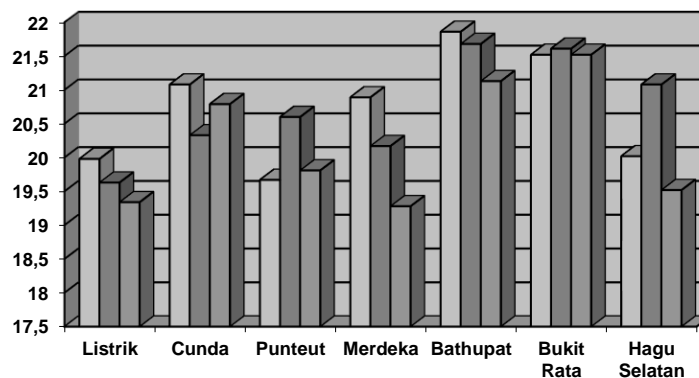

Figure 2. ROI Stores

ROI plays a significant role in helping Alfamart evaluate the effectiveness of each promotional campaign. By

comparing the calculated ROI across different stores, Alfamart can optimize marketing budgets by allocating resources to the most effective promotional strategies, identifying campaigns that yield the highest financial returns. It also allows Alfamart to evaluate store performance by measuring how well individual stores perform in terms of return on promotional investment, providing insights into regional effectiveness and enabling tailored promotional strategies. Furthermore, ROI trends can support long-term strategy by predicting the future impact of promotions, helping Alfamart make informed decisions about upcoming marketing campaigns. The system provides visual output of the ROI calculations for each store, displaying the effectiveness of the promotions in driving sales and overall profitability.

Additionally, the system compares national ROI with individual store data, offering a comprehensive view of performance across the company. By integrating ROI into the predictive system, Alfamart gains a valuable tool that not only measures the immediate financial return from promotions but also supports strategic planning for future campaigns. This structured approach ensures that promotions are not only successful in boosting sales but also deliver optimal financial returns, maximizing profitability across all Alfamart stores.

Correlation Between System Features

The predictive system developed in this research integrates multiple key features: regression analysis, ROI calculation, and consumer behavior analysis. These elements work in tandem to provide a comprehensive understanding of how promotional strategies impact sales, while also guiding future marketing decisions. Here's how these features correlate:

1. Regression Analysis: The linear regression model analyzes how different promotional strategies affect consumer interest, measured by total sales. This model quantifies the relationship between promotional activities (such as Tebus Murah) and consumer responses, providing numerical insight into which promotions are most effective.
2. ROI (Return on Investment): The ROI module uses data from the regression analysis to evaluate the financial performance of each promotional campaign. By comparing the revenue generated through promotions with the costs involved, ROI helps assess the profitability of each strategy. This feature allows management to focus on high-impact promotions that yield the best return for their investment. The ROI calculation, although based on dummy data in this study, demonstrates how effective the system is in optimizing Alfamart's promotional budget.
3. Consumer Analysis: Consumer feedback, gathered through surveys and sales data, complements the regression results by providing qualitative insight into customer preferences and satisfaction. The consumer analysis identifies factors such as product preferences and the impact of promotions on shopping frequency. This allows Alfamart to tailor promotions more effectively to their customer base.

By combining these three core features, the predictive system creates a data-driven loop. The regression analysis identifies which promotional strategies drive sales, ROI calculations evaluate the financial success of each promotion, and consumer analysis ensures that the strategies align with customer expectations. This cycle supports Alfamart in refining their promotional strategies for greater efficiency and profitability.

Conclusions

This study demonstrates the effectiveness of a predictive analysis system in evaluating the impact of promotional strategies at Alfamart stores in Lhokseumawe. By using Multiple Linear Regression, the system was able to accurately forecast the influence of different promotions on sales performance. Among the strategies analyzed, Tebus Murah emerged as the most effective in increasing sales, outperforming Promo Spesial Mingguan (PSM) and Serba Gratis in terms of driving consumer purchasing behavior.

The predictive system provides a comprehensive tool for Alfamart to assess the financial return on investment (ROI) for each promotional campaign. This enables management to make data-driven decisions, optimizing promotional budgets and focusing resources on the most profitable strategies. The ROI insights, combined with sales predictions, highlight the importance of aligning promotional efforts with both consumer preferences and financial goals.

Additionally, the study's consumer analysis underscored the significance of customer satisfaction and loyalty. While PSM was the most attractive promotion for consumers, Tebus Murah proved to be the most impactful in generating sales. This reinforces the need for Alfamart to balance consumer appeal with profitability when designing future campaigns.

In conclusion, the predictive system developed in this research equips Alfamart with a valuable decision-making framework that improves promotional effectiveness, enhances sales performance, and maximizes profitability. Future studies could further explore the long-term effects of these promotions on customer retention and loyalty, ensuring sustained business growth.

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