





# Customer Purchase Patterns and Loyalty in MSME Catering Businesses Using the RFM Method

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## ABSTRACT

The increasing competition in the catering industry necessitates a data-driven understanding of consumer behavior to support effective customer retention strategies. **This study aims to** identify customer purchase patterns and loyalty in MSME Catering using the RFM (*Recency, Frequency, Monetary*) method based on transaction data from January 2025 to May 2026. **This research addresses** a gap in the literature regarding the application of transaction-based analytics for customer loyalty in MSMEs, which previously relied more on surveys or subjective perceptions. **A total of** 564 transactions from 80 unique customers were analyzed quantitatively, processed using Google Sheets, and visualized with *Tableau*. **The results indicate that** 55 customers (68.75%) are classified as loyal, while 25 customers (31.25%) are new customers. RFM segmentation grouped customers into Champions, Loyal Customers, Potential Loyalist, Need Attention, and Lost Customers, with the majority in the Potential Loyalist, Need Attention, and Lost segments. In addition to descriptive statistics, the relationship between purchase frequency and monetary value was examined to provide deeper insights into customer behavior. The findings demonstrate that the RFM approach provides a structured understanding of customer loyalty and transaction value, supporting the development of targeted marketing strategies, including loyalty programs, reminder promotions, reactivation campaigns, and customer engagement initiatives. This study contributes a practical RFM-based analytical framework applicable to MSMEs to enhance retention and marketing effectiveness.

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## 1. INTRODUCTION

The food and beverage industry, particularly the catering sector, continues to grow rapidly alongside increasingly intense competition, especially among Micro, Small, and Medium Enterprises (MSMEs) [1]. According to the Central Statistics Agency (BPS), this sector has maintained stable growth of around 5%–7% per year, accompanied by an increase of more than 21% in the number of businesses in recent years [2]. This condition encourages business owners to understand consumer behavior more accurately in order to maintain business sustainability, including purchase frequency and customer loyalty [3].

Pandopo Catering, which provides lunch services through a pre-order system known as *Suapan*, recorded 564 transactions from 80 unique customers during the period from January 2025 to May 2026. These

data indicate the presence of repeat customers, variations in purchase frequency, and differences in customer transaction values. Therefore, transaction data can be used to analyze consumer behavior more objectively without relying solely on perception-based data such as questionnaires [4].

In data-driven analysis, the RFM (Recency, Frequency, Monetary) model is widely used to identify customer characteristics based on the most recent transaction, purchase frequency, and transaction value. This model is effective in classifying customers according to their loyalty level and contribution to the business, thereby supporting the development of more targeted marketing strategies. This study is also aligned with the Sustainable Development Goals (SDGs), particularly SDGs 8 and SDGs 12, as data-driven approaches can help MSMEs improve operational efficiency, optimize production planning, and minimize food waste [5, 6].

Although RFM analysis has been widely applied in retail, e-commerce, and other customer-oriented industries, its application in small-scale Indonesian catering businesses remains limited. Previous studies generally focus on larger business contexts with structured customer relationship management systems, while catering businesses such as Pandopo Catering often rely on simple transaction records and informal customer management practices. This creates a research gap in understanding how transaction-based RFM analysis can be applied to a local catering business to support customer segmentation and retention strategies [7].

Therefore, this study aims to examine customer purchase patterns and loyalty at Pandopo Catering using the RFM method. The novelty of this study lies in applying RFM analysis to a small-scale Indonesian catering business by integrating Google Forms, Google Sheets, and *Tableau* as accessible analytical tools [8]. This study contributes by demonstrating how simple transaction data can be transformed into customer segmentation insights and data-driven marketing recommendations.

## 2. LITERATURE REVIEW

### 2.1. Consumer Behavior and Purchasing Patterns

Consumer behavior reflects purchasing decisions, including purchase frequency, loyalty, and customer preferences [9]. Previous studies have emphasized perception-based analysis, such as surveys or interviews, to understand customer loyalty [10]. However, these approaches have limitations because they do not capture actual transactional activity. Other research indicates that transaction-based data analysis provides a more objective picture of purchasing patterns, purchase frequency, and customer monetary value [11].

In the context of MSME Catering, understanding consumer behavior through transaction data is essential to identify loyal customers, new customers, and those at risk of discontinuing the service. This study addresses this research gap by integrating the RFM (Recency, Frequency, Monetary) method to quantitatively analyze purchasing patterns and customer loyalty. Consequently, this research not only defines consumer behavior but also demonstrates practical contributions for customer retention strategies in MSME Catering.

### 2.2. Business Analytics and the RFM Model

Business analytics enables the processing of historical data into actionable insights for decision-making [12]. Previous studies have employed basic visualizations or descriptive statistical methods to understand customer loyalty, but few have combined RFM with interactive visualization using *Tableau*. The RFM model is widely used to classify customers based on their most recent transaction, purchase frequency, and monetary value [13].

This study integrates the RFM approach with data visualization to:

- Identify loyal, potential, and inactive customers.
- Examine purchasing patterns quantitatively within MSME Catering.
- Provide data-driven marketing recommendations to enhance customer retention.

In this way, the study goes beyond merely defining RFM, combining historical analysis, customer segmentation, and visualization to generate practical insights, distinguishing it from prior research.

## 3. RESEARCH METHODOLOGY

### 3.1. Research Design and Approach

This study uses a descriptive quantitative approach with data-driven analysis to examine consumer behavior based on actual transaction data [14]. This approach was selected because the study does not rely on

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perception-based data such as questionnaires, but instead uses transaction records to identify customer purchase patterns and loyalty at Pandopo Catering.

### 3.2. Data Sources and Types

The data used in this study are secondary data obtained from transaction records of the *Suapan* lunch service at Pandopo Catering. The dataset covers the period from January 2025 to May 2026 and includes order timestamps, customer names, delivery locations, order types, and product prices. This study analyzes 564 transactions from 80 unique customers, reflecting actual customer purchasing activities during the observation period [15].

### 3.3. Data Collection Technique

Data were collected through documentation by compiling transaction records from Pandopo Catering's ordering system. Each order batch represents one sales cycle of the catering service during the research period.

### 3.4. Data Analysis Technique

The data were analyzed using a business analytics approach based on the RFM (*Recency, Frequency, Monetary*) method. Transaction data were collected through Google Forms and processed using Google Sheets. The analysis involved several stages, including data cleaning, grouping transactions by customer, transaction time, purchase frequency, and transaction value, followed by RFM score calculation to classify customers based on their purchasing behavior [16]. The RFM scoring procedure and segmentation criteria are presented in detail in Table 1, which includes the description of each stage, calculation formulas, and segment classification criteria. The results were then used to generate objective insights into customer purchase patterns and loyalty [17].

Table 1. RFM Calculation and Scoring Process

Step	Description	Formula / Criteria
Data Cleaning	Checking missing values, standardizing customer names, and removing duplicate transactions.	Duplicates were identified based on customer name, transaction time, and order information.
Customer Grouping	Aggregating transactions by unique customer.	Each customer was counted once as the unit of analysis.
Recency Calculation	Measuring the time since the customer's last transaction.	$\text{Recency} = \text{End of Research Period} - \text{Last Transaction Date}$
Frequency Calculation	Calculating the total number of transactions per customer.	$\text{Frequency} = \text{COUNT}(\text{transactions per customer})$
Monetary Calculation	Calculating the total transaction value per customer.	$\text{Monetary} = \text{SUM}(\text{transaction value per customer})$
RFM Scoring	Assigning scores from 1 to 5 for each RFM indicator.	Scores were determined using quartile or percentile-based thresholds.
Recency Score	Assigning higher scores to customers with more recent transactions.	Lower Recency values received higher scores.
Frequency Score	Assigning higher scores to customers with more frequent purchases.	Higher Frequency values received higher scores.
Monetary Score	Assigning higher scores to customers with higher transaction values.	Higher Monetary values received higher scores.
Tie Handling	Assigning the same score to customers with identical boundary values.	No random separation was applied.
Customer Segmentation	Grouping customers based on combined RFM scores.	Champions, Loyal Customers, Potential Loyalist, Need Attention, and Lost Customers.

Based on Table 1, the RFM analysis was conducted systematically, starting from data cleaning to customer segmentation. The Recency score was assigned inversely because more recent transactions indicate higher customer engagement [18]. In contrast, Frequency and Monetary scores were assigned directly, as higher

purchase frequency and transaction value indicate greater customer contribution to the business [19]. Ties were handled by assigning the same score to customers with identical values at scoring boundaries, ensuring a consistent and non-random segmentation process [7].

### 3.5. Research Analysis Framework

This study focuses on analyzing consumer behavior in two main aspects, namely purchase patterns and customer loyalty, which were examined using a transaction-based business analytics approach [20]. The transaction data were processed through data cleaning, customer grouping, RFM calculation, customer segmentation, and visualization using *Tableau* [21]. This analytical framework enabled a more objective understanding of customer behavior at Pandopo Catering and facilitated the development of data-driven marketing strategy recommendations [22].

### 3.6. Data Analysis Stages

The analysis began with the collection of customer transaction data from Pandopo Catering's ordering system during the research period. The next stage involved data cleaning to remove duplicate records, correct inconsistencies, and ensure data quality. The data were then processed based on customer, transaction time, purchase frequency, and transaction value. RFM analysis was applied to identify purchase patterns, customer loyalty levels, and customer segments based on transaction characteristics [23, 24].

*Tableau* visualization was used to support the interpretation of the results, including customer loyalty distribution, purchase frequency distribution, and a scatter plot showing the relationship between frequency and transaction value. The analysis results were then used to generate business analytics insights that support decision-making and customer retention strategies.

## 4. RESULTS AND DISCUSSION

### 4.1. Overview of Research Data

This study used customer transaction data from Pandopo Catering from January 2025 to May 2026, consisting of 564 transactions from 80 unique customers. The data were obtained from the company's lunch service ordering system through the pre-order system known as *Suapan* [25]. Unique customers refer to individual customers who were counted once, even if they made multiple transactions during the study period. The dataset shows diverse purchasing patterns, in which some customers made only one purchase, while others made repeated purchases with higher frequency. This indicates that transaction data can be used to examine customer purchase patterns and loyalty more objectively and provides an initial basis for developing retention strategies to encourage new customers to become loyal customers [26].

### 4.2. Consumer Loyalty Analysis

Customer loyalty was analyzed based on purchase frequency. Customers who made more than one purchase were classified as loyal customers, while customers who made only one purchase were classified as new customers [27].

Table 2. Customer Classification Based on Loyalty

Customer Category	Number of Customers	Percentage
Loyal Customers	55	68.75%
New Customers	25	31.25%
<b>Total</b>	<b>80</b>	<b>100%</b>

Based on Table 2, 55 customers or 68.75% were classified as loyal customers because they made more than one purchase, while 25 customers or 31.25% were classified as new customers. These findings indicate that Pandopo Catering already has a relatively active customer base but still needs to retain new customers and encourage them to become loyal customers [28].

### 4.3. RFM Customer Analysis

RFM analysis was used to identify customer behavior based on three main indicators: Recency, Frequency, and Monetary. Recency refers to the time interval since the customer's last transaction, Frequency represents the number of purchases made by each customer, and Monetary reflects the total transaction value during the study period [29].

In this study, RFM analysis was used to classify customers into five segments: Champions, Loyal Customers, Potential Loyalist, Need Attention, and Lost Customers. This segmentation helps Pandopo Catering identify customers with high loyalty, customers with growth potential, and customers who need to be reactivated [30].

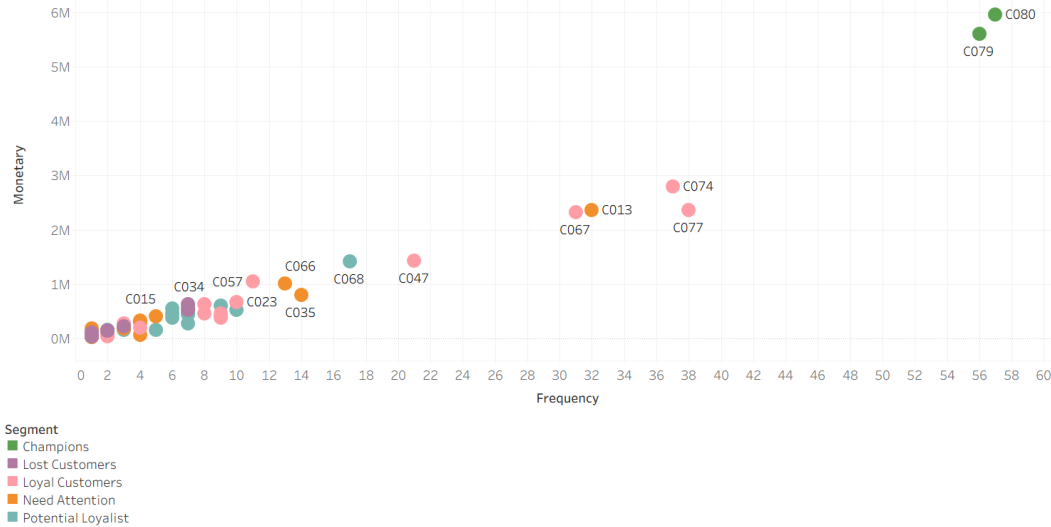


Figure 1. Customer Frequency vs Monetary Value

Figure 1 presents a scatter plot showing the relationship between Frequency and Monetary values, where the X-axis represents purchase frequency, the Y-axis represents total transaction value, and each point represents a customer colored by RFM segment. Customers with higher purchase frequency tend to generate higher transaction values, and those positioned in the upper-right area of the plot can be identified as high-value customers due to both high purchase frequency and monetary contribution. This visualization highlights the relationship between purchase intensity and customer contribution to business revenue and serves as an important basis for identifying priority customers [31]. The relationship is further supported by the Pearson correlation result of  $r = 0.976$ , indicating a strong positive relationship between purchase frequency and monetary value.

#### 4.4. Customer Segmentation Based on RFM

Table 3. Customer Segmentation Results Based on RFM Analysis

Segment	Number of Customers	Percentage
Champions	2	2.5%
Loyal Customers	18	22.5%
Potential Loyalist	20	25%
Need Attention	20	25%
Lost Customers	20	25%
<b>Total</b>	<b>80</b>	<b>100%</b>

Based on Table 3, the Potential Loyalist, Need Attention, and Lost Customers segments each consist of 20 customers, representing 25% of the total customers, while the Loyal Customers segment includes 18 customers or 22.5%, and the Champions segment includes only 2 customers or 2.5%. These findings indicate that the number of highly loyal customers remains relatively small, so Pandopo Catering needs to strengthen customer retention strategies by maintaining loyal customers, increasing the engagement of potential customers, and reactivating customers who have become less active [32].

Table 4. Descriptive Statistics of RFM Metrics by Customer Segment

Segment	Customers	Mean	SD	Mean	SD	Mean
		Frequency	Frequency	Monetary	Monetary	Recency
Champions	2	56.50	0.71	Rp5,780,000	Rp254,558	0.00
Loyal Customers	18	11.56	12.00	Rp772,222	Rp873,213	2.83
Potential Loyalist	20	5.15	3.99	Rp338,500	Rp320,736	21.15
Need Attention	20	5.10	7.37	Rp360,250	Rp541,172	46.10
Lost Customers	20	1.90	1.83	Rp148,500	Rp154,350	62.05

Based on Table 4, the Champions segment has the highest average Frequency and Monetary values, with 56.50 transactions and Rp5,780,000, respectively. This indicates that customers in this segment have the highest purchasing activity and transaction contribution. In contrast, the Lost Customers segment has the lowest average Frequency and Monetary values, with 1.90 transactions and Rp148,500, respectively, indicating low purchasing activity and the need for customer reactivation strategies. The standard deviation values also show variations in purchasing behavior across segments, particularly among Loyal Customers and Need Attention customers [33, 34].

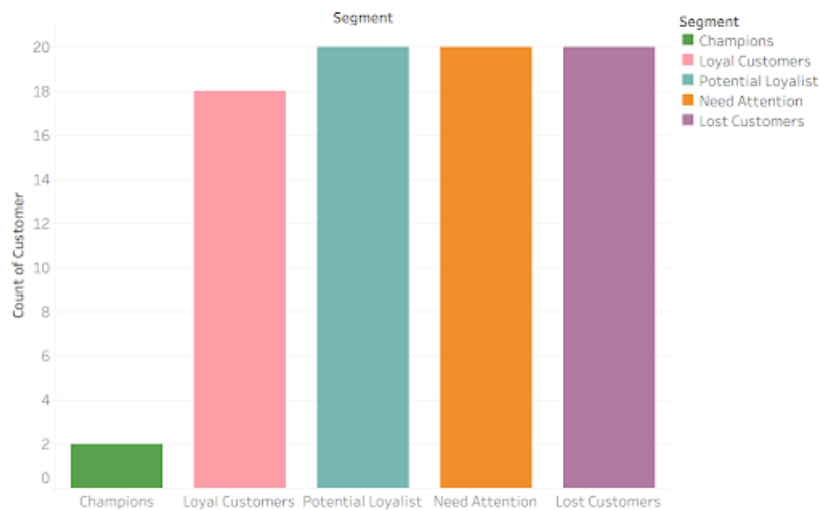


Figure 2. Customer Segmentation by RFM Analysis

Figure 2 visualizes the distribution of customers across RFM segments. This visualization supports the interpretation of Tables 3 and 4 by showing the relative size of each customer segment more clearly. It also highlights that the Champions segment is the smallest group, while Potential Loyalist, Need Attention, and Lost Customers represent the largest customer groups requiring strategic attention [35].

#### 4.5. Marketing Strategy Based on RFM Segmentation

The recommended marketing strategies were developed by considering the characteristics of customers within each RFM segment [36]. The Champions segment represents customers with the highest level of loyalty; therefore, a loyalty reward strategy can be applied to maintain long-term relationships. The Loyal Customers segment shows consistent repeat-purchase behavior, making a membership program suitable for improving engagement and retention [37]. Meanwhile, the Potential Loyalist segment can be approached through engagement marketing because these customers have the potential to become loyal customers [38]. The Need Attention segment requires reminder promotions to encourage repeat purchases, while the Lost Customers segment requires a win-back campaign due to declining purchasing activity [39]. Therefore, the proposed strategies are not merely general recommendations but are developed based on customer behavioral patterns identified through RFM analysis.

#### 4.6. Customer Segmentation by Location

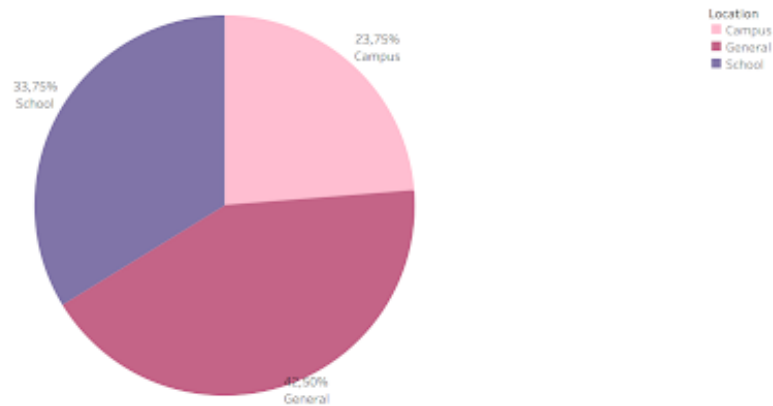


Figure 3. Customer Distribution Based on Delivery Location

The distribution of customers based on delivery location is illustrated in Figure 3. The chart shows that customers are grouped into three location categories: General, Campus, and School. This visualization helps identify the dominant customer areas and supports Pandopo Catering in designing more targeted area-based promotional and distribution strategies.

#### 4.7. Business Analytics Interpretation Discussion

The findings show that transaction-based business analytics provides a more objective understanding of customer behavior. Although most customers made more than one purchase, the number of customers in the Champions segment remains low. This indicates that repeat purchases do not always reflect strong loyalty, as purchasing decisions in the catering business may be influenced by menu variety, price, service quality, ordering convenience, and customers changing consumption needs.

The dominance of the Potential Loyalist, Need Attention, and Lost Customers segments indicates that Pandopo Catering still needs to strengthen its retention strategies. Therefore, RFM segmentation can be used as a basis for developing more targeted marketing strategies, such as loyalty programs for active customers, engagement marketing for potential customers, and reminder promotions or win-back campaigns for customers who have become less active.

However, RFM results should be understood as transaction-based behavioral analysis, meaning that they cannot fully explain why customers become loyal or inactive. Factors such as customer satisfaction, menu preferences, price sensitivity, service quality, and demographic characteristics were not analyzed in this study [40]. Therefore, RFM segmentation should be viewed as an initial basis for understanding customer behavior, rather than a complete explanation of customer motivation.

### 5. MANAGERIAL IMPLICATIONS

The findings of this study suggest that marketing strategies for MSME Catering should be developed based on customer characteristics within each RFM segment. Champions and Loyal Customers should be prioritized through loyalty and membership programs, while Potential Loyalist and Need Attention segments require engagement marketing and reminder promotions to increase purchase frequency. Lost Customers should be targeted through win-back campaigns due to declining transaction activity. In addition, customer location data, such as General, Campus, and School, can support more targeted area-based promotions. However, RFM-based strategies should also be complemented with direct customer feedback, such as satisfaction surveys or menu and service evaluations, to ensure that managerial decisions reflect both transaction patterns and customer preferences.

### 6. CONCLUSION

This study analyzed customer purchase patterns and loyalty at Pandopo Catering using a data-driven approach through the RFM (Recency, Frequency, Monetary) method. Based on transaction data from January


2025 to May 2026, the dataset consisted of 564 transactions from 80 unique customers, with 55 customers (68.75%) classified as loyal customers and 25 customers (31.25%) classified as new customers. RFM segmentation grouped customers into five segments: Champions, Loyal Customers, Potential Loyalist, Need Attention, and Lost Customers. These findings indicate that RFM analysis provides a more objective understanding of customer purchasing behavior and loyalty.

From a business perspective, RFM segmentation and *Tableau* visualization help Pandopo Catering identify high-value customers, potential customers, and inactive customers. These insights support more targeted marketing strategies, such as loyalty rewards for Champions, membership programs for Loyal Customers, engagement marketing for Potential Loyalist, reminder promotions for Need Attention, and win-back campaigns for Lost Customers. In addition, customer location segmentation into General, Campus, and School categories can support more effective area-based promotional planning.


This study has several limitations. First, the analysis focuses on a single catering business with a relatively small sample of 80 customers, which limits the generalizability of the findings to other MSME catering businesses. In addition, this study only uses transaction data and does not include customer demographics, satisfaction levels, menu preferences, or qualitative feedback that could explain why customers become loyal or inactive. Therefore, future studies are encouraged to involve multiple MSMEs with larger customer datasets and to combine RFM analysis with surveys, interviews, demographic analysis, predictive analytics, or customer churn analysis to produce more comprehensive and generalizable findings.


## 7. DECLARATIONS

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### 7.2. Author Contributions

Conceptualization: JZ; Methodology: JZ and NW; Software: ZZ; Validation: SS; Formal Analysis: SS and JZ; Investigation: NW and JZ; Resources: ZZ; Data Curation: JZ and ZZ; Writing Original Draft Preparation: SS and NW; Writing Review and Editing: JZ; Visualization: JZ; All authors, SS, NW, JZ and ZZ, have read and agreed to the published version of the manuscript.

### 7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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The authors declare that no financial support was received for the research, authorship, or publication of this article.

### 7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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