

DESCRIPTIVE AND COMPARATIVE ANALYSIS OF THE EFFECT OF WEATHER/SEASONS ON PRODUCT SALES IN GROCERY STORES

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Abstract

Product sales in grocery stores are influenced by various factors, one of which is weather or seasonal conditions. Weather changes, such as the rainy season and the hot season, can influence consumer preferences when purchasing certain products. This study aims to analyze the effect of weather changes on sales patterns of two temperature-sensitive products: instant noodles and cold drinks. The method used was descriptive and comparative analysis based on eight weeks of weekly sales data, including heavy rain, light rain, and hot/scorching weather. The results showed that instant noodle sales increased significantly during the rainy season, with an average of 28.75 cartons per week, compared to only 13.5 cartons per week in the hot season. Conversely, cold drink sales increased sharply during the hot season, with an average of 28.25 cartons per week, compared to 11.5 cartons per week in the hot season. These findings confirm a direct relationship between weather conditions and consumer purchasing behavior and demonstrate the importance of adaptive inventory management strategies based on seasons so that grocery stores can minimize the risk of understocking or overstocking. This research also provides a basis for small business owners to make more informed and efficient procurement decisions. Abstract is written briefly and factually using Tahoma letter, size 9pt with text length between 150-200 words. English version abstracts are written in English in past tense and in good sentences. Do not use abbreviations or citation in the abstract. Results and conclusions are written in present tense. Abstract includes background of problems, research objectives, research methods, results and conclusions.

Keywords: grocery store; sales; weather; season; consumer behavior; inventory.

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Introduction

Grocery stores are a type of micro-enterprise that plays a vital role in meeting people's daily needs. Grocery stores remain a mainstay for consumers, especially in rural and urban areas with high mobility. Sales dynamics in grocery stores are influenced by various factors. Internal factors include inventory management, service, location, and pricing. Meanwhile, external factors include consumer purchasing power, market trends, and environmental conditions.

Weather or season is a crucial variable often overlooked by small business owners. However, consumer behavior can change significantly depending on weather conditions. For example, during the rainy season, consumers tend to purchase hot or instant foods, while in the summer, cold drinks and refreshments are more popular. This study seeks to illustrate how external weather/seasonal factors can affect grocery store sales, allowing business owners to adjust their inventory management strategies more effectively.

Several previous studies have shown that weather significantly influences consumer shopping patterns. Wicaksono (2020) found that demand for cold drinks tends to increase significantly in the summer, while demand for hot foods increases during the rainy season. Rizal's (2019) research confirms that small-scale retail businesses need to consider weather factors in stock management because changes in consumer shopping patterns can lead to excess or insufficient inventory. Meanwhile, Kotler and Keller (2016) state that weather is an uncontrollable external factor that directly impacts purchasing behavior, particularly for daily necessities.

Using a descriptive and comparative analysis approach, this study aims to provide an empirical overview of how weather changes affect weekly sales patterns. This information is expected to assist grocery store owners in making more accurate and adaptive inventory management decisions.

The products selected as samples were instant noodles and cold drinks, two commodities most sensitive to weather changes. Instant noodles tend to be in demand during cold or rainy weather because they provide a warming sensation and are easy to serve. Conversely, cold drinks are more popular during hot weather.

This study was conducted to understand the extent to which seasonality affects sales volumes of these products so that business owners can plan their inventory appropriately and minimize the risk of running out of stock or overstocking.

Research Method

This study used a quantitative approach with descriptive and comparative analysis methods to determine differences in product sales patterns between the rainy and dry seasons. This method was chosen because it can describe actual conditions based on numerical data and allows for comparisons between weather groups.

1. Research Design

The research design used was a non-experimental, cross-sectional time-series design, meaning data was collected over a specific time period (weekly) without any special treatment. The focus of the study was to observe how naturally occurring weather changes affect the sales of two main grocery store products.

2. Research Location and Subjects

The study was conducted at an urban grocery store that sells a variety of daily necessities. The research subjects were: Instant food products (instant noodles) and cold beverage products (mineral water, cold bottled drinks, and carbonated drinks). These subjects were chosen because these two products are highly sensitive to weather conditions.

3. Data Types and Data Sources, The type of data used is quantitative, in the form of:

- Weekly sales data for instant noodles (in boxes)
- Weekly sales data for cold drinks (in cartons)
- Weather condition data based on categories:
 - Heavy rain
 - Light rain
 - Sunny/hot

Sales data was obtained from the store's daily purchase and sales records, while weather data was classified based on actual observations by the store owner each week.

4. Data Collection Techniques, Data collection was conducted using two techniques:

- Documentation, which involves collecting sales data manually recorded by the store owner.
- Observation, which involves observing daily weather conditions and then grouping them into weekly conditions. Data was collected over 8 weeks, representing both rainy and sunny/hot periods.

5. Research Instruments

The instruments used in this study include:

- Weekly sales summary sheets to record sales of two products.
- Weather observation sheets, which contain daily weather categories and rainfall intensity. A weather categorization table was created to ensure consistency in grouping rainy and hot weeks.

6. Research Procedure

The research stages were as follows:

- Identify the products most sensitive to weather changes (instant noodles and cold drinks).
- Collect sales data from store records for 8 weeks.
- Record daily weather conditions and then group them into weekly categories. d. Group the data into two large groups:
 - Rainy Season Group
 - Summer/Sunny Season Group
- Compile a sales data table based on the two seasons.

- Analyze the data using descriptive and comparative methods.
 - Draw conclusions regarding the effect of weather/season on sales of both products.
7. Data Analysis Techniques
- The analysis was conducted in several stages:
- Descriptive Analysis
Used to: Display the average, range, and sales trend for each weather condition. Visually illustrate trends in sales increases or decreases.
 - Comparative Analysis
simple comparative analysis is conducted by: Comparing average instant noodle sales during rainy weeks versus sunny/hot weeks. Comparing average cold drink sales during both weather conditions. The results of the comparison are presented in tables and graphs for easy interpretation.
 - Interpretation of Results
After the comparison is made, the researcher interprets the logical relationship between weather changes and sales fluctuations, then relates it to consumer behavior theory and seasonal patterns.

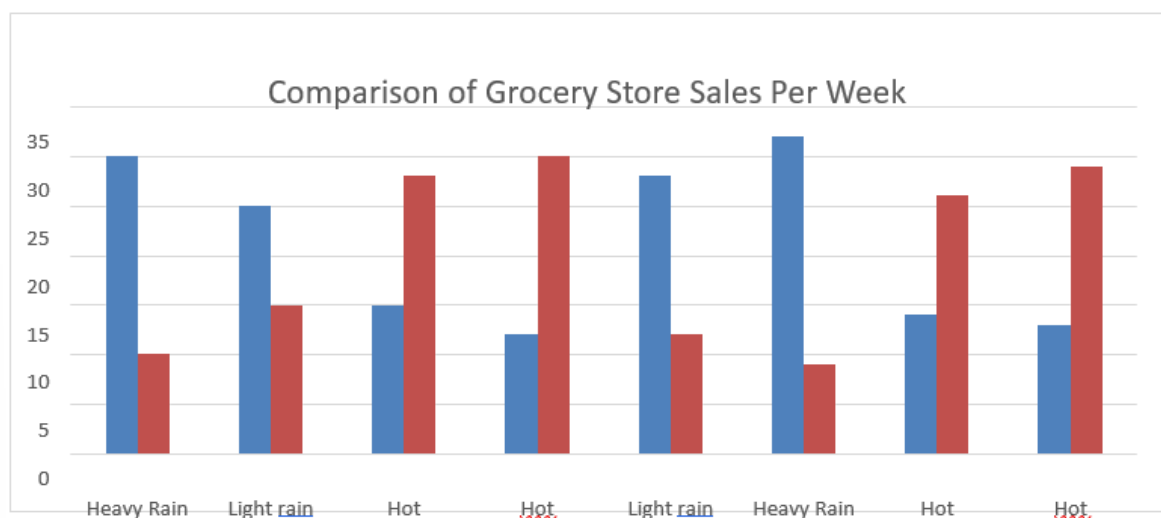
Results and Discussion

1. Sales Data Presentation

Sales data was collected over eight weeks representing two weather conditions: the rainy season and the sunny/hot season. The two products studied were instant noodles and cold drinks, as both are highly sensitive to weather changes.

Table 1. Sales Data Based on Weather Conditions

Sunday	Weather/Season	Instant Noodle Sales (boxes)	Cold Drink Sales (Cartons)
1	Heavy Rain	30	10
2	Light Rain	25	15
3	Sunny/Hot	15	28
4	Sunny/Hot	12	30
5	Light Rain	28	12
6	Heavy Rain	32	9
7	Sunny/Hot	14	26
8	Sunny/Hot	13	29



2. Descriptive Analysis

a. Instant Noodle Sales

Instant noodle sales show a clear pattern:

- During the rainy season, sales range from 25–32 boxes/week.
- In the hot season, sales decrease to 12–15 boxes/week.

Average instant noodle sales:

- Rainy season: $(30 + 25 + 28 + 32) / 4 = 28.75$ boxes/week
- Summer: $(15 + 12 + 14 + 13) / 4 = 13.5$ boxes/week

There is a decrease of more than 50% in the hot season.

b. Cold Beverage Sales

Cold beverage sales show the opposite pattern:

- In the hot season, sales reach 26–30 boxes/week.
- In the hot season, sales are only 9–15 boxes/week.

Average cold drink sales:

- Rainy season: $(10 + 15 + 12 + 9) / 4 = 11.5$ cartons/week
- Summer: $(28 + 30 + 26 + 29) / 4 = 28.25$ cartons/week

There is more than a twofold increase in summer.

3. Comparative Analysis

To see the differences more clearly, a simple comparative analysis was conducted.

a. Comparison of Instant Noodle Sales

- Rainy season: Average 28.75 cartons/week
- Summer: Average 13.5 cartons/week

Interpretation:

The increase in instant noodle sales during the rainy season is related to consumer preference for hot, easy-to-prepare foods. Cold weather and heavy rainfall increase the demand for convenient foods. This is consistent with research by Huang & Lee (2021), which states that ready-to-eat foods are more popular in cold weather.

b. Comparison of Cold Drink Sales

- Rainy season: average 11.5 cartons/week
- Summer season: average 28.25 cartons/week

Interpretation:

In summer, rising temperatures drive demand for cold drinks. Consumers seek products that provide a refreshing effect. This pattern aligns with the findings of Salvatore & Kim (2019), which showed that a 1–2°C temperature increase significantly increases the purchase of packaged beverages.

4. Discussion of Research Findings

a. The Influence of Weather on Consumer Behavior

Weather changes have a direct impact on consumer preferences:

When it rains, consumers reduce outdoor activities, making them more likely to purchase convenience foods such as instant noodles.

When it's hot, consumers seek refreshing beverages such as cold water, energy drinks, and soda. This situation demonstrates that weather plays a role in triggering changes in basic needs, not just as an environmental factor.

b. Implications for Inventory Strategy

Based on the data:

Shop owners need to increase their inventory of instant noodles ahead of the rainy season, especially when heavy rainfall is predicted. Conversely, during the summer, cold beverage inventory should be increased, as it has a faster stock turnover rate. Seasonal-based inventory management can:

1. Reduce the risk of stockouts
 2. Avoid overstocking
 3. Improve working capital efficiency
 4. Increase customer satisfaction levels
- c. Relevance to Previous Studies

The results of this study are consistent with various related studies, including:

- Hot weather increases cold beverage consumption (Smith, 2018).
- Certain products have high seasonal sensitivity (Huang & Lee, 2021).
- Small retailers need to be responsive to seasonal demand (Johnson & Berman, 2020).

This study strengthens this theory by providing empirical evidence in the context of small grocery stores.

d. Research Contributions

- This research contributes to:
- Understanding seasonal demand patterns in small retail businesses.
- The application of simple data analysis to support inventory decisions.
- The basis for further research, such as predictive analytics or data-driven inventory management.

Conclusion

This study aims to analyze the influence of weather or seasons on the sales of two temperature-sensitive products, instant noodles and cold drinks, in a grocery store. Based on the results of descriptive and comparative analysis, the following conclusions were drawn:

1. Weather or seasons have a significant influence on product sales patterns in grocery stores. The shift from the rainy season to the hot season causes a clear variation in demand for certain product types.
2. Sales of instant noodles increase during the hot season. Average sales reach 28.75 boxes/week, significantly higher than the 13.5 boxes/week in the hot season. Consumers tend to choose warm and convenient foods when the weather is cold or rainy.
3. Sales of cold drinks increase significantly during the hot season. Average sales reach 28.25 boxes/week, compared to only 11.5 cartons/week in the hot season. This indicates that hot weather drives consumers' need for refreshing beverages.
4. Differences in sales patterns between the two seasons indicate a direct relationship between weather conditions and consumer purchasing behavior. Products that provide comfort depending on the weather (warm or refreshing) have high demand elasticity.
5. The managerial implications for store owners are clear: During the rainy season, stocks of instant noodles and other hot products need to be increased. In the summer, stocks of cold drinks should be increased to meet surges in demand. Adjusting inventory based on

seasonal patterns can improve inventory efficiency and reduce the risk of loss. Overall, this study confirms that understanding weather factors is crucial for small retailers in optimizing inventory strategies and meeting customer needs appropriately. This study can also serve as a basis for further research addressing seasonal demand prediction or implementing data-driven inventory management.

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