StrategicThinking

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Pizza Sales Analysis Report

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# **Report on Pizza Sales Analysis**

## **1. Strategic Overview of the Business Problem**

## **1.2 Background**

The pizza industry is a significant part of the food service sector, characterized by diverse business models, ranging from small local pizzerias to large multinational chains. In this dynamic and competitive landscape, businesses are constantly seeking ways to optimize their operations, enhance customer satisfaction, and drive revenue growth. Traditionally, pizza businesses have relied on experience and intuition to make decisions regarding inventory management, marketing campaigns, and staffing. However, the increasing availability of data and advancements in data science offer unprecedented opportunities for these businesses to adopt a more data-driven approach.

Data-driven decision-making empowers pizza businesses to move beyond reactive strategies and embrace proactive approaches. By leveraging data, businesses can gain a deeper understanding of customer behavior, identify trends, and predict future outcomes. This shift enables them to make informed choices, optimize resource allocation, and personalize customer experiences, ultimately leading to improved efficiency and profitability.

### **1.2 Business Problem**

This capstone project aims to address the challenge of optimizing business operations and sales strategies for a pizza company by leveraging data analysis and machine learning. Specifically, the project focuses on the following key areas:

**Understanding Sales Patterns** by identifying trends in pizza sales, including daily, weekly, and hourly patterns, to optimize staffing and inventory.

**Analyzing Product Performance** by determining the most popular pizza categories and sizes to inform menu planning and marketing efforts.

**Predicting Sales** by developing a predictive model to forecast future sales, enabling better resource allocation and inventory management.

**Feature Importance** bydetermining which factors most influence sales.

The business problem can be summarized as the need to transform raw sales data into actionable insights that can drive strategic decision-making and improve overall business performance.

### **1.3 Strategic Importance**

Thinking strategically, I'm considering why solving this particular problem is so important for a pizza business.

**Improved Efficiency**

By accurately forecasting demand and understanding sales patterns, the pizza business can optimize its inventory management, reducing waste and storage costs. Staffing levels can also be adjusted to match peak demand periods, improving labor efficiency.

**Enhanced Marketing Effectiveness**

Identifying the most popular pizza categories and sizes allows the business to target its marketing efforts more effectively, increasing the return on investment (ROI) of marketing campaigns.

**Increased Customer Satisfaction**

By understanding customer preferences and ordering patterns, the business can personalize its offerings and promotions, leading to higher customer satisfaction and loyalty.

**Competitive Advantage**

In a competitive market, businesses that leverage data to make informed decisions gain a significant advantage. This project provides the pizza company with the tools and insights necessary to outperform competitors.

**Revenue Growth and Profitability**

Ultimately, the insights gained from this project will contribute to increased revenue and profitability by optimizing operations, reducing costs, and enhancing marketing effectiveness.

Solving these business problems through the application of data analytics is crucial for several strategic reasons. It allows this pizza business to gain a significant competitive advantage by developing a deeper understanding of customer needs and optimizing its operations in ways that competitors might not.

Increased profitability can be achieved through more efficient resource allocation, reduction of waste, and the implementation of targeted marketing strategies that resonate with customers.

By understanding and effectively catering to customer preferences, businesses can significantly improve overall customer satisfaction, fostering loyalty and positive word-of-mouth. Furthermore, leveraging data insights can lead to enhanced operational efficiency through the streamlining of processes and the effective use of technology. In today's competitive pizza industry, data-driven strategies are not merely beneficial; they are essential for sustained success and long-term growth.

In a market characterized by potentially thin profit margins and increasingly demanding customers, even incremental improvements in operational efficiency and customer satisfaction can yield substantial positive impacts on a business's profitability and its share of the market.

### **1.4 Project Objectives**

To provide a focused approach to this project, specific, measurable, achievable, relevant, and time-bound (SMART) objectives are crucial. Examples of such objectives include increasing the accuracy of sales forecasts for the next quarter by a defined percentage compared to previous forecasting methods.

Another objective could be to identify the top and bottom performing pizza combinations within a specified timeframe.

Developing a predictive model for customer order amounts with a quantifiable level of accuracy on a test dataset also constitutes a SMART objective.

Analyzing the impact of specific promotional activities on sales within a set period and formulating optimal promotion strategies based on the findings is another example.

Finally, aiming to reduce ingredient waste by a certain percentage within a defined timeframe through data-informed inventory optimization represents a clear and measurable goal.

The establishment of these well-defined SMART objectives provides a clear roadmap for the project, allowing for the measurement of success and ensuring that the efforts are directed towards achieving tangible business outcomes. Without such specific goals, the project would lack clear direction, making it challenging to assess its effectiveness and impact on the pizza business.

SMART objectives ensure that the project remains focused, accountable, and ultimately delivers measurable value.

The primary objectives of this capstone project are:

**SMART Objective 1**

To load and preprocess the pizza sales dataset, ensuring data quality and consistency.

Loading the pizza\_sales.csv dataset into a Pandas DataFrame, handling missing values using appropriate imputation techniques (mean for numerical, most frequent for categorical), and converting date/time columns to the correct data types within one week.

**SMART Objective 2**

To conduct exploratory data analysis (EDA) to uncover key trends and patterns in the data.

Generating at least four visualizations (line chart for daily sales, bar chart for category sales, pie chart for size distribution, line chart for hourly sales) and documenting three key insights from each visualization within two weeks.

**SMART Objective 3**

To develop a machine learning model to predict total pizza sales.

Training and evaluating three regression models (Linear Regression, Random Forest Regressor, Gradient Boosting Regressor) using appropriate metrics (MSE, R-squared) on a training and testing split of the data, and selecting the best-performing model within three weeks.

**SMART Objective 4**

To provide actionable business recommendations based on the findings of the data analysis and machine learning modeling.

Generating a report with at least five actionable business recommendations, supported by specific findings from the EDA and machine learning results, within one week.

**SMART Objective 5**

To document the project methodology, findings, and recommendations in a comprehensive report.

Compiling all project code, data visualizations, and analysis results into a well-structured report of approximately 5000 words, adhering to the specified outline, within one week.

## **2. Project Plan**

## **2.1 Project Management Methodology**