Executive Summary:
ACME Company Report

Prepared by
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Overview

This executive summary highlights critical findings from the recent analysis of ACME Company's operations and performance with an emphasis on products, customer behavior, and warehouse inventory. Utilizing predictive modeling and visualizations, the analysis provides actionable recommendations to support strategic decision-making.

The analysis identifies challenges in ACME's operations that merit deeper exploration. Addressing these issues will not only mitigate immediate risks but also uncover potential underlying factors impacting future performance. In a dynamic business environment, leveraging data-driven insights is far more effective than relying solely on intuition or historical trends.

By embracing predictive analysis, ACME can confidently make strategic decisions, anticipate potential disruptions, and seize emerging opportunities. The recommendations in this report are based on the assumption that current business operations remain unchanged, offering a roadmap for both immediate improvements and long-term growth.

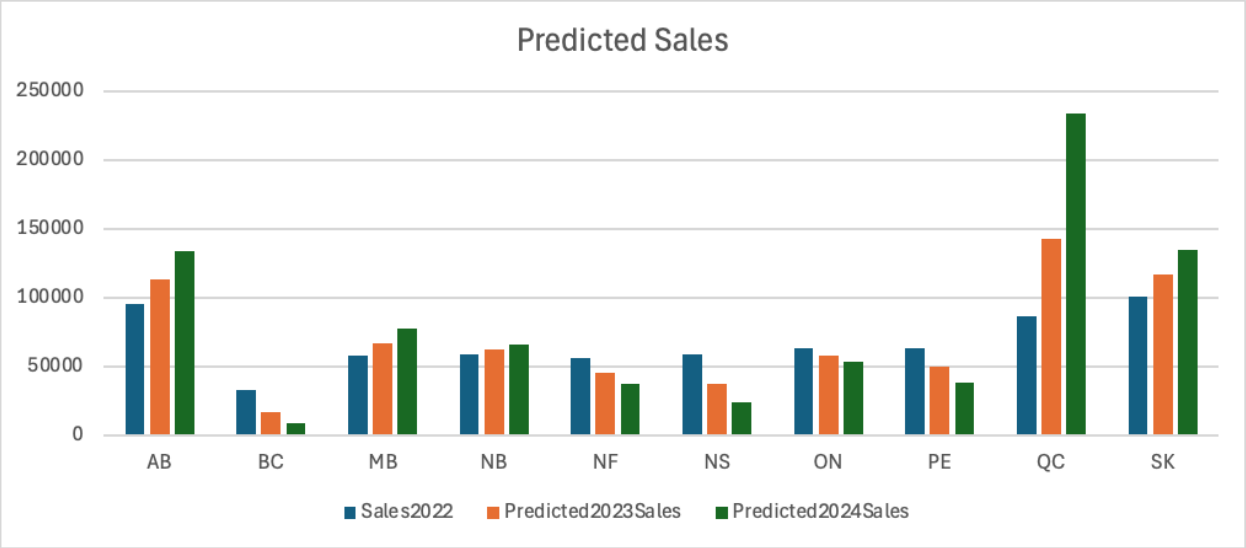
Customers by Region

Overview of Approach with Assumptions:

To analyze the customer base by region, total sales from the *ordersummary* table were used as a primary indicator of customer activity. SQL queries were executed to extract historical sales data by province and year. This data served as the foundation for forecasts created using Excel's *Forecast* and *Forecast.Linear* functions. Visualizations such as bar graphs and maps were employed to highlight trends across regions.

Several Key Assumptions were Made:

1. Total sales correlate directly with customer presence and activity in a given province.
2. Customer behaviors and market conditions will remain consistent through 2023 and 2024.
3. Customer loyalty to ACME products will persist over the forecasted period.
4. Growth rates in customer demand are expected to remain stable across regions unless affected by targeted strategic changes.



State	Sales2022	Predicted2023Sales	Predicted2024Sales
AB	95618.36	113114.8944	133813.0183
BC	33439.22	16904.52889	8545.760502
MB	57642.91	67017.26117	77916.15202
NB	58589.4	62258.67835	66157.74433
NF	56226.82	45902.8449	37474.50081
NS	59213.64	37513.91342	23766.40105
ON	63649.29	58477.59424	53726.11109
PE	63836.47	49800.87301	38851.25866
QC	86881.89	142731.0459	234481.0151
SK	101210.99	116732.3026	134633.8952

Recommendations for Management:

Based on the analysis, Quebec, Alberta, and Saskatchewan consistently demonstrate strong sales growth and are forecasted to remain high-growth regions through 2024. These provinces should receive increased attention in marketing, distribution, and customer engagement strategies. In contrast, regions like British Columbia and Nova Scotia are projected to experience a decline in sales. A shift in strategy, including reevaluating warehouse locations and tailoring outreach efforts, is essential to reinvigorate these markets. Additionally, ACME should consider exploring the causes of declining sales in specific provinces. This may involve customer feedback collection, localized marketing campaigns, or adjustments to product availability. By focusing resources

on high-growth regions while revitalizing underperforming areas, ACME can maximize overall sales and maintain a balanced regional presence.

Best and Worst Products

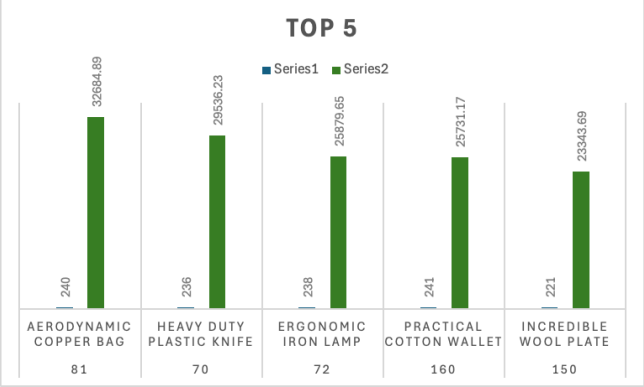
Overview of Approach with Assumptions:

To determine the best and worst performing products, sales data from 2020 to 2023 was analyzed, with forecasts made for 2024 using Excel's *Forecast.Linear* function. Data was drawn from the *orderproduct* and product tables, focusing on sales quantity and revenue generated for each product. Products with zero sales or limited availability during specific years were excluded from the main analysis. To refine results, a correction was applied to ensure negative or invalid sales values were replaced with zero, and products sold fewer than 60 times were filtered out to maintain relevance.

Several Key Assumptions were Made:

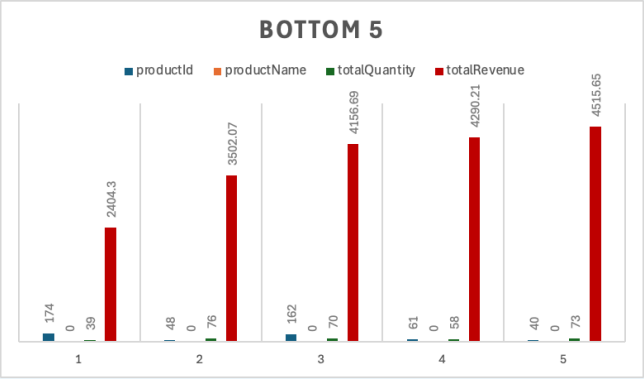
1. Sales revenue directly correlates with product popularity and success.
2. Product prices and market conditions remain stable through 2023 and 2024.
3. No significant external disruptions (e.g., economic downturns) will impact sales trends.
4. All products analyzed have been consistently available since 2020 unless explicitly noted.

productId	productName	totalQuantity	totalRevenue
81	Aerodynamic Copper Bag	240	32684.89
70	Heavy Duty Plastic Knife	236	29536.23
72	Ergonomic Iron Lamp	238	25879.65
160	Practical Cotton Wallet	241	25731.17
150	Incredible Wool Plate	221	23343.69



The top 5 best products were the *Aerodynamic Copper Bag*, *Heavy-Duty Plastic Knife*, *Ergonomic Iron Lamp*, *Practical Cotton Wallet*, and the *Incredible Wool Plate*.

productId	productName	totalQuantity	totalRevenue
174	Sleek Bronze Keyboard	39	2404.3
48	Lightweight Aluminum Gloves	76	3502.07
162	Enormous Wool Wallet	70	4156.69
61	Synergistic Iron Car	58	4290.21
40	Fantastic Silk Knife	73	4515.65



The top 5 worst products were the *Sleek Bronze Keyboard*, *Lightweight Aluminum Gloves*, *Enormous Wool Walley*, *Synergistic Iron Car*, and the *Fantastic Silk Knife*.

Recommendations for Management:

The analysis revealed that top-performing products like the *Aerodynamic Copper Bag*, *Heavy-Duty Plastic Knife*, and *Ergonomic Iron Lamp* continue to drive significant sales. These products should be prioritized for targeted marketing campaigns and inventory optimization to maintain their momentum. Additionally, these products could benefit from promotions that capitalize on their existing popularity,

ensuring customer satisfaction and loyalty. Conversely, products such as the *Sleek Bronze Keyboard* and *Lightweight Aluminum Gloves* are consistently underperforming. For these items, management should conduct a deeper review to understand whether the lack of sales is due to low demand, pricing issues, or market misalignment. In cases where these products remain viable, adjusting marketing strategies or modifying their features might boost performance. If no improvement is feasible, discontinuing such items could free up valuable warehouse space for higher-demand products.
To optimize product performance further, ACME should:

1. Regularly evaluate trends in consumer preferences and adapt offerings accordingly.
2. Encourage customer feedback on both top-performing and struggling products to identify potential areas for improvement.
3. Consider seasonal factors and other external influences that might affect product sales over time.

By focusing on both sustaining the success of top sellers and addressing the challenges with underperforming items, ACME can maximize profitability while maintaining a competitive and responsive product lineup.

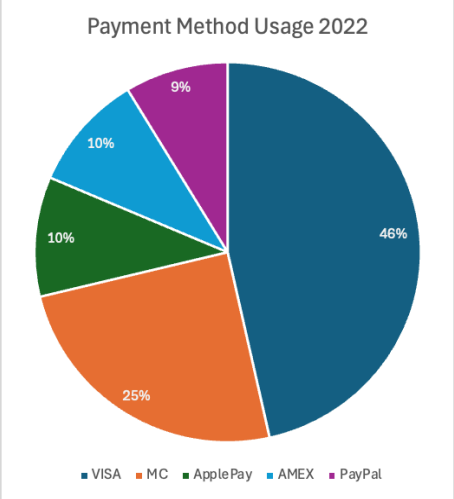
Payment Methods

Overview of Approach and Assumptions:

To analyze payment method trends, SQL queries were executed on the *paymentmethod* and ordersummary tables to retrieve the number of transactions associated with each payment type from 2020 to 2023. The data was then used to calculate yearly growth rates, which were applied to predict transaction volumes for 2024 using Excel's *Forecast.Linear* function. Bar charts were created to visualize patterns in payment method usage, focusing on their frequency rather than transaction value.

Key assumptions for this analysis included:

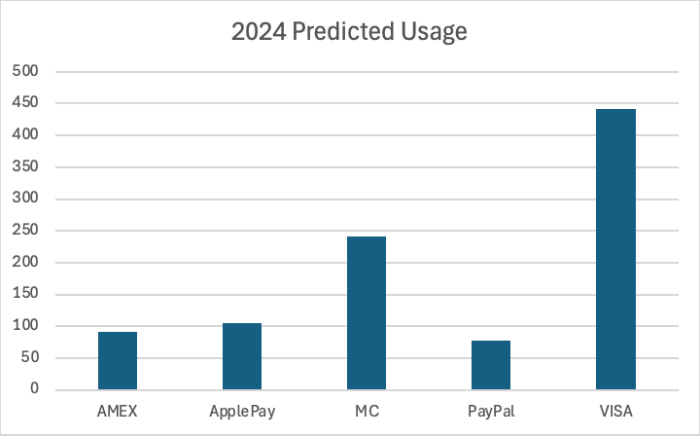
1. The popularity of a payment method is determined solely by the number of transactions, not the total transaction value.
2. The preferences for payment methods will remain consistent barring major changes in consumer habits or technological advancements.
3. The data is assumed to be accurate and does not account for refunds, order cancellations, or incomplete transactions.



Of all of the payment methods used in 2022, the most popular, by far, was VISA with 46% of users opting to pay with their card. MasterCard followed behind with 25%, ApplePay and AMEX both had 10%, and PayPal, with the least amount of users, was at 9%.

PaymentMethod	UsageCount
VISA	333
MC	177
ApplePay	73
AMEX	71
PayPal	62

Recommendations for Management:
The analysis indicates that Visa remains the most frequently used payment method, dominating transactions consistently through 2024. Mastercard and AMEX exhibit steady usage patterns, while PayPal shows a slight decline in adoption. This suggests that traditional card-based payment methods continue to be preferred by the majority of customers, with digital wallets like PayPal being less favored.



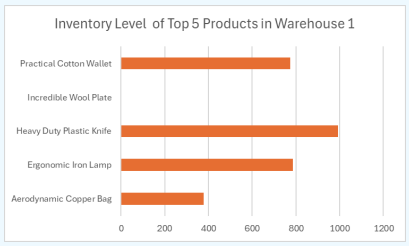
To ensure continued customer satisfaction, ACME should:

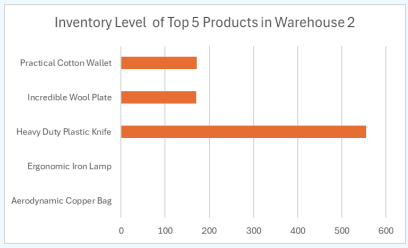
1. Maintain robust support for card-based payments such as Visa and Mastercard, as they are the most reliable and widely used options.
2. Investigate the declining trend in PayPal transactions and explore opportunities to promote this option, particularly to younger, tech-savvy customers.
3. Monitor emerging payment technologies (e.g., digital wallets, buy-now-pay-later services) and consider integrating them to stay competitive and appeal to diverse customer demographics.

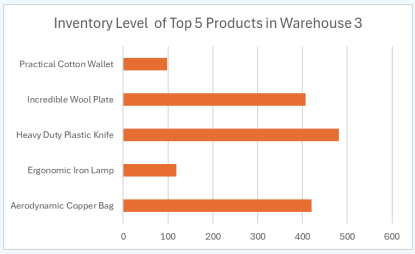
By staying aligned with customer payment preferences and remaining open to new trends, ACME can enhance the shopping experience, potentially boosting customer retention and increasing sales across all regions.

Inventory Management

Overview of Approach and Assumptions:
The analysis focuses on evaluating inventory levels and warehouse efficiency across the three warehouses in Kelowna, Winnipeg, and Toronto. By comparing current inventory levels of top-selling products and assessing stock management practices, the analysis assumes that demand trends from historical sales data will continue into 2024, and that inventory turnover rates remain steady unless bottlenecks or inefficiencies are identified. Shipment times will be estimated by calculating the difference between orderDate from the ordersummary table and shipmentDate from the shipment table. Shipment times are essential for understanding the efficiency of the distribution system and ensuring timely delivery to customers. The analysis will focus on current stock levels and sales data to estimate future inventory needs.







Recommendations for Management:

Based on the analysis, it is recommended that ACME redistribute excess inventory from warehouses with overstocked products to those experiencing higher demand, reducing holding costs and preventing stockouts. Reorder thresholds for high-demand products should be adjusted to ensure timely availability. A real-time inventory monitoring system should be implemented to detect discrepancies and streamline the restocking process. Since shipment times can be derived from the ordersummary and shipment tables, improving order fulfillment speed will help optimize distribution and customer satisfaction. The company should rely on sales trends to estimate inventory needs and adjust stock levels accordingly. Expanding warehouse capacity or optimizing operations in high-performing regions such as Toronto will better accommodate demand and improve overall warehouse efficiency.

Inventory Turnover (Your Choice)

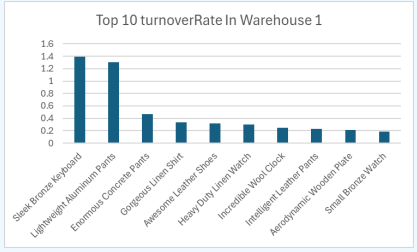
Overview of approach with assumptions:

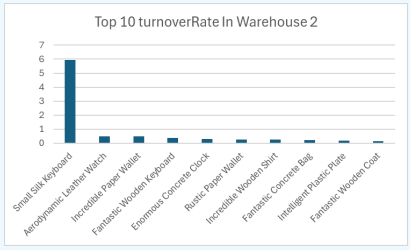
The analysis aims to measure inventory turnover rates, which indicate how efficiently stock is sold and replaced in the warehouses at Kelowna, Winnipeg, and Toronto. This involves calculating the ratio of total sales to total stock for each product at each warehouse.

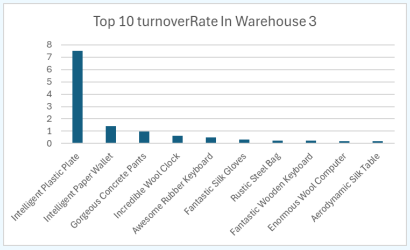
Key assumptions for this analysis included:

1. All sales data is accurately captured in the orderproduct table.
2. The productinventory table reflects the current stock levels accurately without delays in updates.
3. High turnover rates signify strong demand or efficient stock management, while low rates indicate slow-moving inventory or overstocking.

By comparing turnover rates across products and warehouses, the analysis identifies which items and locations are performing efficiently and highlights areas needing improvement.







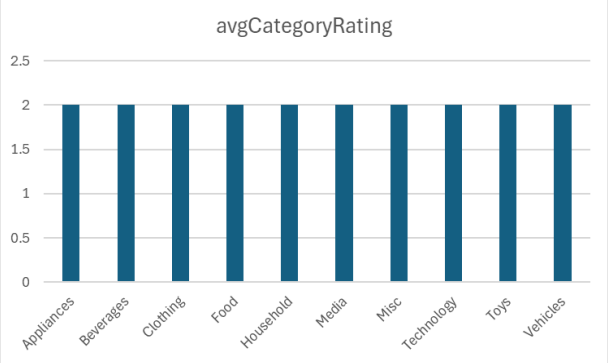
Recommendations for Management:
Based on the analysis, it is recommended that ACME focuses on redistributing inventory for products with low turnover rates to better-performing warehouses to optimize storage and sales efficiency. High-turnover products should have their stock levels increased to avoid potential stockouts and missed revenue opportunities. For products with persistently low turnover rates across all warehouses, consider targeted promotions, discounts, or even phasing them out if demand remains low. Additionally, implement regular monitoring of inventory turnover to adjust stock levels dynamically and align with customer demand trends. Optimizing inventory management in this manner will reduce holding costs and improve overall operational efficiency.

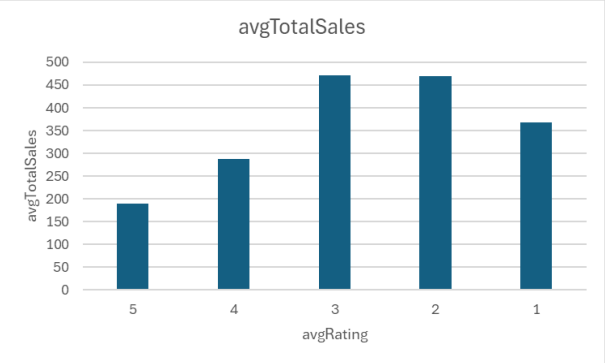
Correlation between Ratings and Sales (Your Choice)

Overview of approach with assumptions:
The analysis evaluates customer satisfaction at the category level by calculating average ratings and total reviews for each product category. Categories with higher average ratings reflect better customer satisfaction. It is assumed that ratings are evenly distributed across all products in a category and that categories with more reviews have more reliable ratings. Additionally, the analysis examines the correlation between product ratings and sales to determine if higher-rated products generate higher sales. This assumes that ratings influence customer purchase decisions and that sales data accurately reflects demand without significant external factors like stock outs or promotional campaigns skewing results.

Key assumptions for this analysis included:

1. It is assumed that customer ratings are evenly distributed across all products within a category, and no single product disproportionately skews the average rating for the category.
2. Categories with more customer reviews are considered to have more reliable ratings, assuming that larger sample sizes reduce the impact of outliers or anomalies in the ratings.
3. Sales data is assumed to accurately reflect customer demand, without being significantly influenced by external factors such as stockouts, promotional campaigns, or seasonal trends. Other factors that could influence sales, such as marketing efforts, brand loyalty, or product availability, are assumed to have minimal impact or are controlled for in the analysis.
4. Market dynamics are assumed to be stable during the analysis period, with no sudden changes in consumer preferences, competitor actions, or external economic factors affecting sales.





Recommendations for Management:
Categories with high ratings should be prioritized for marketing and promotions to capitalize on their strong customer satisfaction. Low-rated categories require immediate action to address quality concerns or customer feedback to improve satisfaction and drive sales. Products with high ratings but low sales should receive greater visibility through targeted promotions or better placement on the website, while high-sales but low-rated products require quality improvements to maintain customer trust and sustain long-term sales. By focusing on these areas, ACME can enhance customer satisfaction, increase revenue, and strengthen its market position.

General and Open Category

Recommendations for Database Improvements:
To optimize ACME's database and enhance its utility for business analysis, it is recommended to implement normalization techniques that ensure data efficiency and integrity. By applying normalization to at least the Third Normal Form (3NF), ACME can eliminate redundancies and better organize its data. For instance, redundant fields such as *price* in tables like *incart*, *orderproduct*, and *productinventory* should be removed, with the system relying on the *productPrice* field in the *product* table for consistency. Similarly, address-related fields, including *address*, *city*, *state*, *postalCode*, and *country*, can be consolidated into a dedicated *address* table to streamline data management for both customer and order information. To further enhance performance, indexes should be added on key foreign keys such as *customerId*, *productId*, and *shipmentId*, while referential integrity should be enforced through foreign key constraints.

For improved security, sensitive fields such as *password*, *paymentNumber*, and *paymentExpiryDate* should be encrypted to protect against unauthorized access. Audit tables for critical entities like *ordersummary* and *productinventory* can be implemented to track changes, ensuring accountability and enabling more robust analysis. Additionally, triggers can be used to automate updates, such as reducing inventory in *productinventory* when an order is placed, ensuring consistency across related tables. Precomputing and storing values like average product ratings directly in the *product* table can reduce query overhead for frequently accessed metrics. Enhancing the *shipment* table with tracking information and status updates will also improve operational transparency and customer satisfaction.

Analytical Tools Recommendations:
To complement database improvements, ACME should consider adopting advanced analytical tools to replace Excel for statistical and visualization purposes. Python, with libraries such as *Pandas*, *Matplotlib*, *Seaborn*, *SciPy*, and *Scikit-learn*, provides a powerful platform for statistical manipulation, data modeling, and predictive analysis. These tools allow for a more nuanced understanding of dynamic factors such as consumer behavior and supply chain patterns. Python's versatility and scalability make it an ideal choice for developing advanced analytical models that deliver actionable insights.

For visualization, *Tableau* and *Power BI* are recommended as they offer dynamic, interactive dashboards that are far superior to static spreadsheets. These tools allow seamless integration with databases and enable advanced functionalities such as building relationships between multiple tables, writing complex queries, and creating intuitive visualizations. A *Tableau* dashboard, for example, could display

top-performing products, sales forecasts, customer segments, and warehouse performance in a visually engaging format. Such visualizations are more likely to engage decision-makers and facilitate data-driven strategies.

By integrating these database improvements and adopting advanced analytical tools, ACME can gain deeper insights into its operations, enhance decision-making capabilities, and better position itself for long-term growth in a competitive market.

Sources

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Data Analysis Report Writing: *https://jgscott.github.io/teaching/writeups/write_ups/*

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Excel Forecast: *https://corporatefinanceinstitute.com/resources/excel/forecast-function/*

General/Open Category: (ChatGPT conversation removed)

Title Page Background: *https://www.freepik.com/free-photos-vectors/report-background*

Analysis Feature List

Analysis Features	Category	Max Points	Points	Comments
Documentation (15 total points)				
Executive Summary (up to 1 page)	Core	2		
Feature List	Core	2		
List of Web and AI sources used	Core	3		
Summary Report (up to 15 pages)	Core	8		
Analysis: Customers by Region (10 total points)				
Overview of approach with assumptions	Done	3		
Predicted sales for 2023+2024 for each province and at least two charts or visualizations	Done	4		
Recommendation/summary paragraph for management	Done	3		
Analysis: Best and Worst Products (10 points)				
Overview of approach with assumptions	Done	3		
Predicted sales for 2023+2024 for top 5 and bottom 5 products with at least two charts or visualizations	Done	4		
Recommendation/summary paragraph for management	Done	3		
Analysis: Payment Methods (up to 5 total points)				
Overview of approach with assumptions	Done	1		
Visualization of payment methods used in 2022	Done	2		
Visualization/prediction of payment methods for 2024	Done	2		
Analysis: Inventory Management (up to 10 total points)				
Overview of approach with assumptions	Done	3		
Perform analysis with at least two charts or visualizations	Done	4		
Recommendation paragraph to management	Done	3		
Analysis: Your Choice (up to 10 total points)				
Overview of approach with assumptions	Done	3		
Perform analysis with at least two charts or visualizations	Done	4		
Recommendation paragraph to management	Done	3		
Analysis: Your Choice (up to 10 total points)				
Overview of approach with assumptions	Done	3		
Perform analysis with at least two charts or visualizations	Done	4		
Recommendation paragraph to management	Done	3		

General and Open Category (up to 20 total points)				
Suggest database improvements	Done	3		
Other (your suggestions including using tools besides Excel)	Done	Up to 20		
Total: (out of 50 with max of 10 bonus. i.e. 60 is max.)				