**📊COMPREHENSIVE SALES ANALYSIS FOR RETAIL OPTIMIZATION🛒**

***An In-Depth Study on Sales Trends and Business Growth Strategies***

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**1. Purpose, Background & Objectives**

**📌 Purpose of the Project**

The primary goal of this project is to analyze sales data from a retail superstore to uncover key insights that can drive business growth. By evaluating various aspects of sales performanceincluding product categories, regional sales trends, profit margins, and customer preferencesthis analysis aims to provide data-driven recommendations for improving sales strategies,optimizing inventory, and maximizing profitability.

**📖 Background Information**

The retail industry is highly dynamic and competitive, with customer preferences shifting based on product demand, pricing, and seasonal trends. Businesses must continuously analyze their sales data to stay ahead of market fluctuations and optimize their operations. By leveraging data analytics, companies can:

✅ Improve **inventory management** to avoid overstocking or stockouts.  
✅ Optimize **pricing strategies** to increase sales and profitability.  
✅ Enhance **marketing efforts** by targeting the right customer segments.  
✅ Strengthen **customer engagement** through data-driven recommendations.

**🎯Objectives**

✔**Analyze** historical sales data to identify trends and patterns.  
✔**Evaluate** total sales, profit margins, and revenue distribution across different product categories.  
✔**Assess** sales performance by region to determine high-revenue locations.  
✔**Identify** seasonal trends and sales fluctuations to improve demand forecasting.  
✔**Provide** actionable recommendations for business expansion, marketing strategies, and inventory management.

**2. Data Collection and Source**

**📊 2.1 Data Sources**

The dataset for this project is sourced from a retail superstore's sales records. It contains detailed transactional data, including product categories, customer demographics, regional sales, shipping details, and profit margins. This dataset enables a comprehensive analysis of sales performance, customer preferences, and revenue patterns to improve business decision-making.

**📑 2.2 Dataset Details (Tables, Columns, and Descriptions)**

The analysis is based on two primary datasets:

**📝 2.2.1 Superstore Orders Data Table**

This table contains detailed sales transactions, including order information, product details, customer demographics, and shipping status.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Description |
| Order\_ID | Text | Unique identifier for each order |
| Order\_Date | Date | Date when the order was placed |
| Customer\_ID | Text | Unique identifier for each customer |
| Customer\_Name | Text | Full name of the customer |
| City | Text | City where the order was placed |
| State | Text | State of the shipping address |
| Country | Text | Country where the order was shipped |
| Category | Text | Product category (e.g., Furniture, Office Supplies) |
| Sub\_Category | Text | Sub-category of the product |
| Product\_ID | Text | Unique identifier for each product |
| Product\_Name | Text | Name of the product |
| Sales | Numeric | Total sales revenue from the order |
| Profit | Numeric | Profit generated from the order |
| Quantity | Integer | Number of units sold |
| Discount | Numeric | Discount applied to the order |
| Ship\_Status | Text | Indicates whether the order was shipped on time or late |

**📈2.2.2 Sales Target Data Table**

This table contains sales targets for different product categories, helping to compare actual sales performance against predefined goals.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Description |
| Order\_Date | Date | Date of the sales target |
| Category | Text | Product category (e.g., Furniture, Office Supplies) |
| Segment | Text | Customer segment (e.g., Consumer, Corporate) |
| Sales\_Target | Numeric | Target sales value for the given date |

**📌 Data Relevance**

These datasets provide a structured foundation for analyzing key sales trends, customer behavior, and profitability. By using SQL queries on this structured data, the project aims to extract meaningful insights that can drive business improvements

**3. Methodology**

This project follows a structured approach using **MS Excel** for data cleaning, **MySQL** for query-based analysis, and **MS Word** for report preparation.

**🛠️3.1 Data Cleaning in MS Excel**

To ensure data accuracy and consistency, the raw dataset was preprocessed using **Microsoft Excel** with the following key steps:

✅**Removing Duplicates** – Identified and eliminated duplicate entries to prevent data redundancy.  
✅**Handling Missing Values** – Filled or removed missing values in crucial fields to maintain data integrity.  
✅**Standardizing Data Formats** – Ensured proper formatting of dates, numerical values, and text fields.  
✅**Checking for Outliers** – Identified and corrected extreme values in sales, profit, and discount fields.

**💻3.2 Data Analysis Using MySQL**

After cleaning, **MySQL** was used for querying and analyzing sales data. Key SQL queries included:

📌**Total Sales & Profit Analysis** – Calculated revenue and profit for different product categories and regions.  
📌**Top-Selling Products** – Identified the most profitable and highest-selling products.  
📌**Customer Purchase Trends** – Analyzed buying patterns based on customer demographics and locations.  
📌**Seasonal Sales Trends** – Examined monthly and quarterly sales performance.  
📌**Shipping & Order Insights** – Assessed the impact of shipping methods on sales and customer satisfaction.

**📝3.3 Report Preparation in MS Word**

The final report was compiled in **Microsoft Word** following a structured format:

✔**Introduction** – Outlined the project objectives and background.  
✔**Data Collection & Methodology** – Explained dataset sources, cleaning techniques, and SQL queries.  
✔**Findings & Recommendations** – Presented insights with data interpretations and business suggestions.  
✔**Conclusion** – Summarized key takeaways and future improvement strategies.

**4. Interpretation & Recommendations**

1. What are the total sales, percentage of overall sales, total profit, and profit margin percentage for each product category ranked by sales?

**Interpretation:**

This query ranks product categories by total sales while calculating their contribution to overall sales, total profit, and profit margin.

* **Technology (36.47% sales, 17.37% profit margin) and Office Supplies (31.33% sales, 17.00% margin) are highly profitable.**
* **Furniture (32.2% sales) has a very low profit margin (2.34%), indicating high costs or pricing issues.**

**Recommendations:**

✅**Prioritize High-Profit Categories** – Increase marketing, promotions, and stock availability for **Technology & Office Supplies**.  
⚠️**Improve Furniture Profitability** – Reduce supplier costs, optimize pricing, or discontinue low-margin products.  
📊**Analyze Discounts & Costs** – Check if excessive discounts or high logistics costs are lowering profitability.  
📈**Optimize Product Mix** – Identify top-performing sub-categories and focus on high-margin products.  
💡**Upsell & Cross-Sell** – Bundle high-margin products with low-margin items to boost profitability.

2. What are the total sales, percentage of overall sales, total profit, and profit margin percentage for each product Region ranked by sales?

**Interpretation:**

This query analyzes total sales, sales percentage, total profit, and profit margin for each region, ranked by sales.

* **West leads in sales (31.7%) and has the highest profit (108,386) with a strong margin (14.94%).**
* **East follows (29.27% sales) with a good profit margin (13.33%).**
* **Central has moderate sales (21.9%) but a lower profit margin (7.92%).**
* **South has the lowest sales (17.12%) but a decent profit margin (11.93%).**

**Recommendations:**

✅**Focus on West & East Regions** – Continue investing in these high-sales and high-profit areas.  
📉**Improve Central’s Profitability** – Review pricing, costs, and product demand to enhance margins.  
📊**Boost South Sales** – Implement targeted promotions or expand product offerings to increase revenue.  
💡**Regional Strategy Optimization** – Analyze customer preferences and adjust inventory accordingly.  
📈**Reduce Inefficiencies** – Assess logistics, discounts, and costs to maximize overall profitability.

3. What are the total sales, percentage of overall sales, total profit, and profit margin percentage for each product Segment ranked by sales?

**Interpretation:**

This query ranks customer segments by total sales, percentage of overall sales, total profit, and profit margin.

* **Consumers contribute the most sales (50.7%) but have a moderate profit margin (11.53%).**
* **Corporate accounts for 30.58% of sales with a slightly higher profit margin (12.92%).**
* **Home Office has the lowest sales (18.72%) but the highest profit margin (13.99%).**

**Recommendations:**

✅**Maintain Focus on Consumers** – As the largest revenue driver, enhance engagement with promotions & loyalty programs.  
📈**Expand Corporate Sales** – Strengthen B2B strategies, bulk discounts, and enterprise partnerships to boost growth.  
💡**Leverage Home Office Potential** – Increase marketing efforts, as this segment yields the highest profit margin.  
📊**Optimize Pricing & Costs** – Identify opportunities to increase Consumer segment margins without impacting sales.  
🚀**Personalized Marketing** – Tailor promotions based on segment preferences to maximize revenue and profitability.

4. What are the total sales, percentage of overall sales, total profit, and profit margin percentage for each product State ranked by sales?

**Interpretation:**

This query ranks U.S. states by total sales, percentage of overall sales, total profit, and profit margin.

* **California (20% sales) and New York (13.59%) dominate sales, with strong profit margins (16.68% & 23.81%).**
* **Texas, Pennsylvania, Ohio, and Illinois suffer heavy losses, with negative profit margins (-15.11% to -21.68%).**
* **Michigan, Indiana, Georgia, and Delaware have the highest profit margins (30%+), despite lower sales.**

**Recommendations:**

✅**Focus on High-Profit States** – Expand operations in **New York, Michigan, Indiana, and Delaware**, which have high profit margins.  
📉**Address Loss-Making States** – Investigate **Texas, Pennsylvania, Ohio, and Illinois** to reduce losses (e.g., optimize pricing, reduce costs).  
📊**Boost Sales in High-Margin States** – Increase marketing in **Virginia, Wisconsin, Rhode Island, and Missouri** to leverage strong margins.  
💡**Analyze Cost Structure** – Identify reasons for negative margins (high discounts, logistics, supplier costs) in loss-making states.  
🚀**Target Underserved Markets** – Small but profitable states like **Montana, Maine, and Arkansas** may present growth opportunities.

5. What are the total sales, percentage of overall sales, total profit, and profit margin percentage for each product Sub-category ranked by sales?

**Interpretation:**

This query ranks sub-categories by total sales, percentage of overall sales, total profit, and profit margin.

* **Phones (14.37% sales) and Chairs (14.32%) generate the highest revenue, but Chairs have a lower profit margin (8.06%).**
* **Copiers (37.2% margin), Paper (43.39%), and Labels (44.44%) are the most profitable sub-categories.**
* **Tables (-8.57% margin) and Bookcases (-4.07%) are the biggest loss-making sub-categories.**
* **Machines (8.27% sales) have very low profitability (1.79%), indicating potential inefficiencies.**

**Recommendations:**

✅**Prioritize High-Profit Sub-Categories** – Focus on **Copiers, Labels, Paper, and Accessories**, which have the highest margins.  
📉**Address Loss-Making Sub-Categories** – Review pricing and cost structures for **Tables, Bookcases, and Supplies** to reduce losses.  
📊**Optimize Machines Strategy** – Machines have high sales but a **very low profit margin (1.79%)**; reconsider pricing or reduce discounts.  
🚀**Boost Sales for High-Margin Items** – Increase promotions and stock availability for **Labels, Envelopes, and Fasteners** to maximize profits.  
💡**Reassess Furniture Strategy** – Despite high sales, **Furniture has multiple underperforming sub-categories**; focus on profitable items like Furnishings (14.25%).

6. What is the average sales amount Per Customer for each product category?  
**Interpretation:**

This query calculates the average sales per customer for each product category.

* **Technology has the highest average sales per customer ($1,214.88), indicating strong customer spending in this category.**
* **Furniture follows with $1,043.75 per customer, showing a high-ticket value but lower profitability in some sub-categories.**
* **Office Supplies has the lowest average sales per customer ($909.79), likely due to lower-priced items and frequent small purchases.**

**Recommendations:**

✅**Leverage Technology’s High Spending** – Promote premium products, upsell, and bundle accessories to increase revenue.  
📉**Boost Furniture Customer Spend** – Offer package deals, financing options, or discounts on bulk purchases.  
🚀**Increase Office Supplies Sales per Customer** – Encourage bulk purchases, subscription models, or loyalty discounts.  
📊**Customer Segmentation Analysis** – Identify high-value customers and tailor promotions based on their spending patterns.  
💡**Cross-Selling Strategy** – Pair high-spending categories (Technology & Furniture) with complementary Office Supplies to increase overall order value.

7. What is the average sales amount per customer for each product sub-category?  
**Interpretation:**

This query calculates the average sales amount per customer for each sub-category.

* **Copiers ($2,336.41) and Machines ($1,911.55) have the highest average sales per customer, indicating high-ticket items.**
* **Chairs ($805.26) and Tables ($792.98) also generate significant spending per customer.**
* **Fasteners ($15.83), Labels ($44.51), and Art Supplies ($54.92) have the lowest average spend, likely due to lower unit prices and smaller purchase volumes.**

**Recommendations:**

✅**Capitalize on High-Value Sub-Categories** – Focus on premium products, extended warranties, and service bundles for **Copiers & Machines**.  
📉**Increase Spending on Low-Value Sub-Categories** – Offer bulk purchase discounts, combo deals, and subscription models for **Art, Labels, and Fasteners**.  
🚀**Optimize Pricing for Mid-Tier Products** – Categories like **Chairs, Tables, and Phones** show strong customer spending; consider upselling complementary products.  
📊**Targeted Marketing for High-Spending Customers** – Personalize promotions for frequent buyers of **high-value items (Copiers, Machines, and Furniture)**.  
💡**Cross-Selling Opportunities** – Encourage customers to bundle high-ticket items with accessories (e.g., **Phones + Accessories, Copiers + Paper/Ink**).

8. What is the average sales amount per customer for each product Region?

**Interpretation:**

This query calculates the average sales amount per customer for each region.

* **Customers in the West region have the highest average sales per customer ($1,057.60), followed by the East ($993.92).**
* **The Central ($796.91) and South ($765.14) regions have lower average sales per customer, indicating potential growth opportunities.**

**Recommendations:**

✅**Focus on High-Spending Regions** – Strengthen marketing efforts and premium product offerings in the **West and East regions** to maintain and grow revenue.  
📉**Boost Customer Spending in Central & South** – Introduce targeted discounts, loyalty programs, or bundle deals to **increase order value per customer**.  
🚀**Analyze Regional Preferences** – Study product performance by region to tailor promotions and optimize inventory.  
💡**Customer Segmentation** – Identify high-value customers in the **Central & South regions** and offer personalized deals to boost spending.

9. What is the average sales amount per customer for each product Segment?

**Interpretation:**

This query calculates the average sales amount per customer for each segment.

* **Corporate customers have the highest average sales per customer ($2,965.68), followed closely by Home Office ($2,894.45).**
* **Consumers have the lowest average spend per customer ($2,836.54), but the difference among segments is minimal.**

**Recommendations:**

✅**Leverage Corporate Spending Power** – Offer volume discounts, corporate accounts, and B2B loyalty programs to encourage repeat business.  
📉**Increase Consumer Sales** – Implement personalized promotions, bundling, and targeted email campaigns to boost spending.  
🚀**Enhance Home Office Offerings** – Promote productivity bundles (e.g., **furniture + office supplies + technology**) to increase order value.  
📊**Identify High-Value Customers** – Use segmentation analysis to target **frequent high-spenders** with exclusive deals.  
💡**Subscription & Membership Models** – Introduce loyalty rewards or business subscription plans for **Corporate & Home Office customers** to drive repeat sales.

10. What is the average sales amount per customer for each product State?

**Interpretation:**

This query calculates the average sales amount per customer for each state.

* **Wyoming has the highest average sales per customer ($1,603), indicating fewer but higher-value purchases.**
* **Rhode Island ($905.16) and California ($793.29) also show strong customer spending.**
* **States like Kansas ($208.29) and New Mexico ($217.23) have the lowest average sales per customer, suggesting a need for targeted strategies.**

**Recommendations:**

✅**Leverage High-Spending States** – Strengthen marketing, loyalty programs, and exclusive deals in **Wyoming, Rhode Island, and California** to sustain high-value transactions.  
📉**Increase Customer Spending in Low-Performing States** – Implement localized discounts, product bundling, and regional promotions in **Kansas, New Mexico, and South Dakota** to boost average order value.  
🚀**Identify State-Wise Buying Patterns** – Analyze product preferences in top-performing states and replicate successful sales strategies in low-performing ones.  
📊**Targeted Regional Campaigns** – Use personalized marketing in states with **moderate sales (Texas, Florida, Pennsylvania)** to increase customer engagement.  
💡**Expand Premium Product Offerings** – In states with high average sales per customer, promote **high-margin products like Copiers, Machines, and Office Furniture**.

11. Identify the top 10 products with the highest sales with profit category and sub-category wise.

**Interpretation:**

This query identifies the **top 10 best-selling products** along with their **category, sub-category, total sales, and total profit**.

* **Copiers and Machines dominate Technology**, indicating a high demand for office automation products.
* **Binding Systems in Office Supplies** are strong performers but have **mixed profitability** (some showing losses).
* **A few high-sales products, like Cisco TelePresence and GBC DocuBind P400, are unprofitable**, suggesting high costs or pricing issues.

**Recommendations:**

✅**Leverage High-Selling, High-Profit Products** – Increase promotion for **Canon imageCLASS 2200 Copier ($61,600 sales, $25,200 profit)** and **HP Designjet T520 Printer ($18,375 sales, $4,095 profit)**.  
📉**Review Loss-Making Products** – Products like **Cisco TelePresence (-$1,811)** and **GBC DocuBind P400 (-$1,879)** need cost optimization or pricing adjustments.  
🚀**Capitalize on Office Supplies Demand** – Binding systems have strong sales, but some have **low profit margins**. Consider supplier negotiation or premium pricing.  
💡**Upsell & Cross-Sell Strategies** – Bundle high-profit products (Copiers, HP Printers) with complementary items (Binders, Paper) to increase revenue.  
📊**Analyze Pricing & Costs** – Some high-sales products are unprofitable. A deeper cost analysis can help optimize pricing strategies.

12. Identify the top 10 products with the highest sales with profit state,city,category,subcategory wise.

**Interpretation:**

This query identifies the **top 10 best-selling products by state, city, category, and sub-category**, along with their **total sales and profit**.

* **Technology dominates the highest sales** category, particularly **Copiers and Machines**.
* **Canon imageCLASS 2200 Advanced Copier appears multiple times across different states** (Indiana, Washington, New York, and Delaware), indicating its strong nationwide demand.
* **Cisco TelePresence System EX90 in Florida has high sales ($22,638) but negative profit (-$1,811)**, suggesting cost inefficiencies.
* **Office Supplies (Binding Systems, Electric Letter Opener) also perform well**, showing a steady demand.

**Recommendations:**

✅**Scale High-Demand, High-Profit Products** – The **Canon imageCLASS 2200 Advanced Copier** is selling well across multiple locations with **positive profits**. Consider boosting marketing efforts and expanding availability.  
📉**Investigate High-Sales, Low-Profit Items** – **Cisco TelePresence in Florida (-$1,811 loss)** suggests a pricing or cost issue. Review **cost structure, competitor pricing, or potential discounts**.  
📊**Target Profitable Cities** – Products like **HP Designjet T520 Printer in Arlington ($8,750 sales, $2,800 profit)** and **Ibico EPK-21 Binding System in Minneapolis ($9,450 sales, $4,630 profit)** indicate strong local demand. Consider **regional promotions**.  
💡**Bundle Profitable Office Supplies** – Binding systems and letter openers show strong profits. Cross-sell with related items like **paper, binders, or office furniture**.  
🚀**Optimize Pricing for Machines** – Several **Technology products (Printers, Machines) have moderate profits**. Consider **premium pricing or supplier negotiations** to increase margins.

13. Identify the top 10 products with the highest Profit with sales category and sub-category wise.

**📊 Interpretation:**

* The **Technology - Copiers** category is the most profitable, with the **Canon imageCLASS 2200 Advanced Copier** generating **$25,200 in profit from $61,600 in sales**. 🖨️
* High-margin office supplies like **binding machines** and **premium accessories** contribute significantly to profits. 📎
* The **Machines and Accessories** sub-categories in Technology also show strong profitability, while some office supplies have moderate sales but lower profit margins. 💼
* Certain **low-profit items** like basic office supplies and low-end electronics underperform in profitability despite decent sales. ⚠️
* The **sales distribution varies by region**, meaning strategic marketing in high-performing areas can further enhance profitability. 📍

**✅ Recommendations:**  
1️⃣**Increase Promotions for High-Profit Copiers & Machines** – Offer financing options and bulk discounts to attract more business customers. 💰  
2️⃣**Expand High-Margin Office Supplies** – Bundle **binding machines & accessories** to maximize sales and profitability. 📦  
3️⃣**Focus on High-Performing Product Categories** – Boost inventory and marketing efforts for **top-selling profitable products** like **copiers, printers, and binding machines**. 🚀  
4️⃣**Reduce or Reprice Low-Profit Items** – Identify low-margin products and consider **phasing them out or adjusting pricing** for better profitability. 📉  
5️⃣**Leverage Regional Insights** – Focus on **high-performing states and cities** to optimize sales strategies and product availability. 📍  
6️⃣**Upsell and Cross-Sell** – Encourage customers to purchase **accessories and maintenance packages** alongside high-value products. 🔄  
7️⃣**Enhance Customer Loyalty Programs** – Offer **exclusive deals and rewards** for repeat customers purchasing high-margin items. 🎯

14. Identify the top 10 products with the highest profit with sales state,city,category,subcategory wise.  
**📊 Interpretation:**

* The **Canon imageCLASS 2200 Advanced Copier** dominates the top profits across multiple states, proving its high profitability and demand. 🖨️
* **Technology - Copiers & Machines** and **Office Supplies - Binders** contribute significantly to total profit. 📎
* **New York, Indiana, Washington, and Delaware** are key states generating high profits from copier sales, while **Detroit and Minneapolis** perform well for binding systems. 📍
* **Profitable products are concentrated in high-business activity cities** like **New York City, Atlanta, and Seattle**, indicating strong B2B demand. 🏙️
* **Consistently high-profit margins** in office supplies and machines suggest bundling opportunities for higher revenue generation. 💰

**✅ Recommendations:**  
1️⃣**Expand Sales of High-Profit Copiers & Binders** – Focus marketing efforts in **New York, Washington, and Indiana** where demand is high. 📢  
2️⃣**Bundle Copiers with Accessories & Services** – Offer extended warranties, maintenance plans, and toner subscriptions to maximize profits. 🔄  
3️⃣**Strengthen B2B Marketing** – Target corporate clients and offices in high-performing cities with bulk order discounts. 🏢  
4️⃣**Optimize Inventory for High-Demand Regions** – Ensure stock availability in **Seattle, New York, and Detroit** to prevent missed sales opportunities. 📦  
5️⃣**Introduce Regional Promotions** – Offer location-based discounts or incentives in top-performing states to sustain demand. 🎯  
6️⃣**Upsell Binding & Printing Solutions** – Promote complementary office supplies when selling **binding systems or printers** to boost revenue. 🏆  
7️⃣**Improve Product Visibility in Profitable Categories** – Highlight **best-selling copiers, printers, and binding machines** in online and offline marketing campaigns. 🚀

15. What is the trend of total sales and profit over time?

Weekly total sales and profit

Monthly total sales and profit

Quarterly total sales and profit

Yearly total sales and profit

**📊 Interpretation:**

* **Total sales and profit have shown an upward trend**📈 from **2017 to 2020**, indicating consistent business growth.
* **Quarterly and monthly trends** suggest that **Q4** (October-December) consistently generates the highest sales and profit. 🎯
* **Seasonal fluctuations** exist, with notable **spikes in sales and profit in Q4 each year**, possibly due to holiday and year-end purchases. 🛍️
* Despite steady sales growth, **some weeks and months recorded losses**, suggesting potential inefficiencies or discount-driven sales. ⚠️
* **2020 saw the highest total sales and profit**, reflecting improved business strategies, higher demand, or increased pricing. 💰

**✅ Recommendations:**  
1️⃣**Capitalize on Q4 Growth** – Launch targeted promotions, stock up on inventory, and optimize supply chains before peak demand. 🎄  
2️⃣**Investigate Profit Dips** – Analyze weeks with negative profits and adjust pricing, promotions, or cost structures to minimize losses. 🧐  
3️⃣**Boost Slow Months with Discounts** – Offer limited-time promotions during Q1 and Q2 to drive engagement and maintain steady revenue. 🔥  
4️⃣**Optimize Inventory for High-Sales Periods** – Ensure stock availability during peak months to prevent missed opportunities. 📦  
5️⃣**Strengthen Marketing for Growth Trends** – Focus digital marketing efforts leading up to high-revenue months to maximize profits. 📢  
6️⃣**Analyze Regional Performance** – Identify states or cities contributing most to Q4 spikes and double down on advertising in those areas. 🌎  
7️⃣**Improve Operational Efficiency** – Streamline supply chain and logistics to reduce costs and improve overall profit margins. ⚙️

16. How does the forecasted sales compare to actual sales?

**📊 Interpretation:**

* The **forecasted sales (3,427,010)** are significantly higher than the **actual sales (2,288,425)**, resulting in a **forecasting error of 1,138,585**. 📉
* This suggests an **overestimation of demand** or potential **market fluctuations, pricing issues, or external factors** affecting actual sales. ⚠️
* A large gap between forecasted and actual sales may indicate **inefficiencies in prediction models, inaccurate assumptions, or unexpected changes in customer behavior**. 🔍

**✅ Recommendations:**  
1️⃣**Improve Forecasting Accuracy** – Refine forecasting models using historical trends, market conditions, and real-time data. 📊  
2️⃣**Analyze Causes of Overestimation** – Identify products, regions, or periods contributing most to the forecasting error and adjust accordingly. 🔎  
3️⃣**Enhance Demand Planning** – Use AI-driven predictive analytics and customer insights to make more precise sales forecasts. 🤖  
4️⃣**Align Inventory & Marketing Strategies** – Reduce excess inventory risks by adjusting supply chain and promotional efforts based on demand patterns. 📦  
5️⃣**Monitor and Adjust in Real-Time** – Implement a dynamic forecasting approach to continuously adjust predictions based on actual sales trends. 📉➡️📈

17. Which customers generate the highest revenue(sales) with profit for the company?

**📊 Interpretation:**

* **Sean Miller** generates the highest **revenue ($25,042)** but incurs a **loss (-$1,981)**, indicating potential issues with pricing, discounts, or product returns. ⚠️
* **Tamara Chand** is the most profitable customer, contributing **$8,983 in profit** from **$19,050 in revenue**. 🏆
* Other top customers, such as **Raymond Buch and Adrian Barton**, contribute both high revenue and substantial profit, making them valuable to the company. 💰
* Some high-revenue customers have relatively lower profit margins, suggesting the need for **profitability analysis** rather than just focusing on sales volume. 🔍

**✅ Recommendations:**  
1️⃣**Improve Pricing & Discount Strategies** – Analyze customers generating high revenue but low or negative profit to optimize pricing and reduce discounting. 💵  
2️⃣**Loyalty & Retention for Profitable Customers** – Strengthen relationships with high-profit customers (e.g., Tamara Chand, Raymond Buch) through exclusive deals and personalized offers. 🎯  
3️⃣**Reduce Costs for Unprofitable Customers** – Review transaction costs, product return rates, and customer-specific discounts to ensure all high-revenue customers contribute positively to the bottom line. 🔄  
4️⃣**Upsell & Cross-Sell to Profitable Customers** – Encourage profitable customers to purchase complementary products or premium services to further increase their value. 📈  
5️⃣**Segment & Target Customers Efficiently** – Use customer segmentation to focus marketing and sales efforts on customers who bring both high revenue and strong profitability. 🎯

18. Which customers generate the highest Profit with revenue(sales) for the company?

**📊 Interpretation:**

* **Tamara Chand** is the most profitable customer, generating **$8,983 in profit** from **$19,050 in revenue**, indicating strong profitability. 🏆
* Other top customers, such as **Raymond Buch, Sanjit Chand, and Hunter Lopez**, contribute significant **profitability and revenue**, making them key assets to the company. 💰
* Some customers, like **Christopher Martinez and Keith Dawkins**, generate moderate revenue but yield high profit, highlighting efficient sales. 📈
* A strong focus should be placed on retaining and growing relationships with these high-profit customers to maximize long-term value. 🔍

**✅ Recommendations:**  
1️⃣**Strengthen Relationships with High-Profit Customers** – Provide personalized offers, loyalty rewards, and exclusive deals to retain and grow these profitable customers. 🎯  
2️⃣**Expand High-Profit Customer Base** – Identify common traits of these top customers (e.g., purchase behavior, product preferences) and target similar customers with marketing efforts. 🚀  
3️⃣**Upsell & Cross-Sell Opportunities** – Offer complementary or premium products to these customers to further increase revenue and profit margins. 🛍️  
4️⃣**Ensure Consistent Customer Experience** – Maintain high service quality and support for these customers to enhance loyalty and repeat purchases. 🤝  
5️⃣**Monitor Pricing & Cost Efficiency** – Evaluate if certain products or services contribute to higher profitability and focus on selling more of these to both existing and new customers. 💵

19. How many unique customers does the company serve?

**Interpretation:**

The company serves a total of **793 unique customers**, indicating a broad customer base. This diversity helps in maintaining a steady revenue stream and reducing dependency on a few key customers.

**Recommendations:**

* **Customer Retention Strategies:** Implement loyalty programs or personalized offers to retain high-value customers and encourage repeat purchases.
* **Customer Expansion:** Analyze purchasing patterns to identify potential markets and target new customer segments with tailored marketing campaigns.

20. How many repeat customers does the company have?

**Interpretation:**

Out of **793 unique customers**, **788 are repeat customers**, meaning that nearly all customers make multiple purchases. This suggests strong customer loyalty and satisfaction.

**Recommendations:**

* **Enhance Customer Loyalty Programs:** Offer exclusive deals, discounts, or rewards to further incentivize repeat purchases.
* **Customer Engagement:** Implement personalized follow-ups, targeted email campaigns, and product recommendations to maintain high retention rates.

21. Identify customers who placed orders only once.

**Interpretation:**

Out of **793 unique customers**, only **5 customers placed a single order**. This indicates that the majority of customers return for repeat purchases, demonstrating strong customer retention.

**Recommendations:**

* **Target First-Time Buyers:** Offer exclusive discounts or promotions to encourage repeat purchases from first-time customers.
* **Analyze Reasons for One-Time Purchases:** Conduct surveys or analyze feedback to understand why these customers did not return and address potential concerns.

22. What is the average order size (sales) per customer with Profit but Highest Sales? Top 10 Customers

**Interpretation**

* **Mitch Willingham** places the **highest-value orders**, averaging **$1,751 per order** with a **good profit of $555**.
* **Tamara Chand** is a **high-value and highly profitable** customer, making **$1,587 per order** with **$748 profit per order**.
* **Sean Miller and Grant Thornton** place expensive orders but cause **losses** (-$132 and -$684 per order).
* **Tom Ashbrook, Hunter Lopez, and others** also place **large orders with good profit margins**.
* **Recommendations:**

✅**Increase profitability from high-value customers:** Review pricing and discount strategies for customers with negative profits.  
✅**Encourage repeat orders:** Create loyalty incentives for **profitable high-order-value customers** like *Tamara Chand & Hunter Lopez.*  
✅**Analyze loss-making orders:** Investigate why *Sean Miller & Grant Thornton* have negative profits and adjust product mix or pricing.

23. What is the average order size (sales) per customer with Profit but Highest Profit? Top 10 Customers

**Interpretation:**

* **Tamara Chand** has the highest **average profit per order (₹748.58)** with an **average order size of ₹1,587.50**, making her the most profitable customer.
* **Mitch Willingham** places the **largest average order size (₹1,751.33)** but has a **lower average profit per order (₹555)** compared to Tamara Chand.
* **Hunter Lopez (₹1,170.45 sales, ₹511.18 profit)** and **Tom Ashbrook (₹1,459.60 sales, ₹470.40 profit)** are also among the top contributors in terms of profitability.
* **Christopher Martinez (₹895.30 sales, ₹390 profit)** and **Raymond Buch (₹839.83 sales, ₹387.56 profit)** maintain a **good balance between order size and profit**.
* **Andy Reiter (₹734.33 sales, ₹320.56 profit)** and **Bill Shonely (₹1,166.89 sales, ₹290.67 profit)** show consistent profitability with moderate order sizes.
* **Adrian Barton (₹723.80 sales, ₹272.25 profit)** and **Sanjit Chand (₹642.95 sales, ₹261.64 profit)** are still valuable, contributing to overall profits.

**Recommendations:**

✅**Prioritize high-profit customers like Tamara Chand and Mitch Willingham** by offering personalized promotions, loyalty benefits, and priority service.  
✅**Encourage repeat purchases** from top customers through special discounts, exclusive deals, or early access to new products.  
✅**Monitor the profit margins of customers with high sales but lower profit (e.g., Mitch Willingham)** to ensure sustainable profitability.  
✅**Analyze the buying patterns** of customers like Hunter Lopez, Tom Ashbrook, and Raymond Buch to attract similar high-value customers.  
✅**Optimize pricing strategies** for moderate contributors like Andy Reiter and Bill Shonely to increase their profitability.

24. What is the average profit per customer across all segments?

**Interpretation:**

* **Home Office segment** has the **highest average profit per customer (₹404.95)**, indicating that customers in this segment are more profitable on average.
* **Corporate segment** follows closely with **₹383.18 average profit per customer**, showing strong profitability from business-related purchases.
* **Consumer segment** has the **lowest average profit per customer (₹326.99)**, suggesting that individual consumers contribute less profit per order compared to businesses and home office buyers.

**Recommendations:**

✅**Focus on the Home Office and Corporate segments** by offering tailored promotions and exclusive deals to retain high-value customers.  
✅**Encourage bulk purchases** from the Consumer segment to increase their average profit contribution.  
✅**Analyze pricing and discounts for the Consumer segment** to improve profitability without losing sales volume.  
✅**Offer loyalty programs** for all segments to enhance customer retention and boost repeat purchases.

25. What is the average profit per customer across all Region?

**Interpretation:**

* **West region** has the **highest average profit per customer (₹158)**, indicating strong profitability from customers in this region.
* **East region** follows with **₹132.45**, showing a good contribution to overall profit.
* **South region** has a lower average profit per customer at **₹91.25**, which may indicate opportunities for improvement.
* **Central region** has the **lowest average profit per customer (₹63.15)**, suggesting possible challenges such as lower spending, higher costs, or competitive pressures.

**Recommendations:**

✅**Prioritize marketing efforts in high-performing regions** (West & East) to maintain and increase their profitability.  
✅**Analyze customer behavior in the South and Central regions** to identify potential reasons for lower profits.  
✅**Implement region-specific promotions** to encourage higher spending in the South and Central regions.  
✅**Optimize supply chain and cost structures** in low-performing regions to enhance profitability.

26. What is the average profit per customer across all State?

**Interpretation:**

* **Rhode Island has the highest average profit per customer (₹291.44)**, indicating strong profitability and high-value customers.
* **District of Columbia (₹264.75), Indiana (₹262.6), and Minnesota (₹257.81)** also show high average profits, suggesting strong sales and customer engagement.
* **Several states, including Florida (-₹18.85), Oregon (-₹23.27), and Arizona (-₹34.32), have negative average profit per customer,** indicating losses.
* **Ohio (-₹83.97) and Colorado (-₹87.03) are the least profitable states,** suggesting significant challenges in these regions.

**Recommendations:**

✅**Leverage high-performing states** (e.g., Rhode Island, Indiana, and Minnesota) by expanding marketing and sales efforts to maintain profitability.  
✅**Analyze low-performing states** (e.g., Ohio, Colorado, Texas) to identify issues such as high costs, low demand, or pricing inefficiencies.  
✅**Review pricing and discount strategies** in negative-profit states to improve margins and reduce losses.  
✅**Improve operational efficiency and supply chain management** in states with declining profits to reduce overhead costs.  
✅**Develop targeted promotions and customer engagement strategies** in loss-making states to boost sales and profitability.

27. What is the average profit per customer across all Category?

**Interpretation:**

* **Technology has the highest average profit per customer (₹211.03)**, indicating strong profitability in this category.
* **Office Supplies follows with an average profit per customer of ₹154.65**, showing stable and consistent profit generation.
* **Furniture has the lowest average profit per customer (₹24.44),** which may indicate higher costs, lower sales volume, or frequent discounts.

**Recommendations:**

✅**Focus on expanding Technology sales** by increasing promotions, bundling products, and offering premium services to maintain profitability.  
✅**Sustain and optimize Office Supplies sales** by ensuring competitive pricing and targeted marketing.  
✅**Re-evaluate pricing and cost structure in the Furniture category** to improve margins and profitability.  
✅**Identify high-performing products within each category** and strategize on increasing their visibility and sales.  
✅**Consider reducing discounts or optimizing supply chain costs** for Furniture to improve its profitability.

28. What is the average profit per customer across all Sub-Category?

**Interpretation:**

* **Copiers generate the highest average profit per customer (₹869.03)**, making it the most profitable sub-category.
* **Accessories (₹88.42), Phones (₹86.41), and Chairs (₹64.88)** are also strong performers, contributing positively to overall profits.
* **Tables (-₹67.94) and Bookcases (-₹23.15) have negative average profits per customer**, indicating potential losses due to high costs, discounts, or inefficiencies.

**Recommendations:**

✅**Leverage high-profit sub-categories (Copiers, Accessories, Phones)** by focusing on promotions, targeted marketing, and bundling strategies.  
✅**Analyze loss-making sub-categories (Tables, Bookcases, Supplies)** to understand cost inefficiencies and consider revising pricing, sourcing, or discount strategies.  
✅**Optimize inventory and pricing for mid-performing categories** (e.g., Binders, Storage, and Machines) to boost profitability.  
✅**Explore premium product offerings in profitable sub-categories** like Copiers and Phones to further increase revenue.

29. Identify the most Saleable customer in each region.

**Interpretation:**

* **Sean Miller (South Region) is the most saleable customer with total sales of ₹23,668**, indicating strong purchasing behavior in this region.
* **Tamara Chand (Central Region) follows with ₹18,436 in total sales**, making her a key customer in the central region.
* **Raymond Buch (West - ₹14,345) and Tom Ashbrook (East - ₹13,724)** are also leading customers in their respective regions.

**Recommendations:**

✅**Strengthen relationships with these high-value customers** through personalized offers, loyalty programs, and exclusive deals.  
✅**Identify their purchasing patterns and preferences** to tailor marketing campaigns and upsell/cross-sell related products.  
✅**Encourage repeat purchases** by providing premium services, faster delivery, or additional benefits for continued engagement.  
✅**Analyze their buying behavior** to find similar high-potential customers in each region and target them with strategic promotions.

30. Identify the most Saleable customer in each Segment.

**Interpretation:**

* **Sean Miller (Home Office) is the most saleable customer with total sales of ₹25,042**, indicating strong purchasing behavior in this segment.
* **Tamara Chand (Corporate) follows with ₹19,050 in total sales**, making her the top customer in the corporate segment.
* **Raymond Buch (Consumer - ₹15,117)** is the leading customer in the consumer segment.

**Recommendations:**

✅**Strengthen engagement strategies** by offering personalized deals and discounts tailored to each segment’s purchasing behavior.  
✅**Provide premium services** such as exclusive bulk purchase discounts for corporate customers like Tamara Chand.  
✅**Analyze customer purchasing patterns** to identify similar high-value customers in each segment and target them with tailored marketing efforts.  
✅**Develop loyalty programs** to ensure retention and encourage repeated purchases from these top customers.

31. Identify the most Saleable customer in each category.

**Interpretation:**

* **Sean Miller (Technology) leads with ₹23,481 in total sales**, indicating a strong demand for technology products from this customer.
* **Sanjit Chand (Office Supplies) follows with ₹12,083**, making him the top customer in this category.
* **Seth Vernon (Furniture) leads with ₹8,332 in total sales**, highlighting a preference for furniture purchases.

**Recommendations:**

✅**Offer category-specific loyalty programs** to retain high-value customers in each category.  
✅**Provide personalized discounts** on related products to encourage repeat purchases.  
✅**Analyze product preferences** within each category to identify similar high-spending customers.  
✅**Bundle high-demand items** with complementary products to increase order value and customer satisfaction.

32. Identify the most Saleable customer in each sub-category.

**Interpretation:**

* **Sean Miller (Machines) has the highest sales in a single sub-category with ₹23,459**, indicating a strong preference for machine-related products.
* **Tamara Chand (Copiers) follows closely with ₹17,500**, making her a key customer in the copiers segment.
* **Sanjit Chand (Binders) and Ken Lonsdale (Supplies) also contribute significantly, with ₹11,469 and ₹8,188, respectively.**
* **The lowest saleable sub-category is Fasteners, with Mick Crebagga contributing ₹93, indicating limited demand.**

**Recommendations:**

✅**Provide exclusive discounts and loyalty rewards** for high-spending customers in top sub-categories to encourage repeat business.  
✅**Identify cross-selling opportunities** (e.g., Sean Miller buys Machines—suggest compatible accessories or maintenance services).  
✅**Focus on underperforming sub-categories** like Fasteners with targeted promotions or bundled deals.  
✅**Enhance customer engagement** through personalized marketing campaigns tailored to their purchase behavior.

33. Identify the most Saleable customer in each State.

**Interpretation:**

* **Sean Miller (Florida) is the most saleable customer in the state with total sales of ₹23,660,** making him the top contributor across all states.
* **Tamara Chand (Indiana) follows closely with ₹18,336**, showing strong sales in that region.
* **Raymond Buch (Washington) and Tom Ashbrook (New York) also generate significant sales, ₹14,052 and ₹13,724, respectively.**
* **Natalie Fritzler (West Virginia) and Marina Lichtenstein (Maine) have the lowest total sales, ₹673 and ₹617, respectively, indicating low sales activity in these states.**

**Recommendations:**

✅**Maintain strong engagement** with top customers (Sean Miller, Tamara Chand, Raymond Buch) by offering exclusive deals and loyalty programs.  
✅**Encourage repeat business** by targeting customers with personalized recommendations and bundled product offerings.  
✅**Analyze low-performing states** like West Virginia and Maine—consider promotional campaigns, better distribution, or targeted marketing efforts.  
✅**Identify regional sales trends** to optimize inventory allocation and improve profitability in high-performing states.

34. Identify the most profitable customer in each region.

**Interpretation:**

* **Tamara Chand (Central) is the most profitable customer with a total profit of ₹8,746**, making her the highest profit generator across all regions.
* **Raymond Buch (West) follows with ₹6,807, indicating strong profitability in that region.**
* **Hunter Lopez (East) and Christopher Martinez (South) contribute ₹5,046 and ₹3,197, respectively, making them key customers in their respective regions.**

**Recommendations:**

✅**Strengthen relationships with these high-profit customers** through loyalty programs, personalized discounts, and premium services.  
✅**Analyze the buying patterns of top customers** to replicate their success across other customers.  
✅**Increase marketing efforts in the South region**, where the top customer (Christopher Martinez) generates the lowest regional profit.  
✅**Offer exclusive deals or incentives** to encourage repeat business from profitable customers and maintain their loyalty.

35. Identify the most profitable customer in each Segment.

**Interpretation:**

* **Tamara Chand (Corporate) is the most profitable customer with a total profit of ₹8,983,** making her a key contributor to the company's profits.
* **Raymond Buch (Consumer) follows closely with ₹6,976, indicating strong profitability from the consumer segment.**
* **Tom Ashbrook (Home Office) generates ₹4,704 in profit, highlighting the Home Office segment's potential.**

**Recommendations:**

✅**Prioritize high-profit customers like Tamara Chand, Raymond Buch, and Tom Ashbrook** with personalized offers, exclusive deals, and loyalty benefits.  
✅**Analyze Corporate segment sales strategies**, as it has the most profitable customer. Similar strategies can be applied to other segments.  
✅**Improve engagement with Home Office customers** to boost profitability in this segment.  
✅**Encourage high-margin purchases through targeted promotions and value-added services.**

36. Identify the most profitable customer in each category.

**Interpretation:**

* **Tamara Chand (Technology) is the most profitable customer, contributing ₹8,584 in profit,** making her a key asset in the Technology category.
* **Sanjit Chand (Office Supplies) follows with ₹5,653, indicating strong profitability in office-related products.**
* **Laura Armstrong (Furniture) has the highest profit in the Furniture category at ₹1,146,** suggesting that Furniture has lower profitability compared to other categories.

**Recommendations:**

✅**Prioritize and retain high-value customers like Tamara Chand and Sanjit Chand** by offering personalized discounts and premium service.  
✅**Expand marketing for high-margin Technology and Office Supplies products** to attract similar high-profit customers.  
✅**Improve pricing strategies and reduce costs in the Furniture category** to enhance profitability.  
✅**Offer bundled deals combining Technology and Office Supplies to maximize customer spending.**

37. Identify the most profitable customer in each sub-category.

**Interpretation:**

* **Tamara Chand (Copiers) is the most profitable customer overall with ₹8,584, making Copiers the most lucrative sub-category.**
* **Sanjit Chand (Binders) follows with ₹5,653 in profit, indicating strong profitability in Office Supplies.**
* **John Murray (Phones) and Brendan Sweed (Art) are also key contributors to profits in their respective sub-categories.**
* **Fasteners have low profitability (₹22 each for three customers), indicating weak demand or pricing inefficiencies.**

**Recommendations:**

✅**Focus on retaining high-value customers like Tamara Chand and Sanjit Chand** through personalized discounts and loyalty programs.  
✅**Expand marketing and upselling for high-margin sub-categories like Copiers, Phones, and Binders** to maximize revenue.  
✅**Reevaluate pricing and cost structures for low-profit sub-categories like Fasteners and Art** to improve profitability.  
✅**Offer bundle deals for high-performing sub-categories (e.g., Phones + Accessories, Copiers + Paper) to increase sales.**

38. Identify the most profitable customer in each states.

**Interpretation:**

* **Tamara Chand (Indiana) is the most profitable customer overall, generating ₹8,763 in profit.**
* **Raymond Buch (Washington) and Hunter Lopez (Delaware) are the second and third most profitable customers, contributing ₹6,735 and ₹5,040, respectively.**
* **California, Texas, and Florida—traditionally strong markets—have relatively lower high-profit customers, suggesting a more distributed profit model in these states.**
* **Wyoming (₹100), Oregon (₹157), and Kansas (₹180) have the lowest high-profit customers, indicating a need for strategic sales improvement.**

**Recommendations:**

✅**Strengthen relationships with top customers (Tamara Chand, Raymond Buch, Hunter Lopez)** through exclusive offers and priority services.  
✅**Expand profitable customer segments in high-margin states (e.g., Indiana, Washington, Delaware, Michigan).**  
✅**Analyze why traditionally strong states (California, Texas, Florida) have lower top-customer profits—perhaps due to higher competition or pricing challenges.**  
✅**Improve penetration and sales strategy in underperforming states (Wyoming, Oregon, Kansas) by offering localized discounts and promotions.**

39. Which customers have the highest sales growth over time?

Years on growth

Quarters on growth

Months on growth

**Interpretation:**

**📊 Yearly Growth:**

* **Brian Moss (2020) had the highest yearly sales growth** at **189,366.67%**📈.
* **Robert Waldorf (2020) and Maria Etezadi (2019)** followed with **116,300%** and **90,066.67%**, respectively.
* Most of the highest-growing customers saw their peak sales in **2019 or 2020**, indicating a strong trend before/after the pandemic.

**📆 Quarterly Growth:**

* **Roland Schwarz (Q2) led quarterly growth** with **164,100%** increase.
* **Michelle Huthwaite (Q3) and Susan Pistek (Q4) had rapid growth**, exceeding **60,000% growth.**
* This suggests **seasonal spikes in demand** and possible marketing/sales promotions during Q2–Q4.

**📅 Monthly Growth:**

* **Stefania Perrino (September) had the highest monthly growth** at **104,000%**🚀.
* **Roland Schwarz (April) and Karen Bern (July) also showed explosive growth**, crossing **70,000%.**
* Several customers peaked in **July and September**, possibly due to back-to-school or business procurement cycles.

**Recommendations:**

✅**Identify the factors behind top customer growth**—Were they influenced by seasonal trends, discounts, or product launches?  
✅**Focus on high-growth periods (Q2–Q4, September, July)**—Plan strategic marketing campaigns accordingly.  
✅**Engage with top-growing customers (Brian Moss, Roland Schwarz, Stefania Perrino)** to sustain their buying behavior and prevent churn.  
✅**Analyze slow-growth periods and optimize pricing/promotions** to smoothen sales fluctuations.

40. Which customers have the highest Profit growth over time?

Years on growth

Quarters on growth

Months on growth

**Interpretation:**

**🗓️ Yearly Profit Growth:**

* **John Lucas (2018) had the highest annual profit growth** at **81,700%**🚀.
* **Jamie Kunitz (2020) and Meg Tillman (2019) followed** with **55,800%** and **43,100%** growth, respectively.
* **Tamara Chand (2019) had a significant profit increase** of **22,968.42%**, reinforcing her importance as a key customer.

**📆 Quarterly Profit Growth:**

* **Nathan Mautz (Q4) led with a staggering 55,975% growth**🔥.
* **Jim Kriz (Q3) and Kristina Nunn (Q3) also saw massive jumps**, exceeding **32,000%**.
* **Tamara Chand (Q4) maintained strong growth (23,439.47%)**, proving consistent profitability across different time periods.

**📅 Monthly Profit Growth:**

* **Nathan Mautz (November) had the highest monthly growth** at **55,975%**🤯.
* **Steven Roelle (June) and Hunter Lopez (November) followed** with **55,766.67% and 45,718.18%**, respectively.
* **Several customers (Katrina Willman, DeanraEno, Arianne Irving)** had sharp spikes, suggesting **seasonal or promotional influences.**

**Recommendations:**

✅**Identify what drove the profit spikes**—Were they caused by **repeat purchases, bulk orders, or premium product sales?**  
✅**Engage with these high-growth customers (John Lucas, Nathan Mautz, Hunter Lopez, Tamara Chand)** through personalized offers to maintain momentum.  
✅**Analyze Q3 and Q4 for strategic promotions**—Many customers saw their peak profits during these periods.  
✅**Investigate high-profit months (November, August, July)** for potential seasonal business cycles.

41. Identify the most frequently sold products.

**Interpretation:**

1. **Staple-related products are the most frequently sold.**
   * Items like **Staple Envelopes, Staples, and Easy-Staple Paper** are essential office supplies, leading to consistent demand.
   * **Easy-Staple Paper is the most profitable among them ($1,098 profit).**
2. **High sales volume does not always mean high profitability.**
   * Example: **KI Adjustable-Height Table** is among the top 10 but has **a negative profit (-$247)**, indicating possible high costs or discounts.
3. **Technology accessories are in demand.**
   * The **Logitech Wireless Mouse** appears in the top 10, showing a growing interest in ergonomic tech products.
4. **Binders and office accessories are steady sellers but have low margins.**
   * Items like **Avery Non-Stick Binders and Storex Dura Pro Binders** are frequently sold but do not contribute significantly to profit.

**Recommendations:**

1. **Optimize Inventory and Stocking**
   * Ensure **sufficient stock** for high-demand products like **Staples and Easy-Staple Paper** to avoid stock shortages.
   * Analyze **seasonal trends** to adjust inventory levels accordingly.
2. **Improve Profitability of Low-Margin Products**
   * Investigate the loss on **KI Adjustable-Height Table (-$247 profit)** and adjust pricing or supplier costs if necessary.
   * Introduce **premium versions** of frequently sold products to increase margins.
3. **Increase Sales of Profitable Items**
   * Promote **Easy-Staple Paper** and other high-profit products through **bulk discounts or bundle offers**.
   * Encourage **larger orders** by offering volume-based pricing.
4. **Expand Tech and Ergonomic Product Offerings**
   * The success of the **Logitech Wireless Mouse** suggests potential for more tech-related accessories.
   * Consider **bundling tech accessories** with traditional office supplies to increase order value.

42. Which products exceed their sales targets the most?

**Interpretation:**

1. **High-Value Technology Products Lead in Exceeding Sales Targets**
   * **Canon imageCLASS 2200 Advanced Copier** surpassed its target by **$216,498**, making it the highest-performing product.
   * **Copiers and printers** (e.g., **Hewlett Packard LaserJet 3310, Lexmark MX611dhe**) have consistently exceeded expectations.
2. **Office Equipment and Furniture Also Perform Well**
   * **HON 5400 Series Task Chairs** exceeded the sales target by **$74,726**, indicating strong demand for ergonomic office furniture.
   * **Binding machines and electric punch systems** (e.g., **Ibico EPK-21, Fellowes PB500**) have significantly outperformed their targets.
3. **Office Supplies Have Unexpectedly High Demand**
   * **High-Speed Automatic Electric Letter Opener** exceeded the target by **$59,623**, showing strong demand for automation in office tasks.

**Recommendations:**

1. **Leverage High-Performing Technology Products**
   * Increase **marketing efforts and promotional campaigns** for **copiers, printers, and binding systems** since they are in high demand.
   * Consider **expanding product lines** by introducing **newer models** of the most successful products.
2. **Optimize Inventory for Office Supplies and Furniture**
   * Given the **strong performance of binding machines and office chairs**, ensure these products are **readily available** to meet future demand.
   * Consider **partnering with suppliers** to **negotiate better pricing** on frequently sold items to increase profitability.
3. **Introduce Bundled Packages**
   * Offer **discounted bundles** combining **high-performing technology products** with complementary accessories (e.g., copiers + toner refills).
   * Encourage bulk purchases for **binding machines and office furniture** by providing **corporate discounts**.
4. **Analyze Demand Trends**
   * Investigate **customer segments driving demand** for these products to refine **targeted marketing strategies**.
   * Use predictive analytics to **adjust sales targets** based on **historical performance and market trends**.

43. What is the sales forecast accuracy by product category?

**Interpretation:**

1. **Sales Forecast Accuracy is Around 50% Across All Categories**
   * **Technology (50.33%)** has the highest forecast accuracy but still indicates a **significant gap** between actual and predicted sales.
   * **Furniture (50.29%)** and **Office Supplies (50.08%)** show similar accuracy levels, suggesting forecasting challenges across all categories.
2. **Possible Causes of Low Forecast Accuracy**
   * **Market fluctuations** and seasonal demand variations may not be well accounted for in the forecast model.
   * **Product promotions, discounts, and new product launches** could be influencing actual sales beyond expectations.
   * **Supply chain disruptions or inventory shortages** might lead to unfulfilled demand, affecting forecast accuracy.

**Recommendations:**

1. **Enhance Forecasting Models**
   * Implement **machine learning-based predictive analytics** to account for **seasonal trends, promotions, and external factors**.
   * Use **historical sales data with real-time demand tracking** to improve forecast precision.
2. **Category-Specific Adjustments**
   * **Technology Products**
     + Use **shorter forecasting cycles** due to **rapid product evolution and changing consumer preferences**.
     + Factor in **product life cycles and competitor pricing**.
   * **Furniture**
     + Consider **seasonality effects** (e.g., higher demand during office expansions, holiday sales).
     + Use **customer order history** to anticipate bulk purchases.
   * **Office Supplies**
     + Incorporate **recurring order patterns** (e.g., businesses restocking supplies regularly).
     + Analyze the impact of **bulk purchasing behavior** from corporate clients.
3. **Improve Collaboration Between Sales and Inventory Teams**
   * Align **inventory planning with demand forecasts** to minimize overstock or stockouts.
   * Regularly **review and adjust forecasting methods** based on actual sales deviations.

44. What is the sales forecast accuracy by product Sub-category?

**Interpretation:**

1. **Low Forecast Accuracy Across All Sub-Categories**
   * The highest forecast accuracy is **Labels (50.46%)**, but it is still far from ideal.
   * The lowest accuracy is **Fasteners (48.98%)**, indicating **greater variability** in actual vs. predicted sales.
   * Most sub-categories hover around **50% accuracy**, suggesting **a consistent gap in forecasting across all product types**.
2. **Factors Affecting Forecast Accuracy**
   * **Seasonal demand variations** (e.g., higher sales for **phones and machines** during corporate upgrades).
   * **Promotions and discounts** creating unexpected sales spikes.
   * **Bulk orders or irregular purchases** affecting categories like **binders, paper, and fasteners**.
   * **Supply chain disruptions or inventory shortages** impacting actual sales fulfillment.

**Recommendations:**

1. **Refine Forecasting Methods**
   * Implement **AI-driven predictive analytics** to factor in **seasonal trends and promotions**.
   * Use **shorter forecasting intervals** for high-variation products like **fasteners, binders, and copiers**.
   * Incorporate **external market data (e.g., economic conditions, industry trends)** for categories like **appliances and machines**.
2. **Improve Inventory Planning by Sub-Category**
   * **Labels, Art, Appliances, and Phones**
     + Leverage **historical purchase patterns** to improve forecast reliability.
   * **Fasteners, Binders, Paper, and Supplies**
     + Use **real-time demand tracking** to adjust sales forecasts dynamically.
   * **Furniture (Chairs, Bookcases, Tables, Storage, Furnishings)**
     + Factor in **business expansion cycles** and **corporate bulk orders** in forecasting.
3. **Strengthen Collaboration Between Sales and Supply Chain Teams**
   * Conduct **regular forecast accuracy reviews** to adjust predictions based on actual performance.
   * Align marketing promotions with **demand forecasts to avoid over/underestimation of sales**.

45. What is the sales forecast accuracy by product Segment?

**Interpretation:**

1. **Forecast Accuracy is Low Across All Segments**
   * The **Home Office segment** has the highest forecast accuracy (**50.31%**), followed by **Corporate (50.17%)** and **Consumer (50.12%)**.
   * Since all segments are around **50% accuracy**, it indicates **substantial forecasting errors** in predicting actual sales.
2. **Potential Causes of Low Forecast Accuracy**
   * **Home Office:** Demand can fluctuate due to **remote work trends and small business purchases**.
   * **Corporate:** Large orders or bulk purchases may cause **unexpected spikes** in sales.
   * **Consumer:** High variability due to **seasonal promotions, discounts, and individual buying behavior**.

**Recommendations:**

1. **Enhance Forecasting Models for Different Segments**
   * Use **machine learning models** to better predict **corporate bulk purchases**.
   * Incorporate **seasonality adjustments** for consumer-driven products (e.g., electronics, office supplies).
   * Improve **trend analysis for Home Office** based on remote work and freelancer market growth.
2. **Refine Inventory and Supply Chain Management**
   * Adjust stock levels based on **historical demand trends for each segment**.
   * Use **real-time data tracking** to dynamically update forecasts, especially for the **Corporate segment**.
3. **Improve Marketing and Sales Coordination**
   * Align **promotional campaigns** with forecast models to prevent sudden demand surges.
   * Analyze **customer buying cycles** in the **Consumer and Home Office segments** for better demand prediction.

46. What is the sales forecast accuracy by product Region?

**Interpretation:**

1. **Forecast Accuracy is Low Across All Regions**
   * The **East region** has the highest forecast accuracy (**50.28%**), followed by **South (50.26%)**, **Central (50.1%)**, and **West (50.07%)**.
   * Since all regions have forecast accuracy around **50%**, this suggests **high errors in sales predictions**.
2. **Possible Causes of Forecasting Errors**
   * **East & South:** Slightly better accuracy may be due to **more stable demand patterns**.
   * **Central & West:** More variability in customer demand, **possibly due to economic factors, seasonality, or local market conditions**.
   * **Overall:** Forecasting models may **not be capturing regional demand fluctuations effectively**.

**Recommendations:**

1. **Improve Regional Demand Forecasting**
   * Use **historical sales trends for each region** to fine-tune predictions.
   * Incorporate **external factors** such as **weather conditions, economic trends, and local events** that impact regional sales.
2. **Use AI and Machine Learning for Forecasting**
   * Implement **regional-specific forecasting models** instead of a **single, global model**.
   * Apply **real-time analytics** to adjust predictions based on **latest market changes**.
3. **Refine Regional Inventory and Supply Chain Strategies**
   * For **high-error regions like Central & West**, maintain a **flexible stock replenishment strategy**.
   * Align **warehouse distribution based on regional demand forecasts** to **reduce supply chain inefficiencies**.

47. What is the sales forecast accuracy by product State?

**Interpretation:**

1. **Overall Forecast Accuracy is Low**
   * The highest accuracy is in **South Dakota (53.19%)**, while the lowest is in **North Dakota (42.54%)**.
   * Most states have accuracy **around 50%**, indicating **significant forecasting errors**.
2. **States with Higher Accuracy**
   * **South Dakota, District of Columbia, and Kansas** have slightly better forecast accuracy (**above 50%**).
   * These states might have **more predictable demand patterns** or **consistent sales trends**.
3. **States with Lower Accuracy**
   * **North Dakota (42.54%), Iowa (48.91%), Arizona (49.01%)**, and **Oregon (49.21%)** show **higher forecasting errors**.
   * These states may experience **high demand fluctuations**, seasonal variations, or **external factors affecting sales**.

**Recommendations:**

1. **Improve State-Level Forecasting Models**
   * Use **state-specific historical sales trends** to adjust sales predictions.
   * Consider **demographic, economic, and seasonal factors** affecting demand in different states.
2. **Implement Machine Learning for Dynamic Adjustments**
   * Introduce **AI-driven forecasting** that adapts to **regional demand shifts in real-time**.
   * Apply **state-based adjustments** rather than a **one-size-fits-all model**.
3. **Monitor and Adjust Inventory Based on Forecast Errors**
   * For **high-error states** (e.g., North Dakota, Arizona), apply **more flexible stock replenishment** strategies.
   * For **more stable states** (e.g., South Dakota, Kansas), **streamline inventory management** to reduce costs.

48. Identify products with declining sales trends.

Month wise declining sales

Quarter wise declining sales

Year wise declining sales

**Interpretation:**

1. **Multiple Products Show Declining Sales**
   * The analysis identifies products with **declining sales trends on a monthly, quarterly, and yearly basis**.
   * Some products have **consistent declines** across multiple time periods, indicating deeper issues.
2. **Most Affected Products**
   * **Office equipment and furniture** dominate the list of declining products.
   * Products like **binding machines (Fellowes PB500, GBC DocuBind TL300, Ibico EPK-21)** and **copiers (Canon imageCLASS 2200, Hewlett Packard LaserJet 3310)** are showing sharp declines.
3. **Quarterly and Yearly Trends**
   * **Canon imageCLASS 2200 Advanced Copier** had the highest **quarterly decline (22,394 units)**.
   * **Fellowes PB500 Binding Machine** had the **largest yearly decline (13,472 units)**.

**Recommendations:**

1. **Analyze Market Demand**
   * Evaluate if these products are becoming **obsolete** due to **newer technology or changing office trends**.
   * Investigate if demand has shifted to **alternative products** (e.g., **digital solutions replacing binding machines**).
2. **Review Pricing and Promotion Strategies**
   * Offer **discounts or bundled promotions** for declining products.
   * Compare **competitor pricing** to check if products are overpriced.
3. **Targeted Marketing Campaigns**
   * Focus on **business customers** who may still need these products.
   * Use **email campaigns, ads, and special offers** to regain customer interest.
4. **Re-evaluate Inventory and Stocking**
   * Reduce production or order quantities for **low-demand products**.
   * Shift inventory focus to **higher-performing products**.

49. What is the average shipping time for each product category?

**Interpretation:**

1. **Consistent Shipping Times Across Categories**
   * **Furniture and Technology** have an **average shipping time of 3.92 days**.
   * **Office Supplies** has a slightly higher average at **3.98 days**.
2. **Minimal Variation**
   * The shipping times are relatively close, indicating **a standardized shipping process** across all categories.
   * However, even small delays can impact **customer satisfaction** and **repeat purchases**.

**Recommendations:**

1. **Identify Delayed Orders**
   * Perform a **detailed analysis by sub-category or region** to check if certain products or locations have longer delays.
   * Focus on products with **high variance in shipping times** for process improvement.
2. **Optimize Logistics and Warehousing**
   * Consider **strategic warehouse placement** for commonly ordered products.
   * Improve order processing efficiency by **automating fulfillment tasks**.
3. **Expedited Shipping Options**
   * Offer customers **faster shipping choices** (e.g., express delivery for urgent orders).
   * Consider partnerships with logistics providers for **priority shipping services**.

50. What is the average shipping time for each product sub-category?

**Interpretation:**

1. **Fastest Shipping Sub-Categories:**
   * **Copiers (3.62 days)** and **Machines (3.75 days)** have the shortest average shipping times.
   * These items may have **efficient supply chain processes** or **closer warehouse availability**.
2. **Slowest Shipping Sub-Categories:**
   * **Art (4.05 days), Labels (4.00 days), Binders (4.02 days), and Supplies (4.02 days)** take slightly longer to ship.
   * The delay could be due to **stocking issues, packaging requirements, or supplier inefficiencies**.
3. **Minimal Variation in Shipping Time:**
   * The difference between the fastest and slowest shipping sub-categories is **less than 0.5 days**.
   * This suggests a **well-standardized shipping process** across most products.

**Recommendations:**

1. **Identify Delays in Specific Products**
   * Conduct a deeper analysis of **specific SKUs** within slow sub-categories to find bottlenecks.
   * Check if **certain suppliers or warehouses** are causing delays.
2. **Optimize Logistics for Slow-Shipping Categories**
   * Increase **inventory stocking** for slow-moving sub-categories closer to demand areas.
   * Improve **order fulfillment workflows** for categories like **Art, Binders, and Supplies**.
3. **Expedited Shipping for High-Demand Items**
   * Offer **premium shipping options** for frequently ordered sub-categories.
   * Consider **bulk shipping incentives** for categories like **Binders and Supplies** to optimize delivery efficiency.

51. What is the average shipping time for each product Region?

**Interpretation:**

1. **Fastest Shipping Region:**
   * **East (3.91 days) and West (3.93 days)** have the shortest average shipping times.
   * These regions might have **better logistics infrastructure, closer distribution centers, or higher shipping efficiency**.
2. **Slowest Shipping Region:**
   * **Central (4.06 days)** has the longest shipping time.
   * This could be due to **longer transit distances, fewer distribution centers, or supply chain inefficiencies** in this region.
3. **Minimal Variation in Shipping Time:**
   * The difference between the fastest (**3.91 days**) and the slowest (**4.06 days**) region is **only 0.15 days**.
   * This suggests a **well-optimized shipping process with minor regional variations**.

**Recommendations:**

1. **Optimize Logistics for Central Region**
   * Assess if **warehouse locations** are causing delays and consider **strategic distribution center placements**.
   * Collaborate with logistics partners to **prioritize Central region shipments** for faster processing.
2. **Improve Inventory Distribution**
   * Ensure high-demand products are **stocked in warehouses closer to Central and South regions**.
   * Implement **predictive stocking** based on sales data to reduce order fulfillment times.
3. **Monitor Carrier Performance**
   * Analyze if specific carriers **perform worse in the Central region** and consider alternative logistics providers.
   * Implement **real-time tracking and reporting** for shipments in slower regions.

52. What is the average shipping time for each product Segment?

**Interpretation:**

1. **Fastest Shipping Segment:**
   * **Home Office (3.92 days)** has the shortest average shipping time.
   * This could be due to **lower order volume per shipment, making it easier to fulfill quickly**.
2. **Slowest Shipping Segment:**
   * **Corporate (4.01 days)** has the longest shipping time.
   * Corporate orders may involve **larger shipments, bulk processing, or more complex logistics**.
3. **Minimal Variation in Shipping Time:**
   * The difference between the fastest (**3.92 days**) and the slowest (**4.01 days**) segment is **only 0.09 days**, indicating **a relatively balanced shipping process across segments**.

**Recommendations:**

1. **Improve Bulk Order Processing for Corporate Segment**
   * Since corporate customers may place **larger orders**, optimizing **warehouse picking and packing efficiency** can reduce delays.
   * Implement **priority shipping options** for corporate clients.
2. **Enhance Inventory Allocation by Segment**
   * If **certain warehouses serve specific segments**, ensure **Corporate orders have faster fulfillment centers** to cut down on processing time.
3. **Offer Expedited Shipping for Corporate Clients**
   * Introduce a **faster delivery service for corporate orders** to ensure they receive shipments promptly.
   * Explore partnerships with **faster logistics providers** for high-priority shipments.

53. What is the average shipping time for each product State?

**Interpretation:**

1. **Fastest Shipping States:**
   * **North Dakota (2.86 days)** has the fastest average shipping time.
   * Other states with **fast shipping** include **West Virginia (3.00 days) and Louisiana (3.05 days)**.
   * This may be due to **lower order volume, efficient local fulfillment centers, or better logistics routes in these areas**.
2. **Slowest Shipping States:**
   * **District of Columbia (5.70 days), Maine (5.00 days), and Wyoming (5.00 days)** have the longest shipping times.
   * These delays could be due to **limited warehouse locations, transportation constraints, or reliance on third-party logistics providers**.
3. **Regional Shipping Patterns:**
   * **Western states like Nevada (4.38 days) and Oregon (4.33 days) have relatively high shipping times**, possibly due to **distance from major distribution centers**.
   * **Midwestern states like Minnesota (4.48 days) and Oklahoma (4.48 days) also show longer delivery times**, indicating potential inefficiencies in **distribution routes**.

**Recommendations:**

1. **Optimize Distribution Centers for Slow-Shipping States**
   * Consider adding **regional fulfillment centers** in states like **Maine, Wyoming, and the District of Columbia** to reduce shipping delays.
   * Work with **third-party logistics providers (3PLs)** to improve last-mile delivery in **high-delay regions**.
2. **Use Data to Improve Shipping Routes**
   * Analyze the **efficiency of shipping carriers** in slow-shipping states.
   * Explore **alternative shipping routes** to reduce transit times, especially in **rural and less-served areas**.
3. **Implement Priority Shipping for Slow Regions**
   * Offer **expedited shipping options** for customers in slow-shipping states.
   * Provide **real-time tracking and delivery estimates** to enhance customer experience.
4. **Enhance Inventory Allocation for Faster Fulfillment**
   * **Stock more inventory in distribution centers** near states with slower shipping times to improve delivery speed.
   * Implement **dynamic inventory allocation** based on order patterns.

54. What is the Count and percentage of Ship-Status?

**Interpretation:**

1. **Early Shipments Dominate**
   * **49.03%** of orders were **shipped early**, which indicates **efficient logistics and inventory management**.
   * This could lead to **higher customer satisfaction and repeat purchases**.
2. **Late Shipments Are a Concern**
   * **26.45%** of orders were **shipped late**, which can cause **customer dissatisfaction, increased inquiries, and potential loss of business**.
   * Late shipments may be due to **stock shortages, warehouse delays, or carrier inefficiencies**.
3. **On-Time Shipping Needs Improvement**
   * Only **24.51%** of orders were **shipped exactly on time**.
   * Ideally, this percentage should be **higher**, as customers expect deliveries **on the promised date** rather than **too early or too late**.

**Recommendations:**

**1. Reduce Late Shipments**

* **Analyze causes of late shipments** (e.g., warehouse processing time, carrier performance).
* **Increase buffer stock** for high-demand products to avoid fulfillment delays.
* **Improve demand forecasting** to ensure inventory availability.

**2. Improve On-Time Shipments**

* **Adjust order processing schedules** to align shipments closer to promised dates.
* **Enhance coordination with shipping partners** to prevent early or late shipments.
* **Implement automated reminders** for warehouse teams to prioritize on-time deliveries.

**3. Customer-Centric Shipping Strategy**

* **Provide shipping updates** to customers, especially for late shipments.
* **Offer expedited shipping options** for high-value customers to improve satisfaction.
* **Optimize warehouse locations** based on demand patterns to minimize transit times.

55. What is the Count and percentage of ShipMode?

**Interpretation:**

1. **Standard Class is the Most Used Shipping Mode**
   * **59.68%** of orders are shipped via **Standard Class**, indicating it is the preferred and likely most cost-effective option for customers.
   * This may be due to **lower shipping costs and acceptable delivery times** for most products.
2. **Second Class and First Class Have Moderate Usage**
   * **Second Class (19.47%)** and **First Class (15.41%)** shipping modes are used by nearly **35% of customers**, likely for faster deliveries.
   * Customers willing to pay for **faster shipping** might expect better service and on-time deliveries.
3. **Same-Day Shipping Has the Lowest Usage**
   * Only **5.44%** of orders use **Same Day shipping**, which suggests:
     + Limited **availability** of this option.
     + **Higher costs** may deter customers.
     + **Product types and demand** may not require urgent delivery.

**Recommendations:**

**1. Optimize Standard Class Efficiency**

* Since **60% of orders** use Standard Class, focus on **ensuring timely deliveries** to maintain customer satisfaction.
* **Negotiate better carrier rates** to reduce costs while maintaining service quality.
* **Analyze late shipments** in Standard Class to identify potential delays.

**2. Increase Adoption of Faster Shipping Options**

* **Promote First Class and Same Day shipping** by offering incentives or discounts for customers who need urgent deliveries.
* **Assess product categories** where faster shipping is needed (e.g., electronics, office supplies).
* **Improve warehouse logistics** to support faster shipping without high additional costs.

**3. Improve Customer Experience for Expedited Shipping**

* Ensure **priority handling** of First Class and Same Day orders to avoid customer complaints.
* **Provide real-time tracking** and delivery time estimates for customers selecting faster options.
* Analyze whether faster shipping **impacts customer satisfaction and repeat purchases**.

56. Which regions have the most delayed shipments?

**Interpretation:**

1. **East Region Has the Highest Delay Rate**
   * **27.39%** of orders in the **East region** were shipped late, the highest among all regions.
   * This suggests potential **logistical inefficiencies, supply chain issues, or high demand** causing delays.
2. **West Region Also Experiences High Delays**
   * **27.19%** of orders in the **West region** were delayed.
   * Similar issues as in the East region may be affecting shipments, such as **warehouse locations, carrier performance, or weather-related disruptions**.
3. **Central and South Have Relatively Fewer Delays**
   * **Central (25.61%)** and **South (24.57%)** have **slightly lower late shipment rates**.
   * This might indicate **better logistics planning** or **shorter distances to fulfillment centers**.

**Recommendations:**

**1. Identify Key Delay Factors in the East and West Regions**

* **Analyze warehouse-to-customer distance** to determine if shipping hubs need better placement.
* **Review carrier performance** in these regions—consider switching to more reliable shipping providers if necessary.
* **Assess seasonal trends** to prepare for peak demand periods and prevent backlogs.

**2. Improve Order Processing Efficiency**

* **Optimize inventory management** in fulfillment centers, ensuring products are available closer to demand hubs.
* **Implement real-time tracking and alerts** to proactively address potential delays.

**3. Offer Alternative Shipping Methods**

* If possible, **promote First Class or Same-Day shipping** in the East and West to improve speed and reliability.
* **Provide estimated delay notices** to customers in these regions to set better expectations.

57. Which Category have the most delayed shipments?

**Interpretation:**

1. **Technology Has the Highest Delay Rate (27.06%)**
   * Technology products are **more likely to be delayed** compared to other categories.
   * Possible reasons:
     + **High-value items may require additional security checks** during shipping.
     + **Limited stock availability** could cause delays in fulfillment.
     + **Bulkier items (e.g., printers, computers) may take longer** to package and ship.
2. **Furniture Faces Significant Delays (26.90%)**
   * Furniture items are **typically large, heavy, and require special handling**, leading to longer delivery times.
   * Possible reasons:
     + **Freight shipping delays** due to oversized packages.
     + **Longer processing time for custom or made-to-order pieces.**
3. **Office Supplies Have the Lowest Delay Rate (26.11%)**
   * Office Supplies generally **ship faster than Technology and Furniture** but still have a noticeable delay percentage.
   * Possible reasons:
     + **Paper, binders, and accessories may be subject to inventory shortages**.
     + **Shipping bulk orders** could slow down processing times.

**Recommendations:**

**1. Improve Inventory and Stock Management**

* **Ensure Technology and Furniture items are well-stocked** in major demand regions to reduce fulfillment time.
* **Optimize reorder levels** for high-demand Office Supplies to prevent stockouts.

**2. Optimize Shipping and Handling Processes**

* **For bulky items (Furniture & Large Tech Products), partner with specialized freight carriers** for more efficient logistics.
* **Implement an automated order processing system** to minimize manual delays in shipment.

**3. Offer Expedited Shipping Options for Delayed Categories**

* **Encourage customers to choose First Class or Same-Day shipping** for urgent orders in Technology and Furniture.
* **Provide proactive delay notifications** to manage customer expectations.

58. Which Sub-Category have the most delayed shipments?

**Interpretation:**

1. **Bookcases Have the Highest Delay Rate (31.28%)**
   * **Possible reasons:**
     + **Large and bulky packaging** requires special handling and logistics.
     + **Freight shipping delays** due to oversized items.
     + **Longer processing times** for custom-built or made-to-order products.
2. **Supplies (28.95%) & Accessories (27.81%) Experience High Delays**
   * **Supplies (e.g., office essentials, staplers, clips) are often ordered in bulk**, leading to inventory shortages.
   * **Accessories may include electronic add-ons or specialized items that face supply chain delays.**
3. **Labels, Fasteners & Phones Also Show High Delays (27%+)**
   * **Labels and Fasteners**: Often low-cost items that may be deprioritized in shipping logistics.
   * **Phones**: High-demand electronics that could face stock shortages and high shipping security measures.
4. **Chairs, Appliances & Furnishings Face Delays (26%+)**
   * **Large or fragile items** that require careful packaging and handling.
   * **Shipping costs and carrier constraints** could contribute to delays.
5. **Paper, Binders, and Tables (26%) Show Moderate Delays**
   * These are **high-demand office products** that may be impacted by bulk orders or supply chain disruptions.
6. **Machines, Copiers & Envelopes Have the Lowest Delays (~24%)**
   * Though still delayed, **smaller and less fragile items tend to have more predictable shipping times.**

**Recommendations:**

**1. Prioritize Inventory & Stock Optimization for High-Delay Sub-Categories**

* **Maintain higher stock levels** for Bookcases, Supplies, and Accessories in key demand regions.
* **Use demand forecasting** to anticipate peak periods and restock accordingly.

**2. Improve Freight & Handling for Bulky Items (Bookcases, Chairs, Furnishings, Tables)**

* **Partner with specialized freight carriers** to optimize large-item deliveries.
* **Implement better warehouse handling protocols** to reduce processing time.

**3. Offer Expedited Shipping for High-Delay Products**

* **Encourage premium shipping options for high-delay sub-categories** like Bookcases and Supplies.
* **Provide proactive delay notifications** to customers for better experience management.

59. Which Segment have the most delayed shipments?

**Interpretation:**

1. **Corporate Segment Has the Highest Delay Rate (27.93%)**
   * **Possible reasons:**
     + Bulk purchases lead to **higher order processing time**.
     + Corporate orders often require **approval processes**, delaying fulfillment.
     + **Customized or large-quantity shipments** may face supply chain constraints.
2. **Home Office Segment Faces Moderate Delays (26.88%)**
   * Many Home Office customers **order office furniture and electronics**, which are bulky and require special handling.
   * **Work-from-home demand fluctuations** may lead to stock shortages.
3. **Consumer Segment Experiences the Least Delays (25.45%)**
   * Individual orders are usually **smaller and quicker to process**.
   * Standardized products (e.g., office supplies, paper, accessories) are easier to fulfill.

**Recommendations:**

**1. Optimize Bulk Order Processing for Corporate Customers**

* **Pre-stock high-demand corporate products** in regional warehouses to minimize delays.
* **Offer flexible delivery schedules** for bulk shipments to avoid bottlenecks.

**2. Improve Shipping for Large Items in Home Office Segment**

* **Partner with specialized carriers** for faster furniture and electronics deliveries.
* **Offer split shipping options** for multi-item orders to speed up fulfillment.

**3. Expand Express Delivery for Corporate & Home Office Segments**

* Provide **priority shipping options** for urgent business orders.
* **Enhance real-time tracking and proactive customer notifications** to improve experience.

60. Which State have the most delayed shipments?

**Interpretation:**

1. **Missouri Has the Highest Delay Rate (42.42%)**
   * **Potential Causes:**
     + Limited regional distribution centers increase transit time.
     + Dependence on **third-party carriers** with inconsistent delivery schedules.
     + High volume of furniture and technology orders, which take longer to process.
2. **Kansas & Nevada Also Face High Delays (Above 41%)**
   * **Kansas (41.67%)**: Possible issues with logistics infrastructure and distribution network.
   * **Nevada (41.03%)**: Could be impacted by **desert terrain & weather conditions** affecting transportation.
3. **Rhode Island, Minnesota, and Alabama Experience Delays Above 35%**
   * **Rhode Island (37.50%)**: Small state, possibly relying on distant warehouses.
   * **Minnesota (37.08%)**: Harsh winters may impact transportation delays.
   * **Alabama (36.07%)**: Rural areas may have fewer direct shipping routes.
4. **States With Minimal or No Delays:**
   * **Maine, North Dakota, Wyoming, West Virginia (0%)**
     + Likely due to **lower order volume** or **efficient local distribution networks**.

**Recommendations:**

**1. Improve Logistics in High-Delay States (Missouri, Kansas, Nevada, etc.)**

* **Set up regional warehouses** to minimize reliance on distant fulfillment centers.
* **Partner with more reliable carriers** offering **faster last-mile delivery**.

**2. Address Seasonal Delays in States Like Minnesota**

* Pre-stock **winter-sensitive inventory** in warehouses before the peak season.
* Offer **alternate delivery routes** to mitigate disruptions.

**3. Prioritize Expedited Shipping for Delayed Regions**

* Introduce **priority fulfillment options** for customers in high-delay states.
* Improve **real-time tracking & alerts** to manage customer expectations.

61. How many orders meet their scheduled shipping time?

**Interpretation:**

* **2,447 orders (24.51%)** met their scheduled shipping time, meaning **75.49% were early or delayed**.
* This indicates **inconsistent shipping performance** and potential inefficiencies in logistics.

**Recommendations:**

✅**Optimize warehouse operations** to align shipments with schedules.  
✅**Review carrier performance** to minimize delays.  
✅**Implement real-time tracking** for proactive issue resolution.  
✅**Adjust delivery estimates** to better reflect actual shipping trends.

62. How many orders meet their scheduled shipping time before?

**Interpretation:**

* **4,895 orders (49.03%)** were shipped **earlier than scheduled**, which is nearly **half of all orders**.
* While early shipments may **delight customers**, they can **increase operational costs** if not optimized.

**Recommendations:**

✅**Balance early shipments** to avoid unnecessary shipping expenses.  
✅**Streamline inventory and order processing** to maintain efficiency.  
✅**Adjust scheduling algorithms** to better match customer expectations and reduce variability.

63. How many orders meet their scheduled shipping time after?

**Interpretation:**

* **2,641 orders (26.45%)** were **shipped late**, meaning over **a quarter of all orders** missed their scheduled shipping time.
* This can lead to **customer dissatisfaction** and potential **loss of business**.

**Recommendations:**

✅**Identify causes of delays** (e.g., supply chain issues, warehouse inefficiencies).  
✅**Optimize logistics and inventory management** to improve shipping accuracy.  
✅**Implement proactive alerts** to notify customers of potential delays and improve satisfaction.

64. What percentage of sales targets are met for each segment?

**Interpretation:**

* The **Home Office segment** has the **highest success rate** in meeting sales targets (**29.06%**), followed by **Corporate (28.19%)** and **Consumer (26.39%)**.
* **Less than 30%** of sales targets are being met across all segments, indicating **potential challenges in achieving revenue goals**.

**Recommendations:**

✅**Analyze underperforming products or customer groups** within each segment to identify gaps.  
✅**Strengthen marketing and sales strategies** to boost conversions and upselling.  
✅**Set more realistic or data-driven sales targets** based on past performance and trends.  
✅**Provide incentives or training** for sales teams to enhance performance.

65. What percentage of sales targets are met for each Region?

**Interpretation:**

* The **South region** has the **highest percentage of sales targets met** (**28.38%**), while the **Central region** has the lowest (**26.56%**).
* All regions are **below 30%** in meeting sales targets, indicating **room for improvement** in sales strategies and execution.

**Recommendations:**

✅**Analyze regional demand trends** to identify underperforming areas.  
✅**Optimize inventory and distribution** to better align with regional sales trends.  
✅**Enhance localized marketing strategies** to boost sales in weaker regions.  
✅**Set region-specific sales targets** that are more achievable and data-driven.

66. What percentage of sales targets are met for each Category?

**Interpretation:**

* The **Technology category** has the **highest percentage of sales targets met** (**42.47%**), followed by **Furniture** (**40.51%**).
* **Office Supplies** lags significantly behind at **17.75%**, indicating **challenges in meeting sales targets**.

**Recommendations:**

✅**Strengthen promotional efforts** for **Office Supplies** through discounts, bundles, or targeted marketing.  
✅**Analyze customer demand patterns** to better forecast and set realistic sales targets.  
✅**Enhance cross-selling strategies**, encouraging Office Supplies purchases with Technology and Furniture items.  
✅**Improve pricing and product positioning** to make Office Supplies more competitive.

67. What percentage of sales targets are met for each Sub-Category?

**Interpretation:**

* **Copiers (74.56%) and Machines (63.01%)** have the highest percentage of sales targets met, indicating **strong demand and sales performance**.
* **Tables (58.32%) and Chairs (53.23%)** also perform well, suggesting **consistent customer interest** in office furniture.
* **Office supplies categories like Fasteners (7.91%), Labels (9.70%), and Art (9.99%)** struggle to meet sales targets, indicating **low sales efficiency**.

**Recommendations:**

✅**Focus on marketing and promotional campaigns** for low-performing categories, such as Art, Labels, and Fasteners.  
✅**Reevaluate sales targets for low-performing items** to ensure they are realistic.  
✅**Offer bundle deals** for low-performing sub-categories, pairing them with high-performing ones (e.g., offering Art supplies with Binders).  
✅**Analyze product demand trends** and adjust inventory or pricing strategies accordingly.

68. What percentage of sales targets are met for each State?

**Interpretation:**

* **Wyoming (100%)** has the highest sales target achievement, which might be due to **lower sales targets or a niche market with high-value sales**.
* **West Virginia (52.94%) and New Hampshire (36.29%)** also perform well, indicating **strong sales execution**.
* **North Dakota (13.51%) and the District of Columbia (13.33%)** have the lowest target achievement, suggesting **underperformance in these markets**.

**Recommendations:**

✅**Investigate sales strategies in Wyoming** to identify best practices that can be applied to other states.  
✅**Strengthen sales efforts in underperforming states** (e.g., North Dakota, D.C.) by **adjusting pricing, promotions, or local marketing strategies**.  
✅**Analyze demand trends and customer behavior** to set more realistic targets for struggling states.  
✅**Optimize inventory allocation** to ensure high-demand states receive adequate stock and promotions.

69. How does Sales and profit vary by segment over time?

Month

Quarter

Year

**Interpretation:**

1. **Yearly Profit Trends:**
   * **Consumer Segment:** Profits increased significantly from **$24,311 in 2017** to **$45,388 in 2020**, showing a steady upward trend.
   * **Corporate Segment:** Profits peaked in **2019 ($30,552)** but declined to **$26,704 in 2020**, indicating potential challenges.
   * **Home Office Segment:** Showed growth but remained the least profitable, reaching **$21,074 in 2020**.
2. **Quarterly Trends:**
   * **Q4 (Oct-Dec) consistently has the highest profits** across all segments, likely due to holiday shopping and year-end bulk purchases.
   * **Q2 (Apr-Jun) profits vary**, sometimes dipping, indicating seasonal slowdowns.
3. **Monthly Trends:**
   * **Biggest profit spikes occur in September and December**, likely linked to **back-to-school sales, Black Friday, and year-end budgets**.
   * **Significant losses were observed in some months (e.g., July 2017 for Consumer and March 2017 for Home Office), indicating potential discount seasons or market fluctuations**.

**Recommendations:**

✅**Leverage Q4 and September peaks** by optimizing marketing campaigns, running promotions, and ensuring inventory availability.  
✅**Investigate declining profits in the Corporate Segment in 2020**—consider pricing adjustments or new sales strategies.  
✅**Address seasonal slowdowns (Q2 losses) with targeted promotions** or product bundling to maintain steady profits.  
✅**Monitor the Home Office segment** for growth opportunities, as it shows steady improvement but lags behind other segments.

70. How does Sales and profit vary by Category over time?

Month

Quarter

Year

**Interpretation:**

1. **Monthly Trends:**
   * Profit fluctuates significantly month-to-month, with some months showing negative profit, especially in the **Furniture** category.
   * **Office Supplies** and **Technology** generally show consistent profitability, with spikes in certain months.
   * **Furniture** has several months with negative profit, suggesting high costs, discounts, or returns impacting margins.
2. **Quarterly Trends:**
   * **Q4 (October - December)** tends to have the highest sales and profits, likely due to holiday shopping trends.
   * **Technology** has the most significant quarterly profit growth, especially in **Q4 2017, Q4 2018, and Q4 2019**.
   * **Office Supplies** shows stable profit growth across quarters, peaking in **Q4 2019**.
   * **Furniture** remains the least profitable and has fluctuations between negative and positive profits.
3. **Yearly Trends:**
   * **Technology** has the highest total sales and profit in every year, with consistent growth.
   * **Office Supplies** also shows increasing profit over the years.
   * **Furniture** remains the lowest-performing category in terms of profitability, sometimes declining or showing minimal gains.

**Recommendations:**

* **Technology is the most profitable category** and grows steadily year-over-year.
* **Office Supplies has stable profitability**, peaking in 2020.
* **Furniture struggles with profitability**, often experiencing losses in some months/quarters.
* **Q4 is the best-performing period for all categories**, indicating strong end-of-year demand.
* **The overall profit trend increases year-over-year**, suggesting a growing business with seasonal patterns.

71. How does Sales and profit vary by Sub-Category over time?

Month

Quarter

Year

**Interpretation:**

1. **Some Sub-Categories may have high sales but low or negative profits**, indicating pricing or cost issues.
2. **Quarterly trends could reveal seasonal demand patterns**, helping optimize inventory and promotions.
3. **Certain Sub-Categories might show consistent losses**, requiring product discontinuation or strategy changes.
4. **Annual trends can highlight profitable and struggling Sub-Categories**, helping refine product focus.

**Recommendations:**

1. **Identify and focus on high-profit Sub-Categories**, scaling successful strategies.
2. **Reduce discounts or renegotiate costs** for Sub-Categories with high sales but low profit margins.
3. **Optimize stock levels** for seasonal Sub-Categories to prevent overstock or shortages.
4. **Consider discontinuing or modifying loss-making Sub-Categories** to improve overall profitability.
5. **Analyze customer demand shifts** and adjust pricing or marketing accordingly.

72. How does Sales and profit vary by Region over time?

Month

Quarter

Year

**Interpretation:**

1. **West & East regions** consistently lead in profit, with the **West reaching $43,795 in 2020**.
2. **Central & South regions** experience fluctuations, with **Central losing $2,152 in Q4 2020** and **South losing $1,542**.
3. **Sales don’t always translate to profit**—e.g., **Central had $147K in sales in 2020 but only $7.5K profit**.
4. **Q4 2020 was highly volatile**, with the East gaining **$20,184** while Central & South saw losses.

**Recommendations:**

1. **Improve profitability in Central & South** by reducing costs and optimizing pricing strategies.
2. **Expand successful strategies from West & East** to weaker regions for balanced growth.
3. **Analyze high-loss periods (e.g., Q4 2020 in Central & South)** to prevent future declines.
4. **Identify low-margin products/services** contributing to profit fluctuations and optimize the product mix.
5. **Monitor sales-to-profit conversion** closely and adjust strategies accordingly.

73. How does Sales and profit vary by State over time?

Month

Quarter

Year

**Interpretation:**

1. **Profitability varies significantly by state**—some states consistently generate profits, while others suffer losses.
2. **Certain states may have high sales but low (or negative) profit margins**, indicating pricing or cost inefficiencies.
3. **Quarterly trends may reveal seasonality**—some states perform better in specific quarters due to demand shifts.
4. **Annual trends help identify long-term growth or decline** in state-level profitability.

**Recommendations:**

1. **Identify underperforming states** and investigate cost structures to improve profitability.
2. **Analyze top-performing states** and apply their successful strategies (e.g., product mix, pricing) to weaker regions.
3. **Optimize inventory and marketing efforts** in states showing seasonal sales spikes for better cost efficiency.
4. **Review discounting and operational costs** in states with high sales but low/negative profit.
5. **Focus on high-profit states** for expansion while restructuring operations in loss-making ones.

**5. Conclusion**

This project successfully analyzed **profit variations across sub-categories over time**, identifying key trends that impact business performance. By utilizing **MySQL for data analysis, MS Excel for data preparation, and MS Word for reporting**, a structured approach was applied to extract meaningful insights for decision-making.

The findings revealed that **Copiers and Phones** generate the highest profit, while **Tables and Bookcases** frequently incur losses, requiring strategic adjustments. Sales volume does not always correlate with profitability, as seen in categories like **Chairs and Machines**, which have strong sales but low margins. Additionally, **seasonal trends affect sub-category performance**, with some products experiencing demand fluctuations across different months and quarters.

To enhance profitability, businesses should **prioritize high-margin sub-categories, refine pricing strategies, and optimize inventory management**. Addressing **loss-making products through cost reduction or discontinuation** and leveraging **seasonal demand for targeted promotions** will further drive growth. By implementing these insights, companies can **increase overall profitability, improve sales efficiency, and strengthen their competitive position in the market**.