

Sales Profitability Analysis & Business Strategy Optimization

Project Introduction: this project outlines the analytical process aimed at identifying the key factors driving sales and profit within a retail company. It utilized historical transactional data from the Superstore Database. The work was divided into three core stages: data preparation in MS Excel, in-depth data exploration using SQL queries, and the visualization of key performance indicators (KPIs) in Power BI.

Stage I: Data Preparation and Feature Engineering (Excel)

Prior to conducting the **SQL analysis**, the data underwent thorough cleaning and transformation, which is crucial for ensuring the reliability of the results. The table below presents a detailed log of the executed operations.

#	Stage / Action	Tool	Description	Result
1	Import raw data	Excel	CSV file → structured table	Data successfully loaded
2	Check data completeness	Excel (Filters, COUNTBLANK)	Verified missing values in date, number, and text fields	No critical missing values
3	Data type conversion	Excel (Format Cells)	Set proper formats: date, number, percentage, text	Formats standardized
4	Remove unnecessary columns	Excel	Row ID, PostalCode, Country	Table width reduced
5	Date validation	Excel IF(Ship<Date)	Checked chronological correctness	100% records valid
6	Remove duplicates	Excel → Remove Duplicates	Duplicates based on Order ID + Product Name	0 duplicates after cleaning
7	Standardize date format	Excel Format: YYYY-MM-DD	Prepared for SQL and Power BI	Format unified
8	Add calculated columns	Excel (formulas)	Year, Month, Profit Margin, Is Discounted, Lead Time, Lead Speed	Extended analytical data
9	Validate numeric ranges	Conditional formatting	Checked negative values / >100%	No anomalies found
10	Standardize text	TRIM, PROPER	Standardized city and product names	Consistent values
11	Export to CSV for SQL	Save as CSV UTF-8	Prepared for database import	File ready for ETL

Stage II: Data Exploration and Insights (SQL)

After data preparation in Excel, the dataset was imported into a database to conduct advanced analysis using SQL. The queries and key analytical findings are presented below.

1. Identifying the Top 10 Products by Total Sales

	Product_Name	Category	Sub-Category	Total_Sales	Total_Profit
1	Canon imageCLASS 2200 Advanced Copier	Technology	Copiers	61599.83	25199.94
2	Fellowes PB500 Electric Punch Plastic Comb Binding ...	Office Supplies	Binders	27453.38	7753.06
3	Cisco TelePresence System EX90 Videoconferencing ...	Technology	Machines	22638.48	-1811.08
4	HON 5400 Series Task Chairs for Big and Tall	Furniture	Chairs	21870.57	0.00
5	GBC DocuBind TL300 Electric Binding System	Office Supplies	Binders	19823.48	2233.50
6	GBC Ibimaster 500 Manual ProClick Binding System	Office Supplies	Binders	19024.50	760.98
7	Hewlett Packard LaserJet 3310 Copier	Technology	Copiers	18839.68	6983.89
8	HP Designjet T520 Inkjet Large Format Printer - 24" Co...	Technology	Machines	18374.90	4094.98
9	GBC DocuBind P400 Electric Binding System	Office Supplies	Binders	17965.07	-1878.17
10	High Speed Automatic Electric Letter Opener	Office Supplies	Supplies	17030.31	-262.00

Insights and Recommendations:

- **Insights:** the **Technology** Category generates the highest revenue, with the **Canon imageCLASS 2200 Advanced Copier** being a standout product, which is also highly profitable.
- **Profitability Risk:** significant heterogeneity in profitability is observed within the Top 10 products.
- **Immediate Intervention:** the **Cisco TelePresence System EX90** product, despite generating high revenue (22.6K), is operating at a loss (-2570.62), requiring swift managerial intervention.
- **Recommendation:** Focus should be maintained on high-margin products (like the Canon copier). Additionally, there is an **urgent need to analyze the costs and discount policy** for products with high sales volume but negative or minimal profitability.

2. Seasonal Sales Trend Analysis

	Year	Sales_by_Year	Profit_by_Year	Orders_by_Year
1	2017	733215.19	93439.77	1687
2	2016	609205.86	81795.27	1315
3	2015	470532.46	61618.69	1038
4	2014	483966.19	49556.12	969

Insights and Recommendations:

- **Insights:** a monthly sales trend analysis reveals a clear **cyclical growth in revenue and profit** in every year of the company's operation. Sales and profit show a tendency to increase sharply in the second half of the year, with peak values regularly achieved in **November and December**.
- **Recommendation:** the company should plan increased investment in marketing, inventory, and logistics staff, concentrating on **Q4 (October – December)** to maximize this cyclic peak. During low-sales months (e.g., February, July), testing new

strategies or reducing operational costs should be considered.

3. Regional Profitability Analysis

	Region	Total_Sales	Total_Profit	Avg_Profit_Margin
1	West	725457.93	108418.79	0.219486
2	East	678499.99	91534.90	0.167300
3	South	391721.90	46749.71	0.163518
4	Central	501239.88	39706.45	-0.104073

Insights and Recommendations:

- **Insight:** domination of the **West and East** as the company's most profitable markets. The **Central Region** requires urgent attention: despite high sales, its low average margin suggests excessive discounting, high operating costs, or poor price management.
- **Recommendation:** focus optimization efforts on the **Central Region** to balance high sales with better profitability, and analyze opportunities for sales growth in the Southern Region.

4. Impact of Discounts on Profitability

	Is_Discounted	Total_Transactions	Total_Sales	Total_Profit	Avg_Profit_Margin
1	Yes	5195	1209011.23	-34578.03	-0.082700
2	No	4798	1087908.47	320987.88	0.340160

Insights and Recommendations:

- **Insight:** there is a strong, negative correlation between applying a discount and profit. The company loses money on every transaction where a discount is applied. Profit from non-discounted transactions is sufficiently high to maintain the company's overall healthy financial results.
- **Wniosek Główny:** the discount policy is detrimental to overall profitability.
- **Recommendation:** discount policy must be urgently reviewed and restricted, ensuring that discounts never lead to a negative aggregated margin.

5. Customer Segmentation

	Segment	Segment_Sales	Segment_Profit	Total_Customers_in_Segment	Avg_Profit_Per_Customer
1	Consumer	1161401.34	134119.33	409	327.920122
2	Corporate	706146.44	91979.45	236	389.743432
3	Home Office	429371.92	60311.07	148	407.507229

Insights and Recommendations:

- **Insight:** the **Consumer Segment** generates the highest total profit. However, the **Home Office Segment** stands out as the most efficient and valuable on a per-customer basis.
- **Recommendation:**
 - **Home Office:** direct specialized, high-margin marketing campaigns toward customers in this segment to leverage their high unit value.
 - **Consumer:** maintain mass strategies and focus on increasing purchase frequency.

6. Impact of Delivery Speed (Lead_Time) on Profitability

	Lead_Speed	Avg_Delivery_Time_Days	Total_Sales	Total_Profit	Avg_Profit_Margin
1	FAST	1,4	561348.74	76045.38	0.133326
2	OK	4,2	1330582.59	156756.20	0.113960
3	SLOW	6,3	404988.37	53608.27	0.125267

Insights and Recommendations:

- **Key Insight:** the fastest executed transactions (FAST, averaging 1.4 days) are the most profitable. It's worth noting that **SLOW transactions are more profitable than OK transactions**. This suggests that customers accepting longer waiting times purchase more expensive, high-margin products.
- **Recommendation:** increase marketing efforts targeting segments willing to opt for FAST delivery (to leverage their high margins), and investigate which products dominate the OK category to raise their margins through pricing adjustments or reduced discounting.

7. Identifying Products with Negative Profit (or Very Low Margin)

	Product_Name	Category	Sub-Category	Total_Profit	Total_Units_Sold
1	Cubify CubeX 3D Printer Double Head Print	Technology	Machines	-9239.97	7
2	GBC DocuBind P400 Electric Binding System	Office Supplies	Binders	-6859.39	16
3	Lexmark MX611dhe Monochrome Laser Printer	Technology	Machines	-5269.97	16
4	GBC Ibimaster 500 Manual ProClick Binding System	Office Supplies	Binders	-5098.57	31
5	GBC DocuBind TL300 Electric Binding System	Office Supplies	Binders	-4162.04	18
6	Cubify CubeX 3D Printer Triple Head Print	Technology	Machines	-3839.99	4
7	Fellowes PB500 Electric Punch Plastic Comb Binding ...	Office Supplies	Binders	-3431.67	9
8	Chromcraft Bull-Nose Wood Oval Conference Tables ...	Furniture	Tables	-3107.52	24
9	Ibico EPK-21 Electric Binding System	Office Supplies	Binders	-2929.48	5
10	Bush Advantage Collection Racetrack Conference Table	Furniture	Tables	-2545.26	25

Insights and Recommendations:

- **Key Insight:** the products at the top of this list represent a financial drain on the company and require immediate action. A significant portion of the losses is concentrated in one or two sub-categories (e.g., Tables), indicating a systemic issue in cost or price management in these areas.
- **Recommendation:** an immediate corrective action plan should be implemented for the 5 products with the largest losses, including: **a) removal from inventory, b) renegotiation of purchase prices, or c) complete halt of discounting.**

8. Analyzing the Impact of City and State: Loss Concentration

	State	City	Total_Sales	Total_Profit	Total_Orders
1	Pennsylvania	Philadelphia	70460.59	-19590.88	250
2	Texas	Houston	37640.70	-14785.41	185
3	Illinois	Chicago	19910.08	-11120.66	155
4	Texas	San Antonio	17395.15	-7831.03	33
5	Ohio	Lancaster	6908.29	-7378.64	13
6	North Carolina	Burlington	12044.87	-5999.33	4
7	Texas	Dallas	9994.05	-4208.55	73
8	New York	New York City	19533.81	-3966.05	40
9	Colorado	Louisville	2884.78	-3694.10	8
10	Arizona	Phoenix	5245.59	-3613.63	27

Insights and Recommendations:

- **Key Insight:** cities like Pennsylvania are the main centers generating negative profit, which points to critical issues in local pricing, discount policies, or logistics.
- **Recommendation:** Introduce a profitability audit at the ZIP Code/City level for the Top 5 loss-generating areas. Corrective actions should be diversified and tailored to the specifics of the local market.

Stage III: Visualization and Dashboards (Power BI)

Visual analysis was conducted in Power BI to condense key performance indicators (KPIs) and present the most important findings in an accessible format.

1. Sales and Profit Overview

Visual Insights:

- **KPIs:** total Sales stand at **2.30M** and Total Profit at **286K**, yielding an average margin of **12%**. This is healthy but shows optimization potential.
- **Annual Trend:** a strong, positive growth trend is evident, particularly dynamic after 2015, confirming the effectiveness of the expansion strategy.
- **Product Categories:** the **Technology** Category generates the highest profit (50.79%), while **Office Supplies** generates the lowest (6.45%). **Furniture** accounts for a large portion of revenue, but its profit is moderate.
- **Regional Profitability:** confirms SQL results: West and East dominate. The Central Region is the least profitable.

2. Discount Impact Analysis

Visual Insights (Confirming SQL Findings):

- **Sales Amount:** sales with Discounts (1.21M) are slightly higher than Sales without Discounts (1.09M).
- **Non-Discount Margin:** non-discounted transactions have a very healthy margin of **30%**.
- **Discounted Margin:** discounted transactions have a **negative margin of -3%**, meaning the company is systematically losing money on every transaction where a discount is applied.
- **Bar Chart:** the graphical comparison (Dynamic Profit with Discounts vs. without Discounts) strikingly shows how 1.21M in discounted sales results in a loss, while smaller sales without discounts generate a large profit. **This is the strongest evidence of the necessity for a revolution in pricing policy.**

3. Product Performance by Sales

Visual Insights:

- **TOP 10:** consistent with the SQL analysis, the **Canon imageCLASS 2200 Advanced Copier** is the leader in terms of sales and profit. The product **Cisco TelePresence System EX90** (in the Top 10) also stands out as one of the few generating a **loss**.
- **BOTTOM 10:** the lowest-selling products are primarily Office Supplies. While the losses here are small, this panel is crucial for identifying products that should be withdrawn from inventory due to low rotation and minimal profit contribution (e.g., **Eureka Disposable Bags**).

Summary and Final Recommendations

Superstore data analysis identified three key financial levers that must be prioritized:

1. **Discount Policy (Critical Weight):** the company is losing money on all discounted transactions (average margin -3%).

Recommendation: transform the discount policy from a mass tool into a strategic one (e.g., for clearance or B2B negotiation). Establish a rule: **no discount should result in a negative transaction margin.**

2. Product Profitability: loss-making products with high sales (Cisco TelePresence) and products with very low margins, such as certain office supplies and furniture, were detected.

Recommendation: withdrawal of the most loss-making products or renegotiation of their purchase prices. Maintain focus on high-margin Technology products.

3. Regional Optimization: uneven profitability, with poor results from the Central Region.

Recommendation: conduct an audit of operational costs and pricing in the Central Region to bring its margin in line with the Western and Eastern Regions.