Tracking Trends in Supply Chain –
A Sales and Profit Review (2015-2017)

Prepared For: Supply Chain Management

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Executive Summary

This report analyses the supply chain performance from 2015 to 2017 using key metrics such as sales, profit, quantity sold, and customer behaviour, based on the DataCoSupplyChainDataset. The data for 2018 was excluded to maintain temporal consistency and avoid bias from incomplete records.
Key observations include a decline in sales and quantity sold in 2017, while profit remained relatively stable. The report explores potential causes, including shifts in product mix, customer retention, and sales trends. Recommendations focus on improving customer engagement, optimizing product strategy, and enhancing demand forecasting.

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I. Introduction

Background:

The DataCoSupplyChainDataset, sourced from Kaggle, contains supply chain data spanning from 2015 to 2018. To ensure temporal consistency and avoid bias from incomplete data, records from 2018 were excluded, and the analysis focused on the period from 2015 to 2017. This report aims to analyse trends in key metrics such as sales, profit, orders, quantity, discounts, and customer behaviour, providing actionable insights to optimize supply chain performance.

Purpose:

This analysis aims to understand the year-over-year changes in key supply chain metrics. It investigates anomalies, such as the phenomenon of decreasing sales but stable profit, and identifies potential causes for declining repeat purchase rates. Furthermore, the analysis provides recommendations for improving profitability and enhancing customer retention.

II. Methodology

1. Data extraction:

SQL queries were utilized to extract relevant metrics from the dataset, ensuring the selection of key supply chain data. The data was then cleaned to remove inconsistencies and null values, ensuring the dataset's accuracy for analysis.

2. Data analysis:

Power BI was employed to visualize key metrics and trends, providing an intuitive overview of the data. Year-over-year comparisons were conducted for sales, profit, orders, the impact of discounts, repeat purchase rates, and quantity sold. Time series analysis was also performed to examine sales trends on a weekly and monthly basis. Additionally, customer segmentation analysis was carried out to assess repeat purchase behaviour.

III. Findings and Analysis

A. Sales trend analysis

1. 2016 vs. 2015 performance

- Sales: Decreased by -0.3%
- Quantity: Decreased by -0.8%
- Profit: Decreased by -0.7%
- Orders: Decreased by -0.2%
- Discount Impact Profit: Increased by +0.2%
- Total Discount: Decreased by -0.3%
- Repeat Purchase Rate: Increased by +1%

⇨ The slight increase in Repeat Purchase Rate (+1%) was a positive sign, but the increased Discount Impact on Profit (+0.2%) indicates that discounts had a slightly negative effect on margins.

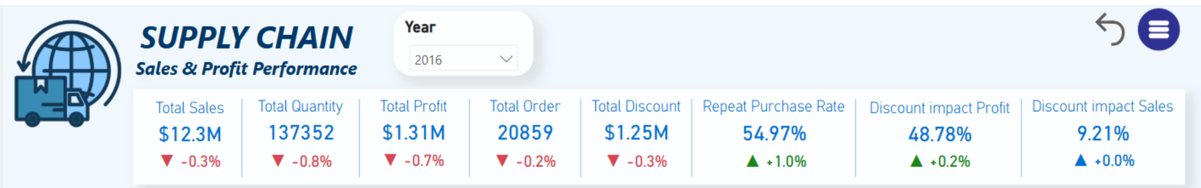


Figure 1: 2016 vs. 2015 key metrics

2. 2017 vs. 2016 performance

- Sales: Decreased by -4%
- Quantity: Decreased by -22.7%
- Profit: Decreased by -0.5%

- Orders: Increased by +4.8%
- Discount Impact Profit: Decreased by -1.9%
- Total Discount: Decreased by -4%
- Repeat Purchase Rate: Decreased by -12.4%

⇨ Despite declining sales, profit only decreased slightly (-0.5%), while orders increased (+4.8%), and repeat purchase rate decrease (-12.4%). This suggests a shift in customer purchasing behaviour.

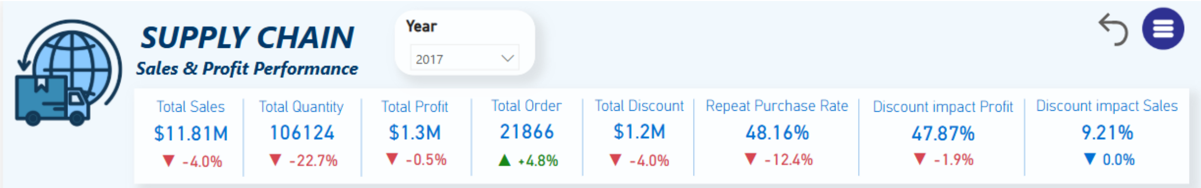


Figure 2: 2017 vs. 2016 key metrics

3. Unusual 2017 sales and profit trends

- October-December 2017 sales dropped significantly, with October sales reaching only half of 2016 levels.
- Total quantity sold in Sep-Dec 2017 was just 1/3 of 2016.
- Weekly trend (Week 40-53 in 2017):
    - Week 40: Sudden sales decline.
    - Week 43: Highest sales peak of the year.
    - Weeks 44-53: Sales fluctuated downward.
- Profit and Orders Trends: Despite the drop in sales and quantity, the total number of orders increased by around 18% each month from September to December 2017, which raises questions about what caused the increase in orders without impacting profit significantly.
- Profit by customer segment remained relatively stable year-over-year, which is unusual given the other declines.

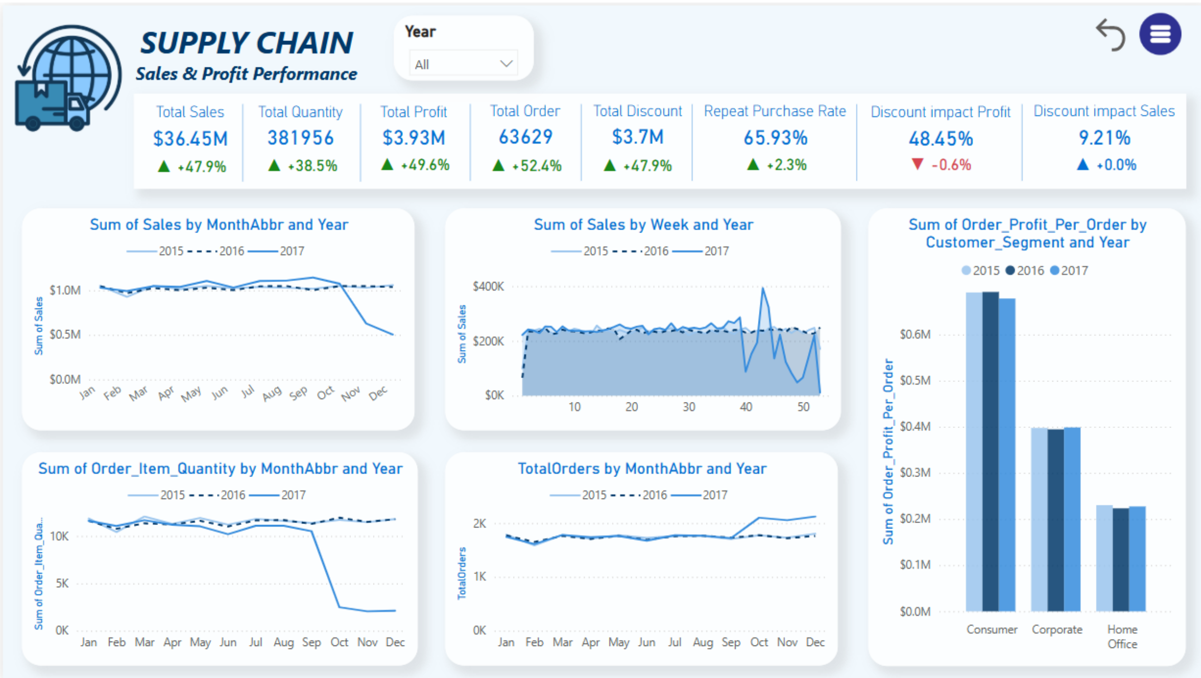


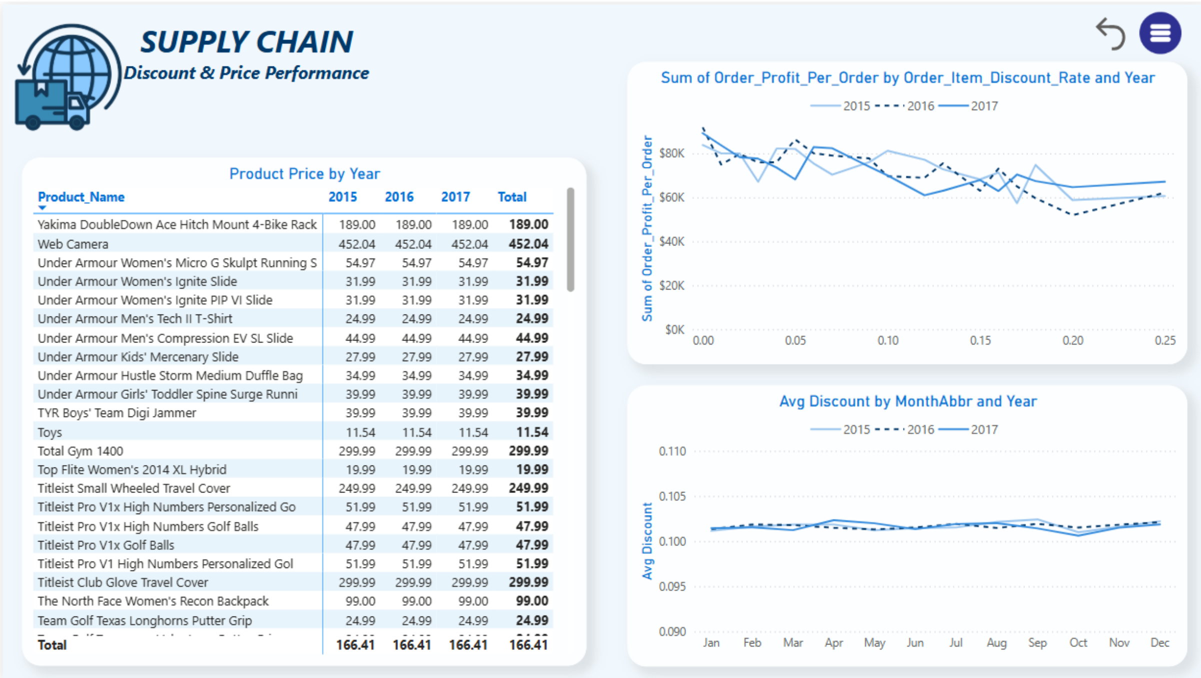
Figure 3: Sales and profit performance

B. Potential causes for trends in 2017

1. Price and discount impact:

- Product Price Trends: There were no price changes across the years.
- Discount Rates: The average discount remained relatively stable (around 0.1) across all years, with no significant impact on the discount trend.

⇨ Findings: Price and discount rate don't seem to be the main factors causing these anomalies.



Product_Name	2015	2016	2017	Total
Yakima DoubleDown Ace Hitch Mount 4-Bike Rack	189.00	189.00	189.00	**189.00**
Web Camera	452.04	452.04	452.04	**452.04**
Under Armour Women's Micro G Skulpt Running S	54.97	54.97	54.97	**54.97**
Under Armour Women's Ignite Slide	31.99	31.99	31.99	**31.99**
Under Armour Women's Ignite PIP VI Slide	31.99	31.99	31.99	**31.99**
Under Armour Men's Tech II T-Shirt	24.99	24.99	24.99	**24.99**
Under Armour Men's Compression EV SL Slide	44.99	44.99	44.99	**44.99**
Under Armour Kids' Mercenary Slide	27.99	27.99	27.99	**27.99**
Under Armour Hustle Storm Medium Duffle Bag	34.99	34.99	34.99	**34.99**
Under Armour Girls' Toddler Spine Surge Runni	39.99	39.99	39.99	**39.99**
TYR Boys' Team Digi Jammer	39.99	39.99	39.99	**39.99**
Toys	11.54	11.54	11.54	**11.54**
Total Gym 1400	299.99	299.99	299.99	**299.99**
Top Flite Women's 2014 XL Hybrid	19.99	19.99	19.99	**19.99**
Titleist Small Wheeled Travel Cover	249.99	249.99	249.99	**249.99**
Titleist Pro V1x High Numbers Personalized Go	51.99	51.99	51.99	**51.99**
Titleist Pro V1x High Numbers Golf Balls	47.99	47.99	47.99	**47.99**
Titleist Pro V1x Golf Balls	47.99	47.99	47.99	**47.99**
Titleist Pro V1 High Numbers Personalized Gol	51.99	51.99	51.99	**51.99**
Titleist Club Glove Travel Cover	299.99	299.99	299.99	**299.99**
The North Face Women's Recon Backpack	99.00	99.00	99.00	**99.00**
Team Golf Texas Longhorns Putter Grip	24.99	24.99	24.99	**24.99**
Total	**166.41**	**166.41**	**166.41**	**166.41**

Figure 4: Discount and price performance

2. Customer performance

- Quantity Sold per Customer Segment: All customer segments saw a decrease in quantity sold in 2017.
- Repeat Purchase Rate: From September to December 2017, the repeat purchase rate plummeted from 10% to 0.44%, with no return customers in November and December.
- Customer Segments: All segments experienced a drop-in repeat purchase rate, indicating a potential issue with customer retention.

⇨ Possible Question: Is the company failing to retain customers? If so, why is the profit stable despite lower repeat purchases?

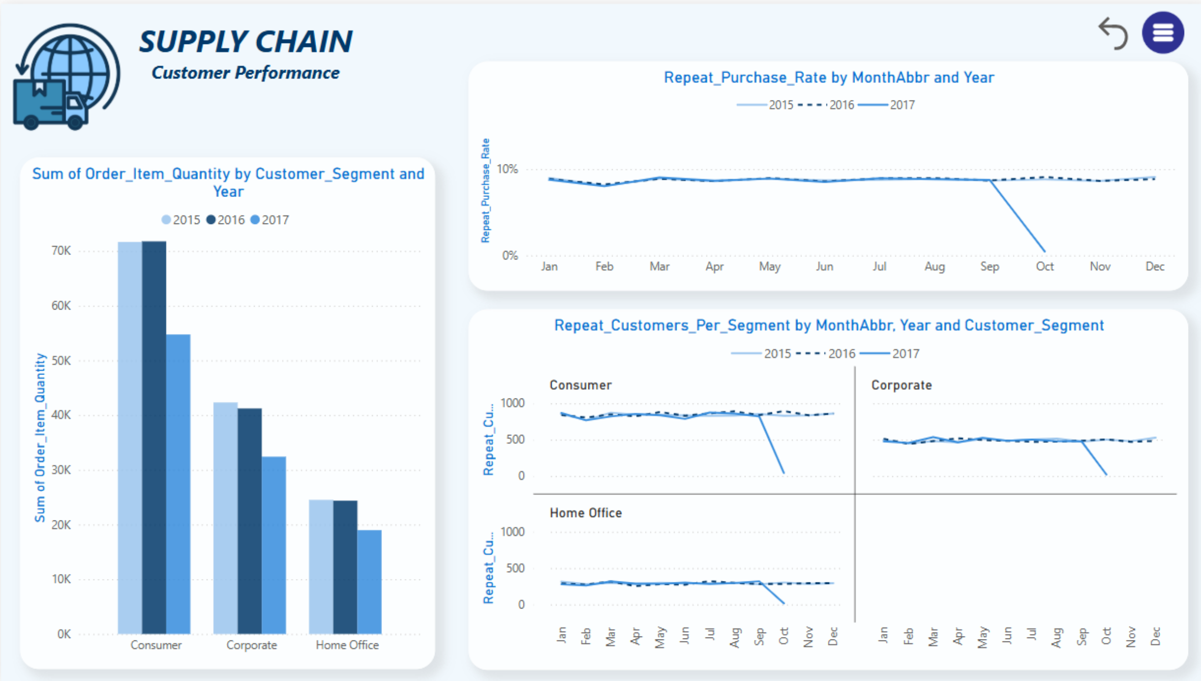


Figure 5: Customer performance

3. **Product performance**

Sales and Quantity Trends by Product:

- Products that had high sales in 2015 and 2016 experienced a decline in 2017.
- New products were more popular in 2017, especially products like Dell laptops (computers) and web cameras (cameras).
- These new products had higher prices, but the quantity sold was lower, indicating that customers were purchasing fewer, higher-priced items.

⇨ Findings: In 2017, the product mix shifted toward newer, higher-priced products, which explains the lower quantity sold but potentially stable profits from these high-priced items.

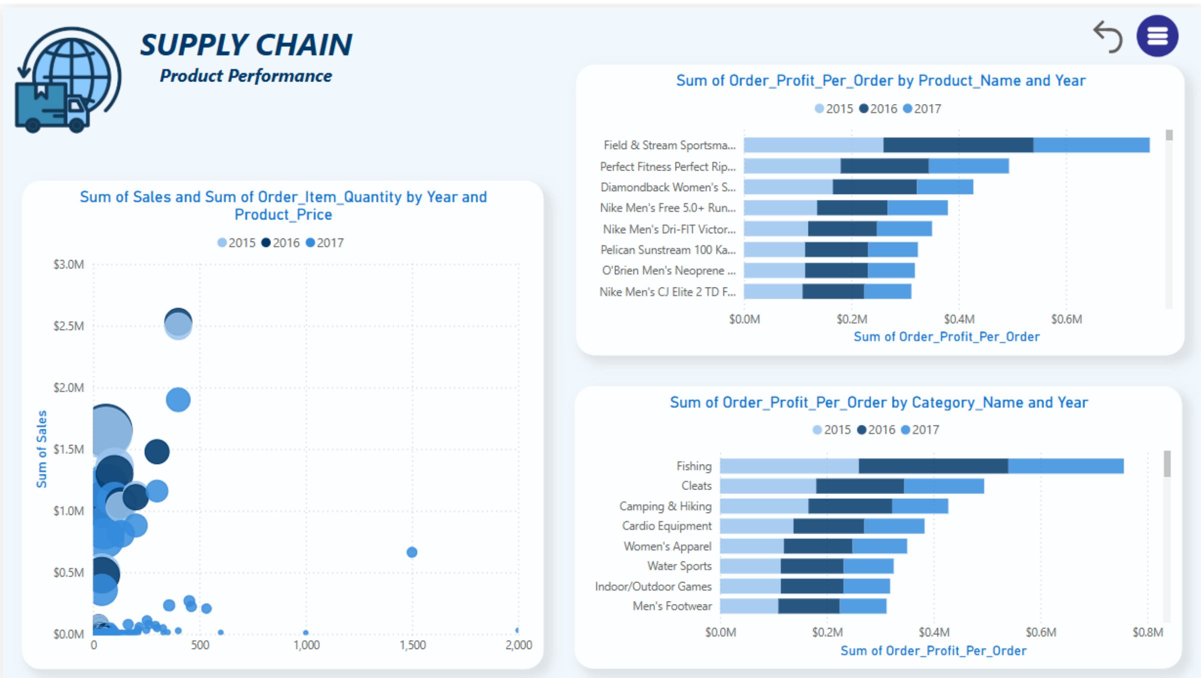


Figure 6: Product performance

IV. Conclusions

The supply chain analysis for 2015-2017 reveals several key findings:

- Declining Sales and Quantity: Sales and quantity sold saw a consistent decline, especially in 2017. This drop in quantity was most pronounced in the second half of the year.
- Stable Profit Despite Decreases: Profit remained relatively stable, despite declining sales and quantity sold. This suggests that higher-margin, higher-priced products, which contributed to a shift in the product mix, helped offset the impact of lower sales volume.
- Decreased Repeat Purchase Rate: Customer retention appears to be a significant concern, as the repeat purchase rate dropped drastically in the latter half of 2017, despite an increase in the number of orders.
- Effect of Discounts: Although discounts slightly increased profit impact in 2016, the overall trend suggests that discounting may have led to lower profit margins. However, the 2017 data indicates that discount strategies were not a major factor in maintaining profitability.
- Product Mix Shift: The company shifted towards selling higher-priced, lower-quantity products in 2017. This shift may have insulated profits from the impact of declining quantity sold but raises concerns about customer purchase behaviour and retention.

V. Recommendations

1. Focus on Customer Retention:
   - The significant drop-in repeat purchase rates from September to December 2017 indicates a need to improve customer loyalty strategies. The company should consider implementing targeted customer retention programs, such as loyalty rewards, personalized marketing, or follow-up offers to encourage repeat purchases.
2. Evaluate the Impact of Higher-Priced Products:
   - While the shift to higher-priced products helped maintain profit margins, the lower sales volumes of these items indicate potential issues with customer preferences. The company should consider balancing the product mix with a blend of mid-range products that attract higher volume sales while still offering premium items for higher profit margins.
3. Revisit Discount Strategies:
   - The company's discount strategy may have led to lower margins in 2016. A more targeted and data-driven approach to discounts should be adopted, offering discounts based on customer segments, product performance, or time-sensitive promotions to maximize the impact of discounts without sacrificing margins.
4. Enhance Demand Forecasting and Product Availability:
   - The significant fluctuations in sales trends in late 2017 suggest that demand forecasting and inventory management may need improvement. The company should invest in better forecasting tools and improve stock availability for products with higher demand, particularly during the peak months.
5. Further Investigate Seasonal Trends:
   - The sharp drop in sales from October to December 2017 compared to 2016 suggests that there may be external factors affecting seasonal trends. The company should analyse external factors (such as marketing promotions, economic conditions, competitors, or market shifts) that may have influenced consumer behaviour during these months and adjust strategies accordingly.

By implementing these recommendations, the company can improve customer retention, optimize its product strategy, and better balance profitability with product demand trends moving forward.