

Business Analytics, Applied Modelling and Prediction Coursework Project:

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Executive Summary :

- The cumulative sales and profits of the Superstore are \$12.6M and \$1.5M respectively, with a Profit Ratio of 11%, over the four years from 2018 to 2021
- The primary sales driver is 'Technology' product category, which contributes to 38% of total cumulative sales and growing at 26% in 2021
- 'APAC' is the largest market for Superstore with cumulative sales of \$3.6M, contributing to 28% of total cumulative sales
- While 'Canada' is the most profitable market with an average profit ratio of 25%, it contributes only 0.5% to the total cumulative sales of Superstore
- 'EU-Central' is the largest region for Superstore with cumulative sales of \$1.7M, contributing to 14% of total cumulative sales
- 'US-West' is the most profitable region with an average profit ratio of 22%, contributing to 6% of total cumulative sales
- The product category, 'Technology' had the highest cumulative sales (\$9.5M), and within that, the subcategory of 'Phones' contribute to 36%, followed by 'Copiers' that contribute to 32% of total cumulative 'Technology' sales
- The 'Consumer' segment accounts for over 50% of the total sales but average sales per order remains constant over all the Customer Segments
- 'Tables' stands out as only subcategory with negative profit ratio due to its high discounts, although it has the highest average price per unit
- Copiers, on the other hand, are more profitable despite having lower average price per unit
- The top 10 most profitable products (mostly from 'Technology' category) all have high average price per unit and minimal discounts
- Of these top 10 products, 'Canon copier' is one of the highest earners in terms of sales and profits
- Discount was found to have a negative relationship with profit ratio
- Shipping costs vary greatly over categories and regions. This can be attributed to product mix of regions and quality of shipping network
- In order to increase profitability, Superstore can adjust its business model by adjusting discount values especially for the subcategory, 'Tables'
- Greater promotional effort on specific products in profitable regions like 'North Asia' can help improve overall profitability

Introduction:

This report, based on the 'superstore' dataset, aims to highlight key performance areas and commercial insights with the primary objective of maximising profit. Emerging Sales and Profit trends across Markets, Product Categories and Customer Segments have been presented along with specific focus on factors that influence profitability; through five succinct dashboards. Finally, recommendations about how to improve overall profitability have been provided.

1. Overview of Sales

The Superstore reported cumulative sales of \$12,642,502 from 2018 to 2021, with a 17.45% Compounded Annual Growth Rate. However, despite the total sales increasing, the Year-on- Year growth has slowed down slightly from 2020 (128%) to 2021 (126%). Sales were analysed over the four years across product categories/subcategories, markets/regions and customer segments.

Amongst the product categories, 'Technology' has the highest cumulative sales (\$4.7m) and highest share of total sales (37%). 'Phones' were the highest selling sub-category from 2018 to 2020; but in 2021 'Copiers' sold nearly as much as 'Phones' and both sub-categories accounted for 68% of the total sales of 'Technology' products.

The 'APAC' market contributes to nearly a third of the total sales (28%) followed by the 'EU' market. Regional analysis reveals that 'EU-Central' has the highest cumulative sales followed by 'APAC - Oceania' (\$1.7m and \$1.1m respectively).

The 'Consumer' segment accounts for nearly half of the total cumulative sales of the superstore, over the years. However, the average sales per order from each of the customer segments is nearly identical.

2. Overview of Profits

The Superstore had cumulative profits of \$1,467,457 from 2018 to 2021. Profits increased over the years with a Compounded Annual Growth Rate of 19.29% but its Year over Year growth decreased from 2020 (133.5%) to 2021(123.5%). Product categories/subcategories, markets/regions and customer segments were factored in whilst analysing profits and profit ratios over the four years.

'Technology' has the highest profit ratio at 13.99% followed closely by 'Office Supplies' at 13.69%. Interestingly, despite 'Furniture' generating almost as much sales as 'Technology' it is significantly less profitable (profit ratio: 6.94%).

'Tables' as a product subcategory is extremely unprofitable with a -8.5% profit ratio, despite contributing nearly 6% to cumulative sales and has a net loss of \$64,083. On the other hand, 'Paper' and 'Labels' have the highest profit ratios 24.24% and 20.45% respectively. However, their contribution to sales, and

consequently to profits, is insignificant. The two subcategories with highest sales - 'Accessories' and 'Copiers' have high profit ratios of approximately 17%.

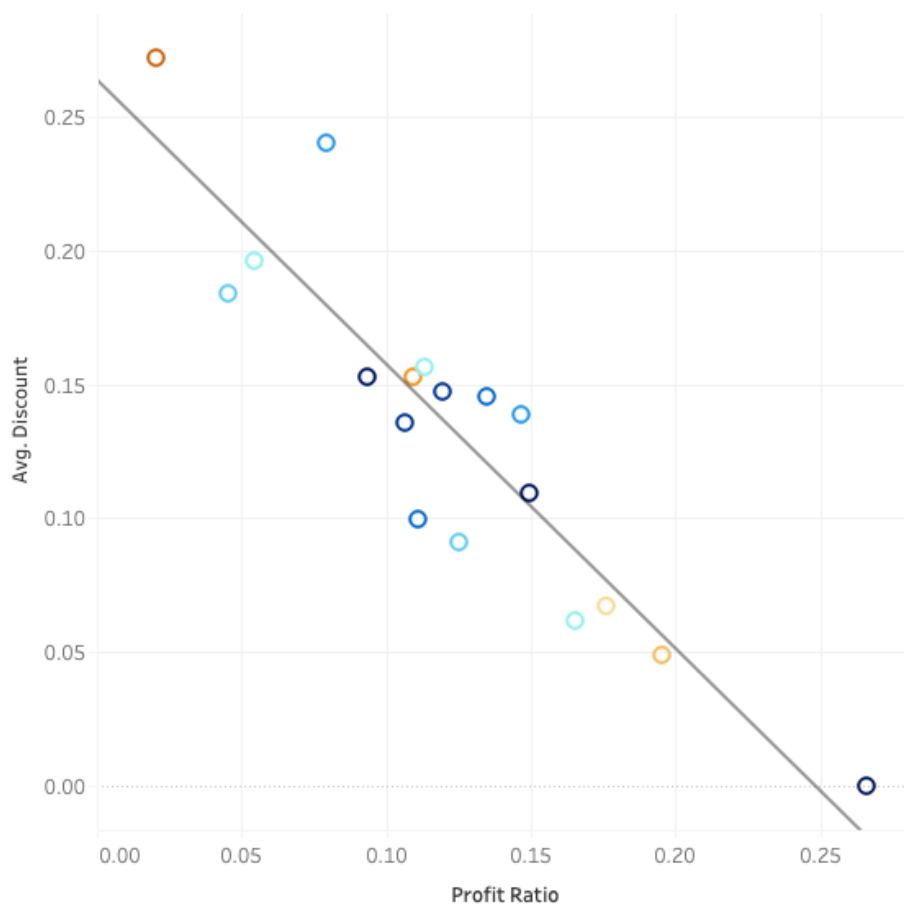
Cumulatively, 'APAC' market contributes to 30% and 'EU' market to 25% of the total cumulative profits. Despite its nascent state, Canada is the most profitable market with a 26.62% profit ratio.

The 'Consumer' segment contributes to 50% of cumulative sales as well as profits - the remaining two customer segments also show the same contribution to profits as their contribution to cumulative sales.

3. Impact of Discounting

Discounting is often used to drive sales and hence to assess the impact of discount on profitability we developed a Scatter Plot of average discount and sales as well as average discount and profit ratio across Product Categories/subcategories and Markets/Regions.

Scatter plot of Average Discount vs Profit Ratio across Regions



The scatter plots indicate a weak correlation between average discount and sales, however there is a positive correlation between average discount and profit ratio. Therefore, to better understand this relationship, we explored profitability across different markets and categories of products:

Although currently 'Canada' contributes just 0.5% to cumulative sales, it is the most profitable market with 25% average profit over the years and does not offer any discounts. On the other hand, 'EMEA' has the lowest profit ratio of 5.4% but the highest average discount (19.6%).

Within the same market, we do find differences in profit ratios due to differences in average discounts, at the regional level. For instance, in the 'APAC' market, 'North Asia' and 'Southeast Asia' have similar sales performance but very different profit ratios (19.5% and 2% resp.) which can be attributed to differences in average discounts (4.9% and 27.2% resp.).

When looking at subcategories, the profit ratio of 'Tables' stands out. The average discount of 'Tables' is by far the highest at 29% while the average discount across all categories is only 14.82%. When trying to assess the average profits of 'Tables' over different regions, we find that the regions with higher average discount, have lower profit ratios, e.g., EU-Central and APAC-Southeast Asia, two regions with the highest average discounts and the lowest profit ratios.

4. Shipping Efficiency

In order to determine shipping efficiency of the Superstore, we analysed Shipping Costs as well as Shipping mode and the time taken to deliver orders. Marked differences in shipping costs across products categories/subcategories, markets/regions and customer segments, were noticed.

Most notably, these seven product subcategories with higher average shipping costs than others: Tables, Bookcases, Appliances, Chairs, Copiers, Machines and Phones. A possible explanation could be that these are larger-sized items that may require more resources to ship.

Average shipping costs also vary greatly over markets since they depend on the types of products sold in those markets. Therefore the seven subcategories with above-average shipping costs were considered, and their percentage of total sales in each market was analysed.

'APAC' and 'EU', two markets with highest average shipping cost, were found to have 75% of their total sales coming from the above-mentioned subcategories. Whereas, in markets such as 'EMEA' and 'Africa' with lower average shipping costs, these subcategories contribute to 65% of their total sales.

While 'North Asia' and 'Southeast Asia' regions have similar cumulative sales, there is marked difference in their average shipping costs (40.65 and 29.94). Interestingly, when the average delivery time (per shipping mode) was plotted for the shipping modes across the two regions, we find that 'Southeast Asia' has higher delivery time. This could mean that North Asia has a more advanced shipping network, which could possibly account for its higher shipping costs.

5. Focus on Products

Graphing the average price per unit of subcategories reveals that 'Tables' has the highest average price per unit across its products (\$346) followed by 'Copiers' (\$229). Despite this, 'Copiers' does significantly more in sales (second highest earner) and has a higher profit ratio. 'Tables' and 'Machines' have the lowest profit ratios but have relatively high average price per unit. Their low profit ratios can be attributed to their above average discount levels.

Of the top 10 products with the highest average profit, the top 9 belong to the 'Technology' category, more specifically to 'Machines' and 'Copiers' subcategories. Nearly all the products have zero or minimal discount and high average price per unit. However one product stands out - 'Canon imageCLASS 2200 Advanced Copier' which has the highest price per unit. And overall, is one of the highest earners in terms of sales and profits. Further analysis reveals that it has only been selling in 2020 and 2021 and unlike similar products which have comparable profits, it has a significant amount of discount in 2020 while still being profitable. The discount was drastically reduced in 2021 and its profit ratio continued to increase.

Recommendations

The objective of this report was to uncover trends in sales and profits across markets/regions, product categories/subcategories and customer segments, and to arrive at recommendations to improve overall profitability.

We have examined the impact of discounting and have found that it affects profitability significantly - this is especially well elucidated within the product subcategory of 'Tables' - which has 170 unique products and cumulative sales of around \$750,000, over the four years, but results in a net loss of \$64,000. However, we find that there are 66 products with an average discount under 25%. These products account for \$310,000 in sales (40% of total sales) but are far more profitable as they generate nearly \$8,000 in profit. Hence we recommend that in order to make 'Tables' more profitable across markets, the discount level should not cross 25%.

Secondly, it was found that within markets, the different regions have varying profitability. Therefore in addition to adjusting discounts in low profit regions, it is recommended that promotional spend be increased in regions with higher profitability and to promote the correct product mix. For instance, the profit ratio for 'North Asia' (18%) is far higher than the average of the entire APAC market (8%), and products like Bookcases, Chairs, Copiers and Phones which together generate 57% of cumulative sales for the region are also the products that drive the profitability of the region and therefore can be promoted more heavily.