ST2187 FINANCIAL ANALYSIS BY VISUALISATION

Recommendations to senior management

Table of Contents

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Executive Summary:

Introduction:

The objective is to extract critical insights to assist senior management in decision-making to streamline or enhance certain business processes. With data visualisation, findings are made more concise and easier to read for immediate adjustments to ensure positive business growth.

Discoveries followed by Suggestions to boost sales:

'Discount, Quantity, and Customer Ranking per Segment' discovers that most profitable orders are from the 'Consumer' segment.
Suggestion: To increase the median discount for the 'Consumer' segment.

'Profit by Categories and Sub-Categories' discovers that products from the 'Tables' sub-category are loss-making.
Suggestion: To slow production for products in the 'Tables' sub-category.

'Profit-Sales Predictor with a Loss Identifier' discovers that losses from selling products in the 'Tables' sub-category complicate profit forecasting for products in the 'Furniture' category.
Suggestion: To increase resources spent on marketing for products in the 'Binders' sub-category instead of the 'Tables' sub-category.

'Profit Ratio by Geography and Profitable Orders' discovers that there is a possible relationship between unprofitable orders for products in the 'Furniture' category and unprofitable orders for the 'Consumer' segment.
Suggestion: To invest in better advertising and quality checks for products in the 'Furniture' category.

'Sales by Sub-Category and Order-Until-Ship Window' discovers that there is a low frequency of orders for products in the 'Tables' sub-category, and a reason could be the longer average order-until-ship window.
Suggestion: Reduce the shipping period by streamlining some in-house processes that can be replaced by well-established third-party service providers.

Story

Discount, Quantity, and Customer Ranking per Segment:

We will be comparing data across three segments based in the Southeast Asia region with a sales range of $5K to $7K.

'Discount by Segment and Region' explores variations in discounts across different segments using a box plot. The 'Consumer' and 'Home Office' segments have an identical interquartile range (IQR) of discounts from 17% to 45%, while the 'Corporate' segment has a greater IQR of discounts from 17% to 47%. However, the 'Corporate' and 'Home Office' segments have the same median discount of 27%, while the 'Consumer' segment has a lower median discount of 25%.

'Quantity per Segment' explores the variations in percentages of orders per segment as the number of items in an order increases using a histogram. Orders with a quantity between 0 and 2 are 56.16% 'Consumer', 23.63% 'Corporate', and 20.21% 'Home Office'. Orders with a quantity between 2 and 4 are 51.70% 'Consumer', 30.77% 'Corporate', and 17.53% 'Home Office'. These percentages do not show a clear trend as the number of items in an order increases. However, for quantities until 10, the bulk of orders is made by 'Consumer', followed by 'Corporate', then 'Home Office'.

'Customer Ranking in Sales and Profit by Segment' explores the ranking of customers by segments using packed bubbles. The size of each circle indicates the sales from each customer, and most of the identified customers here are similar, with approximately $6K. 'Jamie Frazer', a consumer, is labelled with the darkest green, which indicates the most positive profit. Conversely, 'Joy Smith', a consumer, is labelled with the darkest red, which indicates the most negative profit. In order of profit-making, 'Jamie Frazer' is first, and 'Joy Smith' is last in the ranking.

Since most of the profitable orders are made by consumers, senior management can consider increasing the median discount for consumers to boost sales.

Profit by Categories and Sub-Categories:

We will be comparing profit between categories and sub-categories.

'Profit Percentage by Categories' compare profit percentage across categories using gauge charts. The highest is 45.18% for 'Technology', while the lowest is 19.51% for 'Furniture'.

'Running Sum of Profit across Sub-Categories' illustrates the running sum of profit using a waterfall chart. Starting from 'Accessories' and ending at 'Tables', the highest positive profit is for 'Copiers' at $258K in the darkest green, the lowest positive profit is for 'Fasteners' at $11K in the lightest green, and the only dark red, which indicates negative profit is for 'Tables' at -$63K. The net running sum of profit amounts to $1,466K.

'Monthly Profit by Sub-Category in a Year' examines monthly profit of a sub-category in a specific year. The monthly profit for 'Tables' in 2022 has a general downward sloping trend compared to other sub-categories in 2022.

Based on 2022 alone, it is evident that senior management should re-organize products in the 'Tables' sub-category. Since 'Furniture' has the lowest profit percentage of 19.51% compared to other categories, slowing production in the 'Tables' sub-category can increase demand and potentially improve profit percentage.

Profit-Sales Predictor with a Loss Identifier:

We will be comparing data across categories, sub-categories, and regions.

'Sales by Market' uses tree-maps to compare net sales between different markets. 'APAC' has the darkest colour gradient, which indicates highest net sales, followed by 'EU' and 'US'.

'Profit vs Sales by Category' uses a scatterplot to generate a regression line for profit against sales for each category. The regression line for 'Office Supplies' has the best fit, as its R-squared value of 0.772314 is closest to +1. Thus, predictions made using the 'Office Supplies' regression line are closer to the observed values, as compared to regression lines for the other categories. A model is considered significant with a p-value of less than 0.05. The model is also more significant the lower its p-value is. Thus, the model for 'Furniture' fits the data poorly with a p-value of 0.0381479 compared to the best-fitted 'Office Supplies' with a p-value of 0.0001674.

'Profit by Region, Sub-Category, Segment' uses a highlight table to accentuate more positive profits with a darker green, and more negative profits with a darker red across sub-categories and segments in every region. In this case, we will scrutinise profits across sub-categories and segments in the 'Central' regions. Visually, the highest positive profit is for 'Phones' in the 'Consumer' segment at $30.40K, and the lowest positive profit is for 'Binders' in the 'Corporate' segment at $0.31K. The only red-coloured cells are for 'Tables' across all segments, ranging from -$11.12K to -$3.86K.

Senior management can consider removing products in the 'Tables' sub-category in the calculation to improve the 'Furniture' regression line, which has the lowest R-squared value of 0.362984 compared to the other two categories. By making this change, the predicted sales and profit data will be closer to the observed values for 'Furniture' excluding 'Tables'. To add, more creative resources can be used to market 'Binders' products in the 'Corporate' segment, as there is potential to make more profit.

Profit Ratio by Geography and Profitable Orders:

We will be comparing profit ratio and profitable sales across segments and categories in some central regions in the United States for order dates between 1/1/2019 and 1/1/2021.

'Profit Ratio by Geography' assesses profit ratio (net profit/net sales) of states and cities using a map. By selecting 'Illinois' on the map, a bar chart collates the profit ratio of every city in 'Illinois'. Profit ratio is labelled as a darker orange for more negative percentages, and a darker blue for more positive percentages. The overall profit ratio for 'Illinois' is -8.8%, highlighting the state as a light orange colour on the map. While cities in 'Illinois' have varying profit ratios from negative to positive, a nearby 'Missouri' has a light blue colour with 38.7% overall profit ratio, as all its cities have positive profit ratios.

For the following two area charts, blue indicates that orders are profitable, while orange indicates that orders are unprofitable.

'Monthly Sales by Segment' assesses whether orders are profitable across segments. From the data of 'Illinois' and 'Missouri' combined; it is evident that majority of unprofitable orders come from 'Consumer' due to its larger orange area, compared to other segments. Most profitable orders are largely split between 'Consumer' and 'Corporate', as seen from the blue areas.

'Monthly Sales by Category' assesses whether orders are profitable across categories. From the data of 'Illinois' and 'Missouri' combined; it is evident that majority of unprofitable orders come from 'Furniture' due to its larger orange area, compared to other segments. Most profitable orders come from 'Technology', which takes a larger portion due to its larger blue area, and 'Office Supplies' that takes a smaller portion due to its smaller blue area.

Senior management can consider re-structuring marketing strategies towards consumers for the states of 'Illinois' and 'Missouri'. There is a possible link between unprofitable orders for 'Furniture' products and those for consumers. 'Furniture' products require better advertising and a strict routine check for quality such that consumers are willing to increase their purchasing power to increase profitable orders.

Sales by Sub-Category and Order-Until-Ship Window:

We will be examining sales percentage by sub-category and the average order-until-ship window. For this task, we aim to identify the sub-categories of products that take a longer average order-until-ship window of 5.000 to 7.000, and its ship mode for sales range $5K to $10K.

'Sales by Sub-Category' compares the percentage of sales every sub-category occupies in its respective categories, using pie charts. For example, the net sales for 'Furniture' are comprised of 5.99% 'Tables', 3.05% 'Furnishings', 11.60% 'Bookcases', and 11.88% 'Chairs'.

'Average Order-Until-Ship' compares the average order-until-ship (order date till ship date) window across sub-categories and ship modes. It is evident that products from the sub-categories of 'Bookcases', 'Chairs', 'Copiers', 'Machines', 'Phones', 'Storage', and 'Tables' shipped using 'Standard Class' take an average order-until-ship window between 5.000 to 7.000. It is notable that throughout the year, orders for products in the 'Tables' sub-category only account for one instance in the month of December, as compared to other sub-categories.

Senior management can compare customers' delivery complaints with the analysed data and discern the in-house processes that can be made more efficient by hiring third-party service providers to reduce such complaints. To add, it would be ideal to follow-up with a survey for customers about why 'Tables' products are not popular all year round.

Word Count

Excluding executive summary, table of contents, labels, footnotes, the word count is 1389.