

**BUSINESS ANALYTICS, APPLIED MODELLING, AND PREDICTION  
(ST2187)**

**COURSEWORK PROJECT  
TABLEAU VISUALIZATION**



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## Executive Summary

In a world built on data and analytics, it is important for modern companies to be dynamic in their business plan to stay relevant and to prolong their longevity. This report will touch on five interactive dashboards which cover several different aspects of a business. Said dashboards cover topics such as sales and profit overview, market analysis, category analysis, customer analysis, and profit forecast respectively. This data enables us to estimate upcoming cycles thus allowing us to optimize the strategies that will be implemented with the goal of maximizing profits.

In the sales and profit overview, we will analyze profit by each country, overall sales by segment, and sales and profit ratio by category. From this result, we can proceed with deeper analysis in the next dashboard. In market analysis, we will discuss countries that have the highest and lowest profits by sub-categories. Moreover, deepen the research by analyzing the US states which generate high profits and losses also examining profit ratio by market.

From category analysis, we will discuss sales and profit ratios by sub-categories and their average discount. We also evaluate the correlation between profit ratios and average discount. In customer analysis, we examine the ship mode by sales, average shipping cost, preferred shipping mode by order priority, and quarterly sales by category. From this result, we can understand customers' behavior and preferences. Finally, in the profit forecast, we will forecast overall profit, forecast category by profit, and forecast segment by profit.

Through the rigorous process of analyzing the data, we have uncovered interesting facts. A perfect example of this is despite phones having the largest amount of sales, papers still have the highest profit margin of all sub-categories. In addition to that, the data points to the fact that the majority of customers are price sensitive in the sense that they would prefer standard shipping over other faster options that are provided. Lastly, it is important to note that both sales and profit seem to peak on the fourth quarter of every year but would in turn plummet on every first quarter.

Bottom line, while this business excels in generating decent numbers, there are still some glaring issues in need of fixing and optimizing. This report will dive into the details of how we could use the data that has been collected for the betterment of the company.

## **I. Introduction**

### **A. Purpose**

This report tells us about the company's performance throughout the past few years. The purpose of this report is to find important insights and give recommendations to increase the company's overall performance.

### **B. Data**

The data given was from 31 December 2016 to 30 December 2020. We will analyze the dataset by finding the relationship and trend to find crucial insights. There are three main product categories which include furniture, office supplies, and technology.

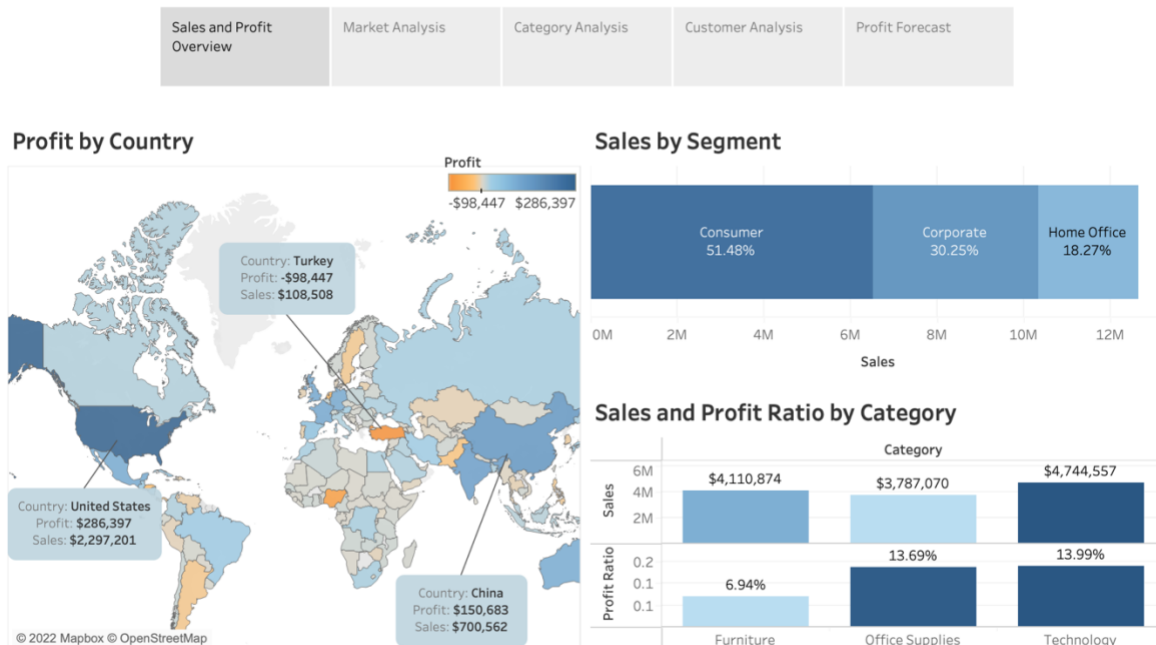
### **C. Visualization**

We will use Tableau to produce the visualization by utilizing the map charts, bar charts, scatter plot, treemap, line charts, and area chart to create interactive dashboards.

## II. Story

### A. Sales and Profit Overview

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From profit by country, the United States has the largest profit of \$286,397, followed by China with a profit of \$150,683. Turkey, on the contrary, has the largest loss of -\$98,447. Other than that, most African countries have low sales, resulting in low profits. In sales by segment, consumers account for 51.48% of total sales, followed by corporate and home office, which makes up for 30.25% and 18.27% respectively. A possible reason for this is that consumers have larger product variations than corporates and home offices.

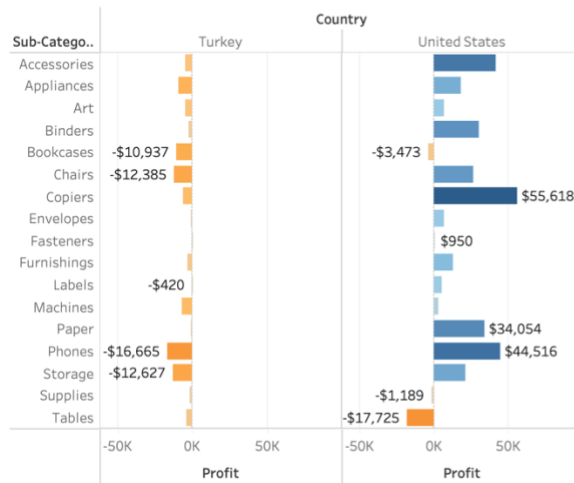
In the category, technology has the highest sales and profit margins of \$4,744,557 and 13.99%, this is followed by furniture with sales of \$4,110,874 but the lowest profit margin of 6.94%. With the final category being office supplies, it is interesting to note that while it has the lowest sales of only \$3,787,070 it has a relatively good margin of profit at around 13.69%. All in all, profit margins higher than 10% could be considered healthy while on the contrary anything below that is relatively low.

## B. Market Analysis

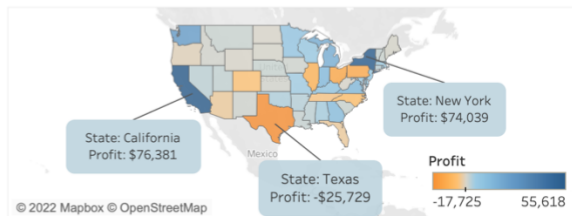
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Sales and Profit Overview	Market Analysis	Category Analysis	Customer Analysis	Profit Forecast
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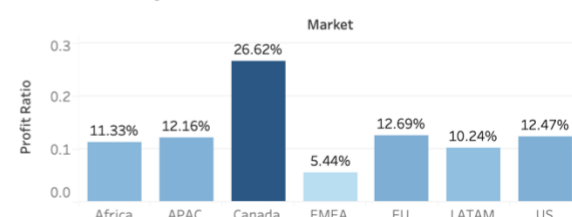
United States and Turkey's Profit Breakdown



US by States Details



Profit Ratio by Market



In market analysis, we want to compare countries with the highest profit and loss by sub-category, which are the United States and Turkey respectively. In Turkey, all sub-categories have reported losses, with phones being the worst at around -\$16,665. The United States on the contrary, has a strong profit on most of the sub-categories, with copiers having the largest profit of \$55,618. Furthermore, for the United States, California has the largest profit of \$76,381 closely followed by New York at around \$74,039. A driving force for this could be the fact that property prices in both states are significantly more expensive than other parts of the US due to the high spending power of the people because of wealth effect. This will unequivocally lead up to an increase of the sales number and profit. Moreover, a part of California, the Silicon Valley is a global center of start-up and technical innovation. In contrast, Texas has the highest loss of -\$25,729. A possible reason is the low property prices that cause low spending power. This results in sales and profit to drop, even losses.

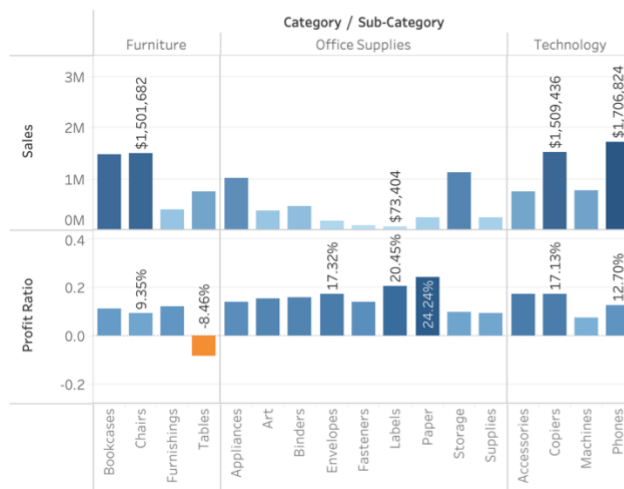
From profit ratio by market, Canada leads all markets at a whopping 26.62% which is considered a high-profit ratio. Markets such as Africa, Asia-Pacific, Europe, Latin America, and the United States have ratios between 10% and 20% which again is considered healthy. However, Europe, the Middle East, and Africa in contrast to the rest, have a relatively low margin of only 5.44%. This was mainly caused by incompetent management of the production cost and pricing strategies.

## C. Category Analysis

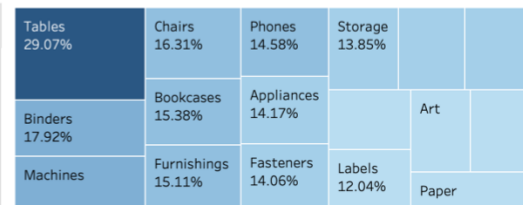
### Business Analytics Coursework

Sales and Profit Overview	Market Analysis	Category Analysis	Customer Analysis	Profit Forecast
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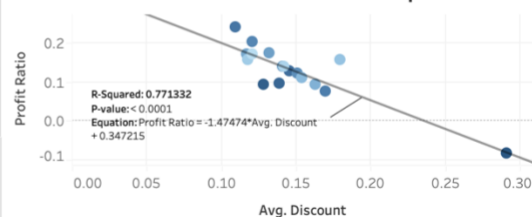
Sales and Profit Ratio by Sub-Category



Discount by Sub-Category



Discount and Profit Ratio Relationship



According to the sales and profit ratio bar chart, phones have the largest sales of \$1,706,824, followed by copiers and chairs. However, large sales do not guarantee good selling performance since the profit ratio must also be considered. As seen, paper has the highest profit ratio of 24.24%, followed by labels and envelopes with 20.45% and 17.32% respectively. Notice that table's profit ratio is negative, implying that the cost of manufacture is larger than the total sales.

In terms of discount by sub-category, tables have the biggest average discount of 29.07%, followed by binders and machines with 17.92% and 16.96% respectively, while the other sub-categories have an average discount between 10% and 16%. Thus, we can assume that there is a correlation between average discounts and profit ratio.

From the scatter plot, the equation of trend line is Profit Ratio = -1.47474 \* Avg. Discount + 0.347215. The P-value is below 0.0001 which is very small and the R-squared is 0.771332 indicating a high level of correlation between average discount and profit ratio. The conclusive evidence is the points are spreading near the trend line and forming a downward sloping pattern. With this proof, we may conclude that profit ratio and average discount have a strong correlation.

## D. Customer Analysis

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Sales and Profit Overview	Market Analysis	Category Analysis	Customer Analysis	Profit Forecast
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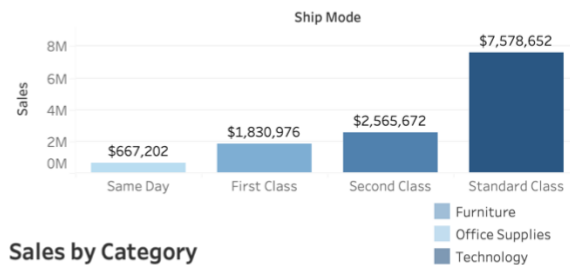
#### Average Shipping Cost

Standard Class	Second Class	First Class	Same Day
\$19.97	\$30.47	\$41.05	\$42.94

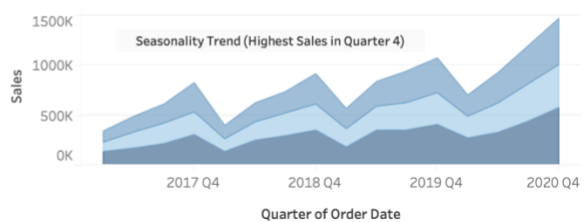
#### Ship Mode by Order Priority

Order Priority	Ship Mode	Sales
Critical	Same Day	\$178,624
	First Class	\$416,907
	Second Class	\$390,704
High	Same Day	\$315,053
	First Class	\$829,953
	Second Class	\$970,082
Low	Standard Class	\$1,692,460
	Standard Class	\$567,826
Medium	Same Day	\$173,525
	First Class	\$584,116
	Second Class	\$1,204,886
	Standard Class	\$5,318,366

#### Ship Mode by Sales



#### Sales by Category



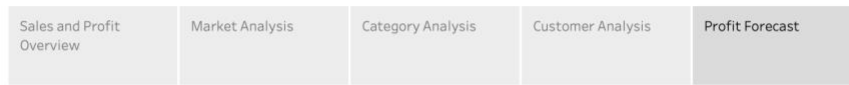
According to ship mode by sales, standard class shipping has the largest sales of \$7,578,652, followed by the second class, first class, and same day respectively. The cost of each ship mode can be a possible reason for this order with the standard class being the least expensive at an average of \$19.97 and same day being the most expensive at \$42.94. Customers with critical order priority do not prefer standard class shipping since it takes the longest to arrive. For high and medium order priority, most people choose standard class shipping. Lastly, all products with low order priority only use standard class shipping.

A seasonality trend may be seen in the area chart with sales being the highest in the fourth quarter while it suffers a significant drop in the first quarter. Then, it slowly increases in the second and third quarter. Here, the fourth quarter is proved to be the most critical period for increasing sales and profits. This is because big promotions on several holidays, such as Black Friday, Cyber Monday, Christmas, and others occur during the fourth quarter. People are prone to purchase items they desire but do not require, or what we refer to as tertiary needs which results sales in the first quarter to plummet since it was fulfilled in the fourth quarter.



## E. Profit Forecast

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#### Forecast Overall Profit



#### Category Forecast



#### Segment Forecast



In profit forecasting, we will forecast the company's performance two years ahead. As demonstrated, in the fourth quarter of 2021 and 2022, profits are expected to rise while it estimates a significant decrease in the first quarter. This is also relevant for category forecasting. As illustrated, the greater the profit increase in the fourth quarter, the greater the downturn in the first quarter. This issue will provoke the company to implement a new strategy to overcome the problem.

From the segment forecast, all segments have great profit estimation, but the home office has the smallest profit rises compared to the others. As shown, the confidence interval of consumers is wider than the corporates and home offices. In fact, the larger the margin, the less confident we are. This is because consumers are more unpredictable while corporates and home office products such as papers, labels, and envelopes are more predictable.

### **III. Conclusion**

To summarize, the United States has the highest profit from all countries while Turkey is the lowest due to massive loss in most sub-categories. The major profit source of the United States is from California and New York while Texas causes enormous losses. As observed, technology category and consumers segments are dominating the market while furniture category and home office segment is the opposite. In terms of profit ratio, Canada leads the market with 26.62%, whereas EMEA accounts for only 5.44%.

From sub-categories, papers have the highest profit margin though tables have the lowest which one of the causes is the high average discount. The strong correlation between average discount and profit margin shown in the scatter plot proves that furniture's low-profit margin is triggered by tables' high average discount.

Analyzing the customer behavior, most prefer standard class shipping since it is the cheapest unless the order priority is critical. Furthermore, sales are fast expanding in the fourth quarter because of big holiday incentives. Inspecting the forecast, we are less confident in the consumer forecast as it has a wider confidence interval. However, overall profits are expected to increase significantly in the fourth quarter but will decrease steeply in the next quarter.

#### **IV. Recommendations**

Some suggestions include implementing 5P's marketing strategy which are product, price, promotion, place, and people in Turkey and other loss countries by considering each country's local culture and economic situations.

Additionally, overall Africa's low profit can be improved with the help of the nearest higher-profit African country to supervise production and marketing strategy. For example, Morocco which has higher profits can help monitor Algeria's performance easily due to their proximity.

With a profit margin of 26.62%, Canada has a significant potential to boost profitability. Unlike EMEA which has the lowest profit margin should consider outsourcing to cut production cost and set reasonable promotions to increase sales.

We will also need to decrease tables' discount because it causes a negative profit margin which conduct detrimental to the business. Finally, extend the promotion period in the fourth quarter until the first quarter to minimize the drastic drop, resulting in greater average sales.

#### **V. References**

What is a good profit margin? Industry averages and how to improve yours. (2020, July 30). Brex. <https://www.brex.com/blog/what-is-a-good-profit-margin/>

Pettinger, T. (2021, April 24). How the housing market affects the economy. Economics Help. <https://www.economicshelp.org/blog/21636/housing/how-the-housing-market-affects-the-economy/>

Overview of California. (n.d.). US News. <https://www.usnews.com/news/best-states/california>