



# COURSEWORK - Report

ST2187 – Business Analytics, Applied Modelling & Prediction

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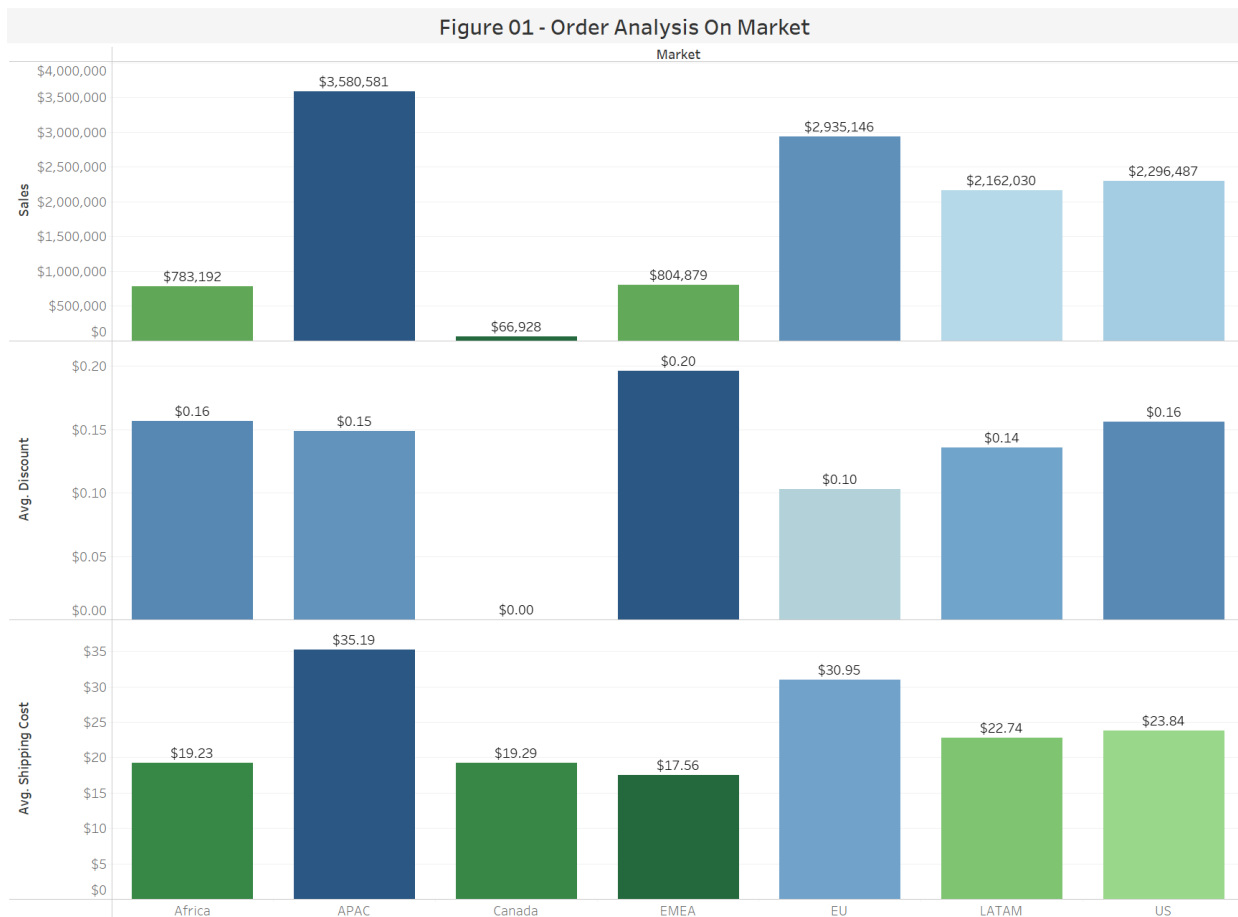
## **1 . EXECUTIVE SUMMARY**

This step analysis report accentuates key performance trends, operational discrepancy and potential breakthroughs following,

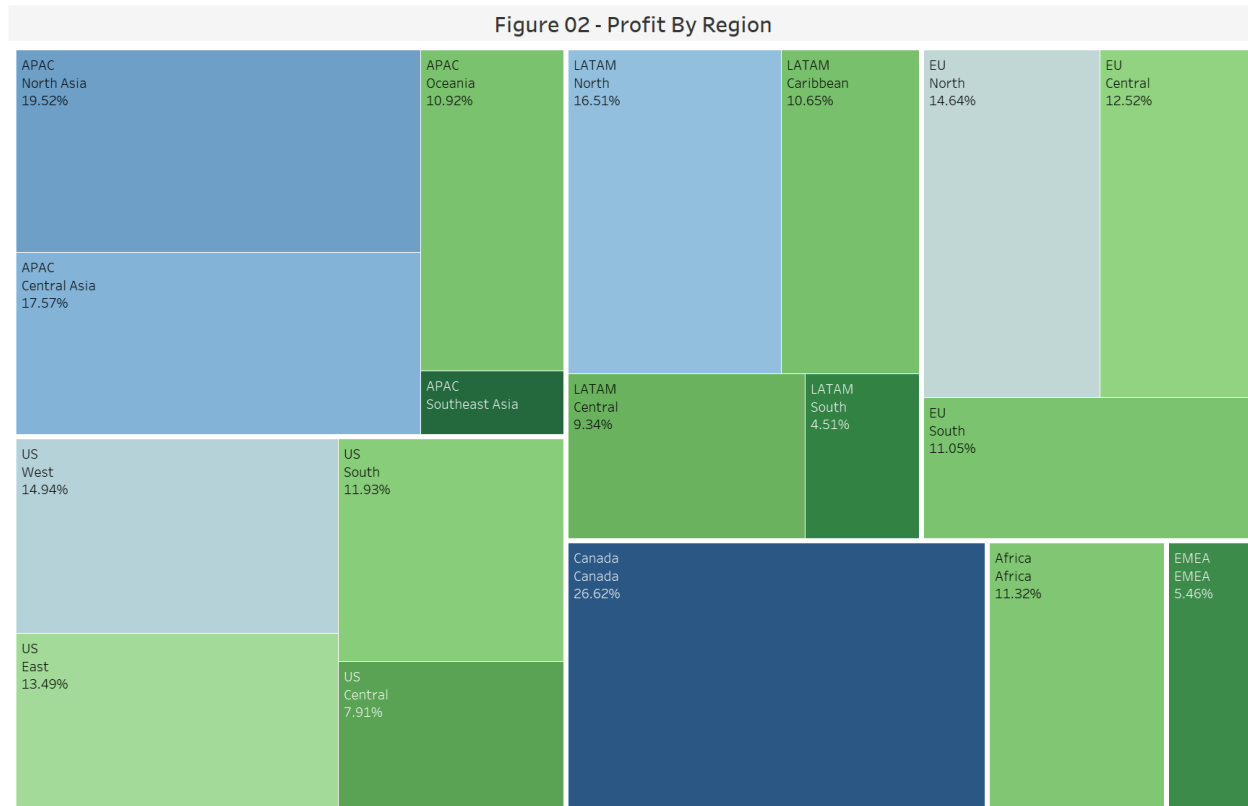
1. Market Analysis
  2. Country Analysis – USA
  3. Categorical Analysis
  4. Shipping Analysis
  5. Customer Analysis
  6. Recommendations
- APAC surfaces as the top – performing region, generating the **highest profit** of **\$346,586** and **\$3.58 million** in **sales**. However, APAC requires high shipping costs which are eating into margins.
  - The US is the **most profitable country** with an overall **profit** of **\$248,295**. Canada shows robust profitability with a **profit ratio** of **26.6%** despite the lack of sales, indicating regional growth potential.
  - EMEA unfortunately settles with the **lowest profit** of **\$44,914** despite weighty discounts. Turkey and Nigeria show significant losses, justifying a re-evaluation of strategy.
  - Technology prevails as the **top-performing category** with a profit of **\$662,605**, while Furniture underachieves. Copiers and Phones achieve steady sales, while Fasteners and Labels fail to do so.
  - **68.18%** of orders were shipped late, while it was noted that only **5.07%** were shipped **early**.

## 2. OBSERVATIONS

### 2.1 Market Analysis



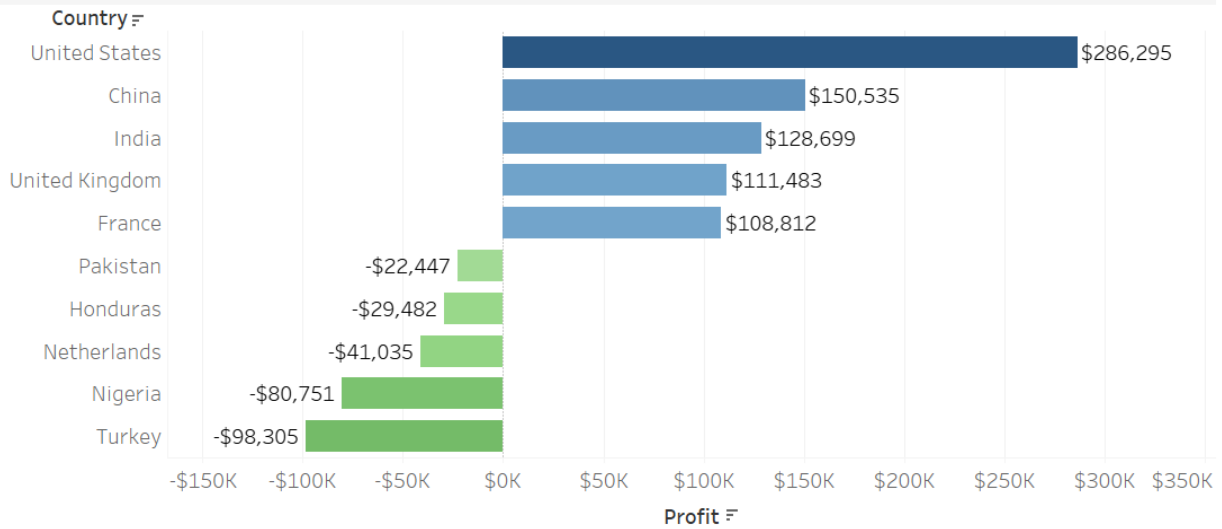
- APAC generates the most sales of \$3,580,581, whilst having the highest average shipping cost of \$35.19 and offering controlled discounts of \$0.15.
- APAC, EU & US are the 3 top-performing markets, generating the highest sales & profits.
- EMEA performs subpar despite having the highest average discount of \$0.20.
- The EU maintains remarkable sales despite having a low average discount of \$0.10 and a high average shipping cost of \$30.95.
- It is noteworthy that the high-profit margin markets have high average shipping costs, whereas low-profit margin markets have offered high average discounts.



- Canada is the most profitable region with a profit ratio of 26.62%, regardless of the low sales. APAC – North Asia and Central Asia regions also show prominent profit ratios of 19.52% and 17.57% respectively.
- APAC – Southeast Asia, LATAM – South and EMEA, are the top 3 least profitable regions with corresponding profit ratios of 2.15%, 4.51% & 5.46%.



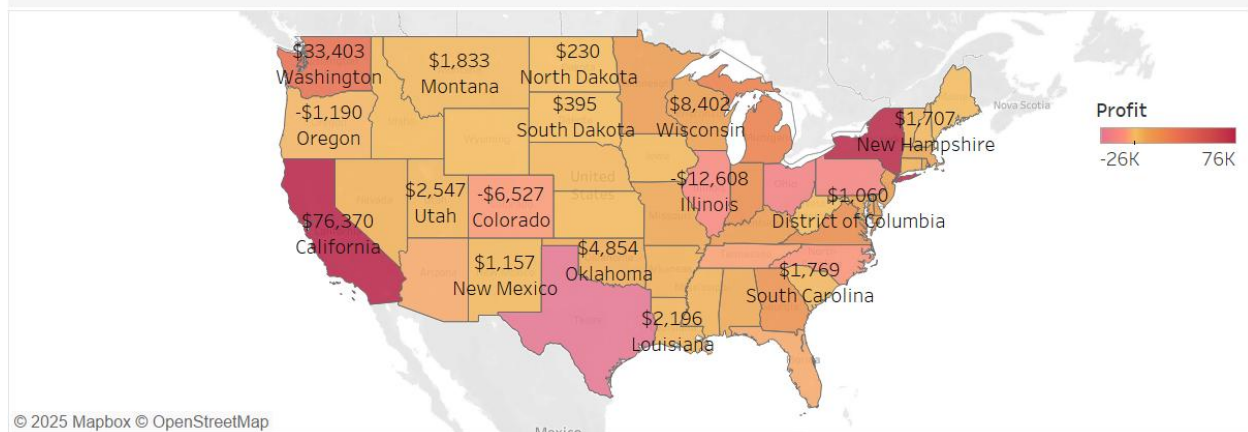
Figure 03 - Top 5 Most Profitable &amp; Least Profitable Countries



- USA dominates as the highest profit generating country with \$286,295, followed by China and India with respective profits of \$150,535 and \$128,699. This spotlights APAC and US as the primary growth regions.
- Turkey and Nigeria face crucial losses, which may be a result of market or operational obstacles.

## 2.2 Country Analysis – USA

Figure 4.1 - Profit By State



- California generates the highest profit of \$76,370.09 followed by New York with \$74,004 and Washington with \$33,403 while North Carolina, Illinois and Texas make the highest losses. This shows that the West takes the lead in generating the highest profit, while the Central States cause damage to the economy of the company.

Figure 4.2 - Sales And Profit Comparison (Top 10 in Sales)

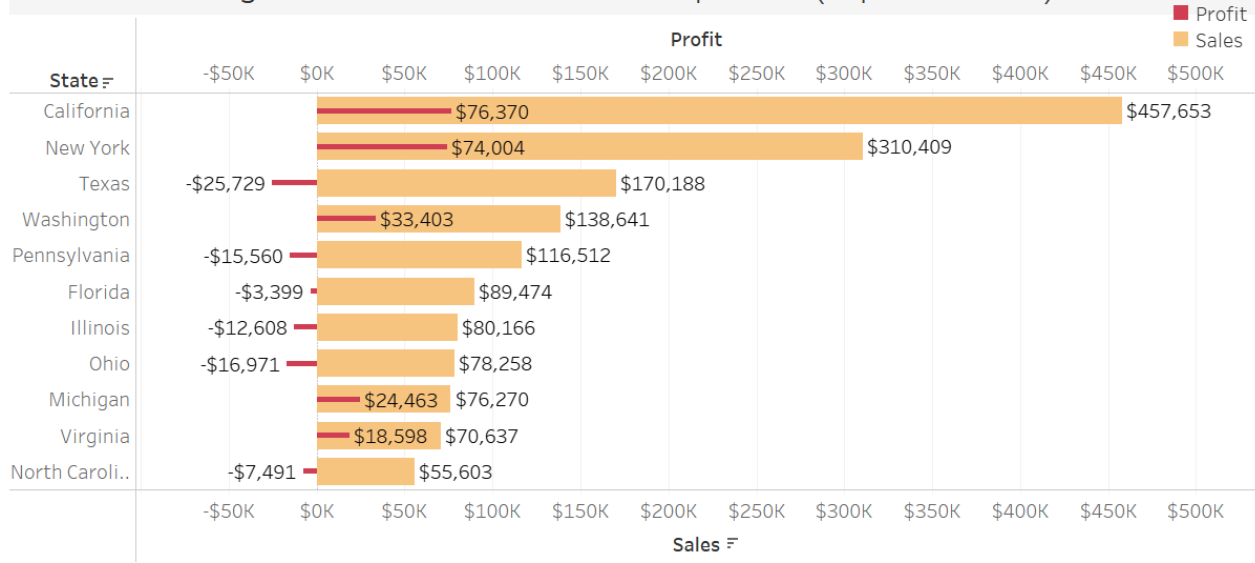
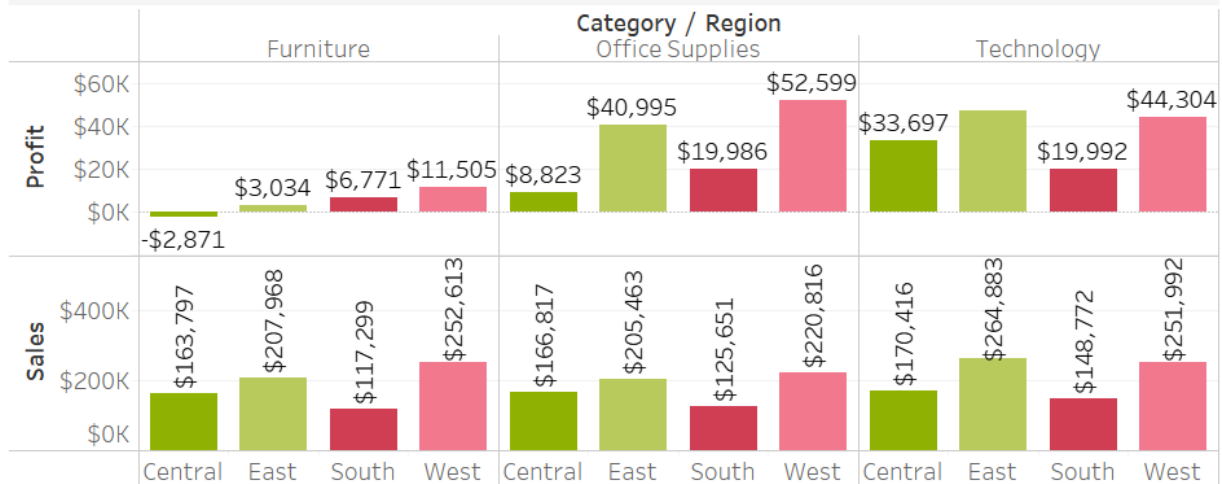
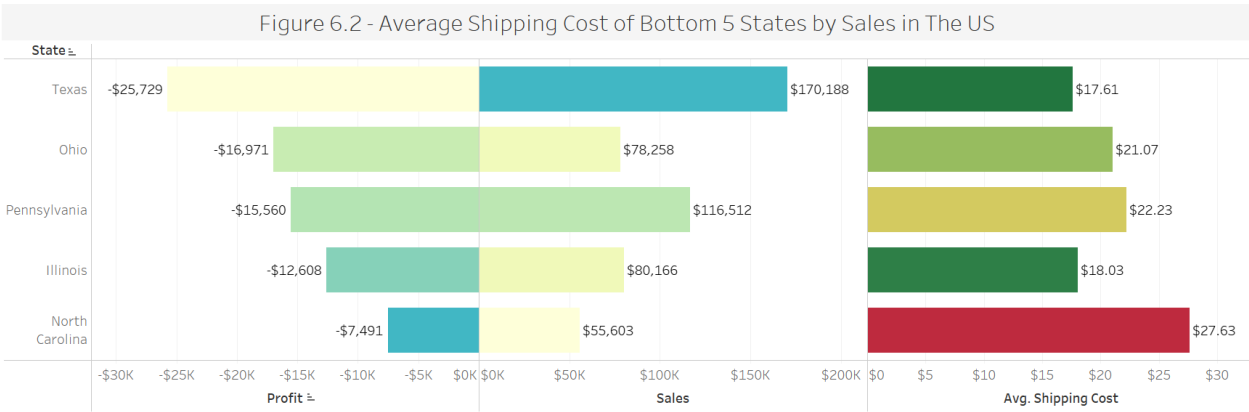
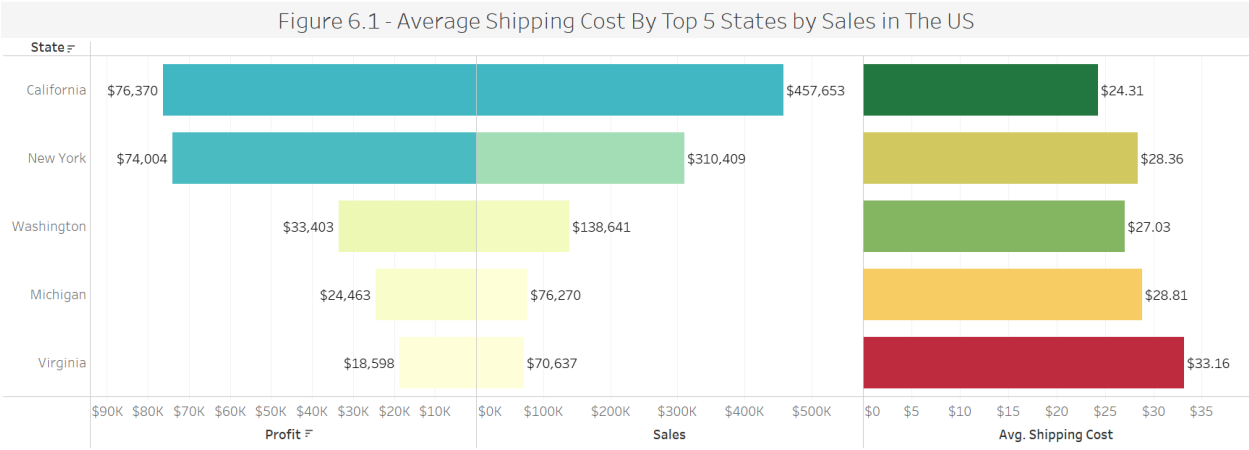


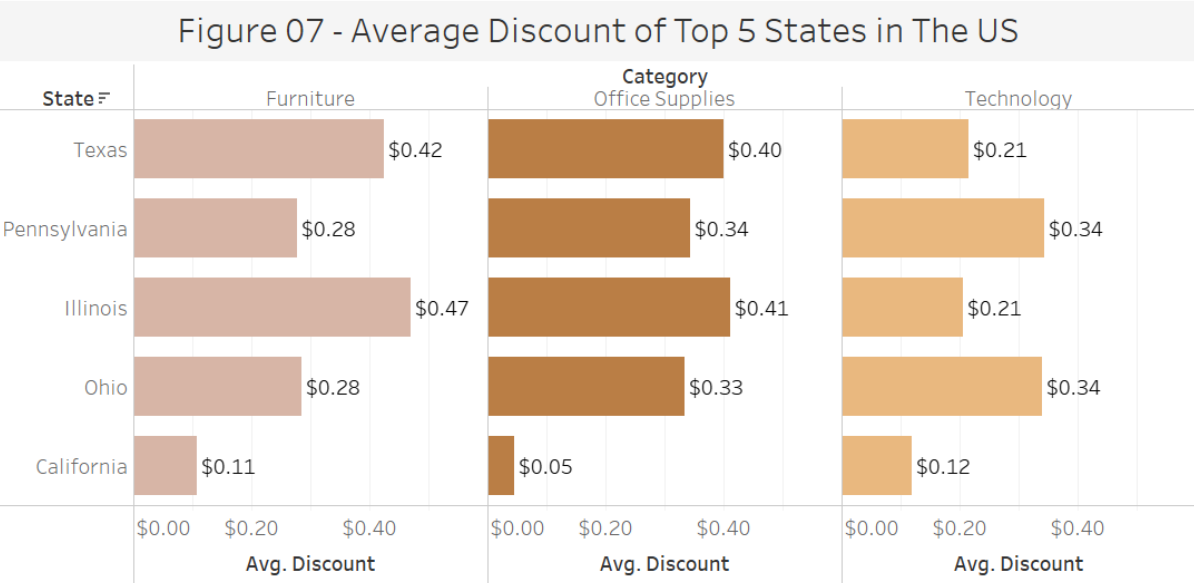
Figure 05 - Profit And Sales By Category in The US



- Office Supplies lead with the highest profit and sales made across regions Central, East, South and West. Technology remains strong in both sales and profit in the East and West. In contrast, furniture underperforms regardless of the high number of sales generated throughout the regions.

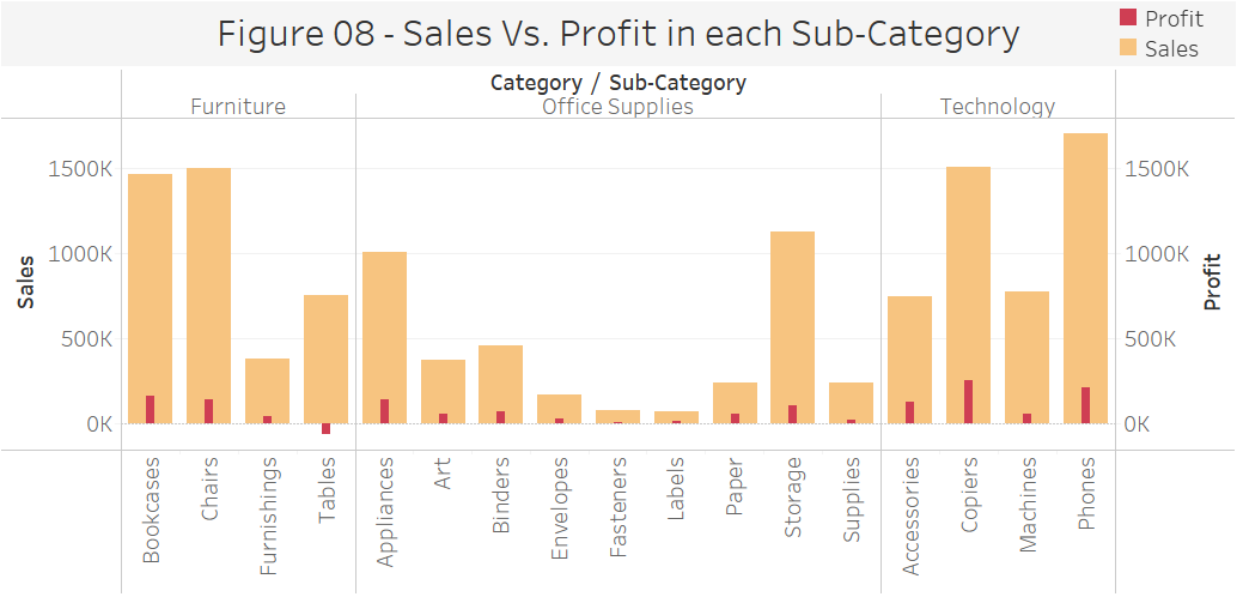


- Although California and New York entail high shipping costs of \$24.31 and \$28.36 respectively, they still sustain profits. Whereas, Texas and Illinois have lower shipping costs of \$17.61 and \$18.03 and in addition offer high discounts (refer to the figure 07), yet they still generate major losses.

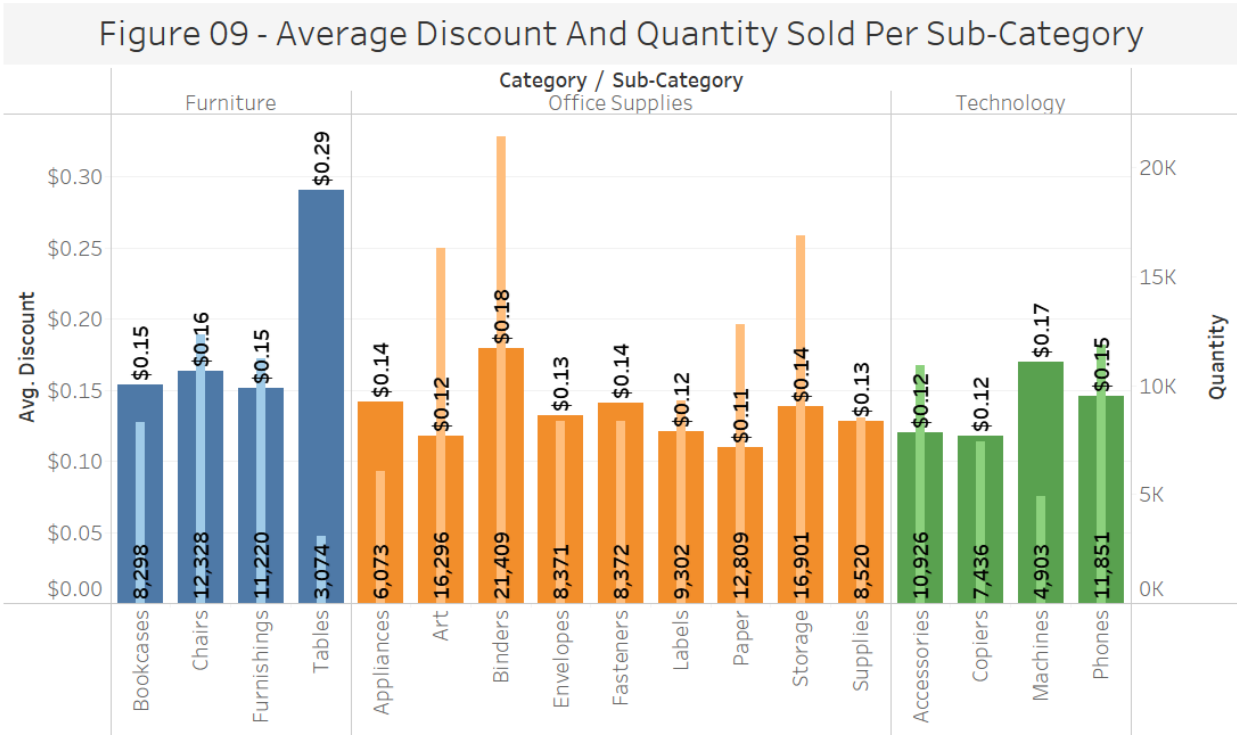




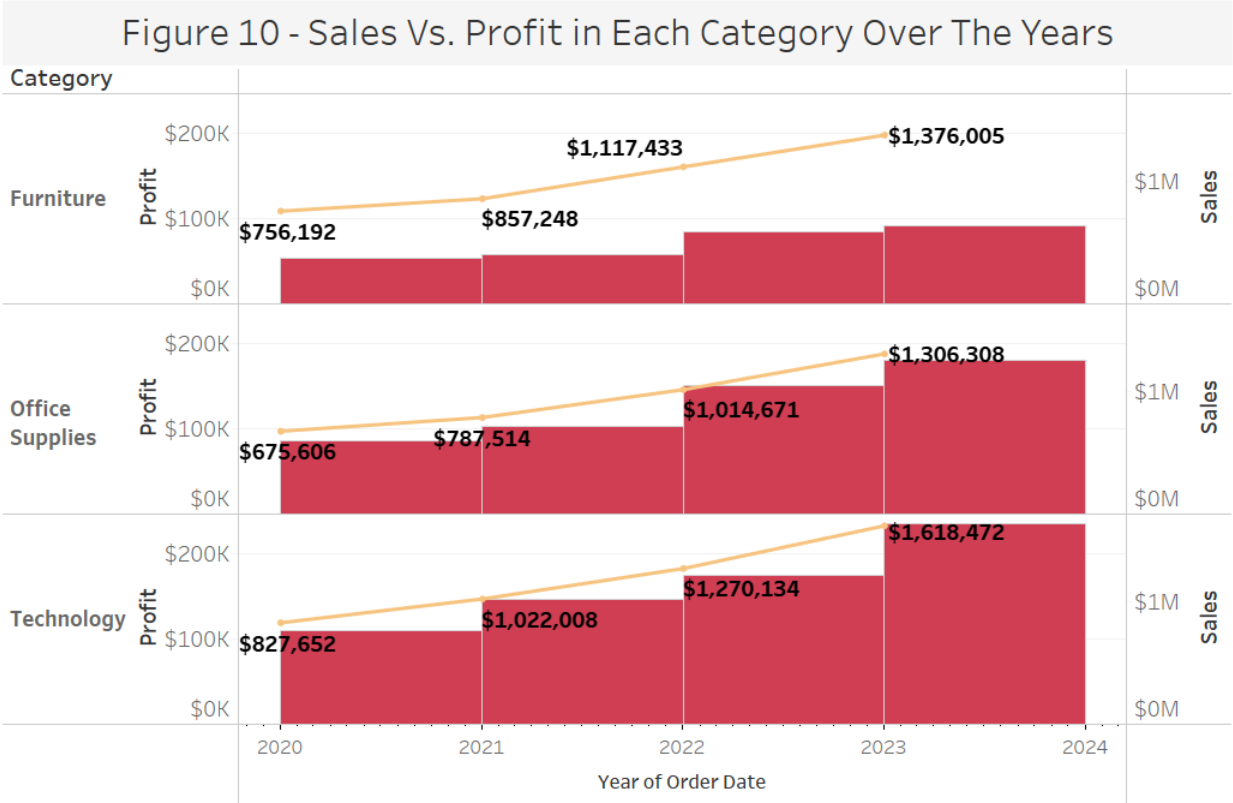
## 2.3 Categorical Analysis



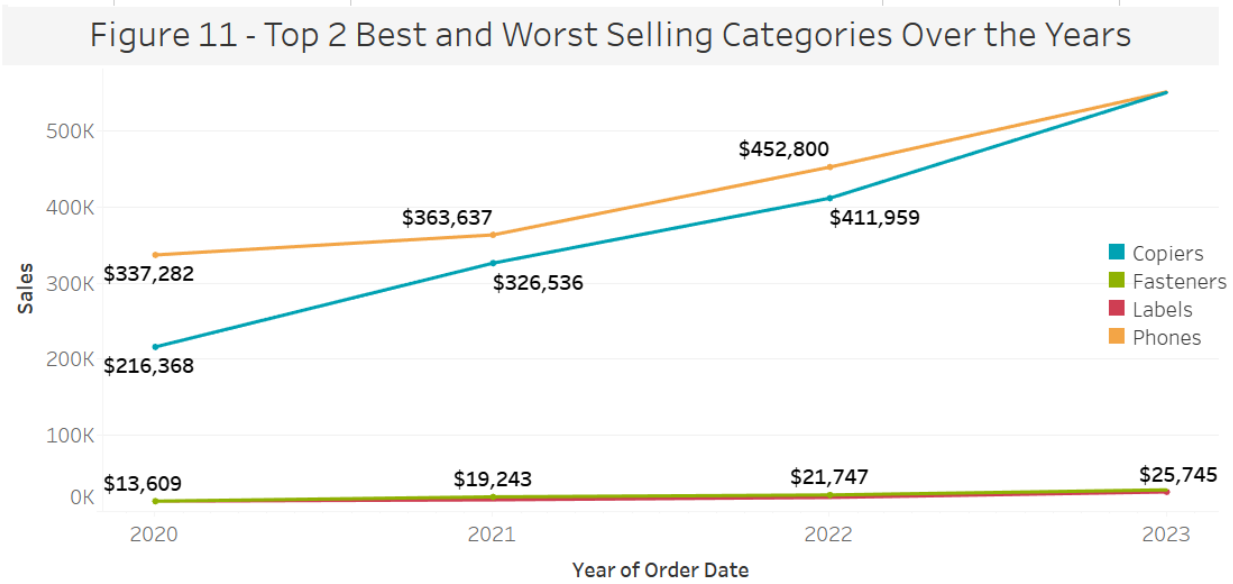
- Technology products show high profitability. Sub-categories: tables and chairs, generate high sales of \$755,993 and \$1,500,977 respectively, but have correspondingly low profits.



- High discounts on Tables (\$0.29) and Machines (\$0.17) paired with very low quantities sold shows price inelasticity. On the contrary low discounts and high selling items such as Art, Binders, Paper and Storage indicate price elasticity and demand stability.

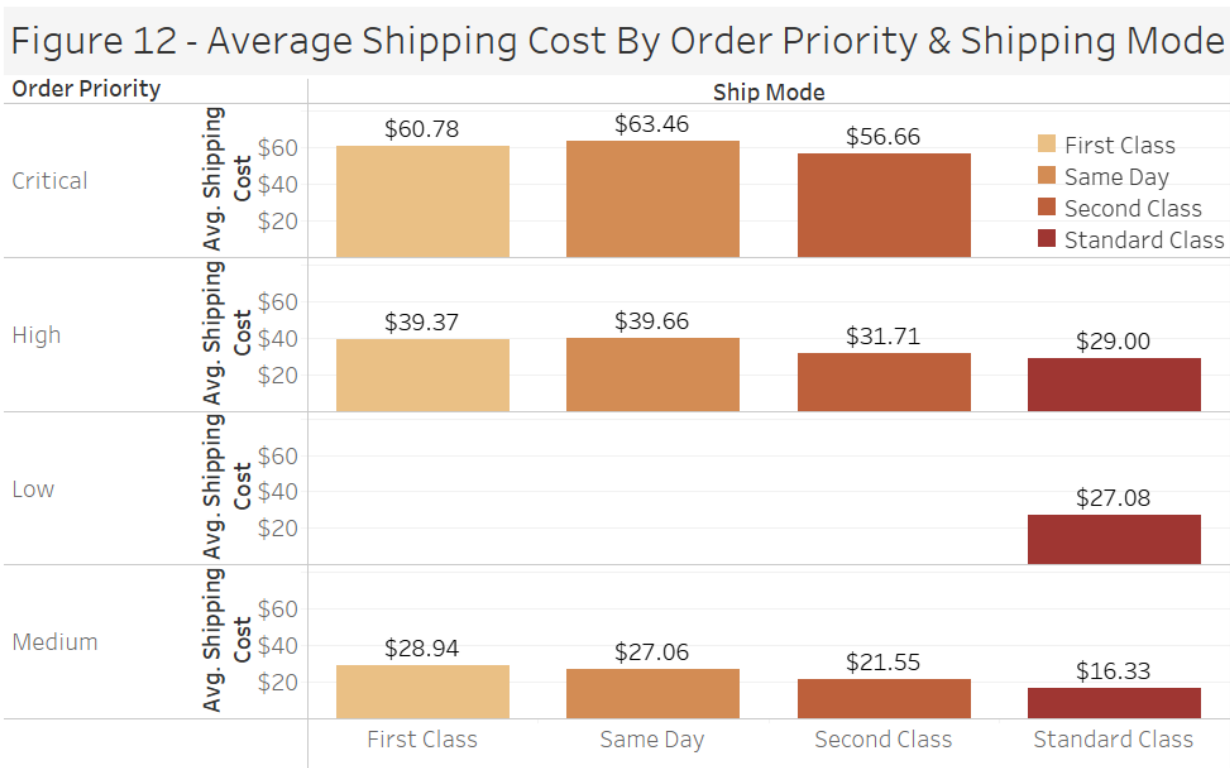


- Technology has the most significant earning expansion, outdoing Furniture and Office Supplies. Consistent growth is shown among all categories; however, Furniture has a lower profitability compared to sales.

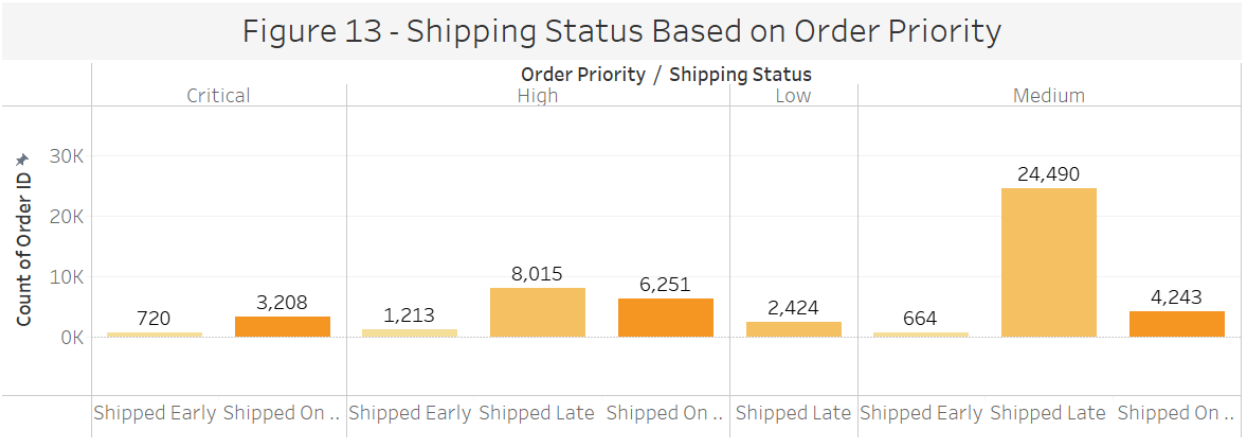


- Sales in Copiers and Phones significantly increase in sales overtime. In contrast, Fasteners and Labels still settle as the lowest selling sub-category regardless of minor improvements made over the years.

2.4 Shipping Analysis



- Critical orders require the highest shipping cost of \$59.76 while medium order priority has the lowest shipping cost of \$18.45.
- High shipping costs for critical orders may indicate express delivery surcharge or incompetency in handling urgent orders.
- Orders with Critical order priority require the highest shipping cost for ship mode of Same day, First Class and Second Class, with shipping costs of \$63.46, \$60.78 and \$56.66 respectively.
- Orders with Medium priority require the lowest shipping cost for all ship modes. The lowest shipping cost among all 4 order priorities and ship modes is inquired by orders with medium order priority and ship mode of Standard Class.

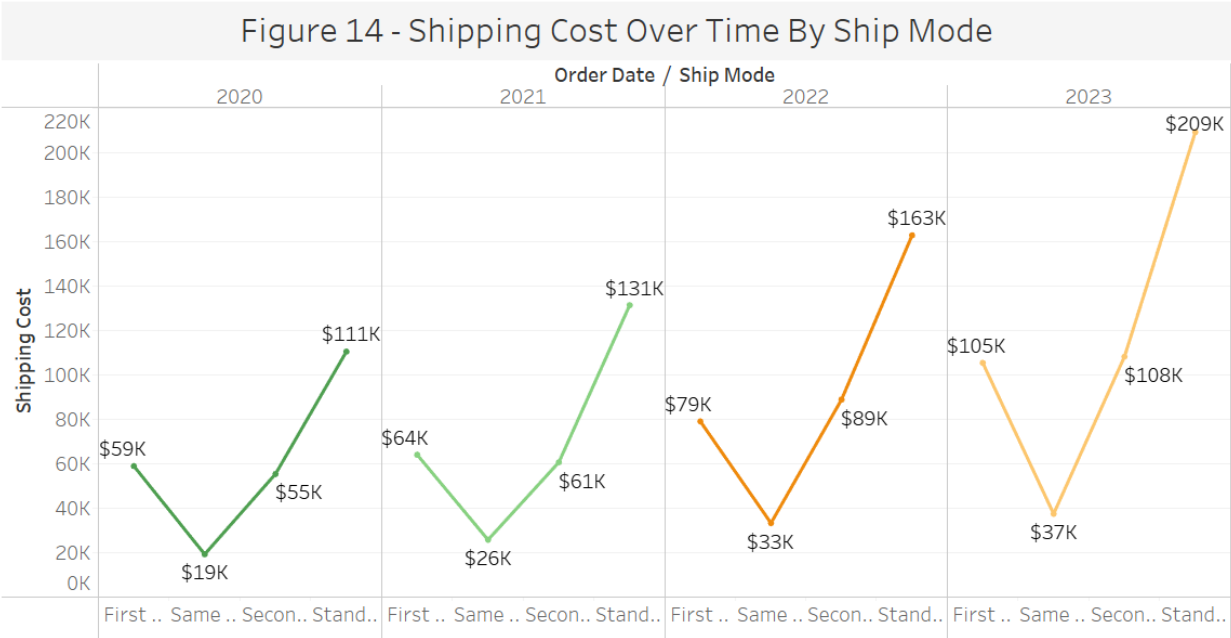


- In this analysis the following was assumed:

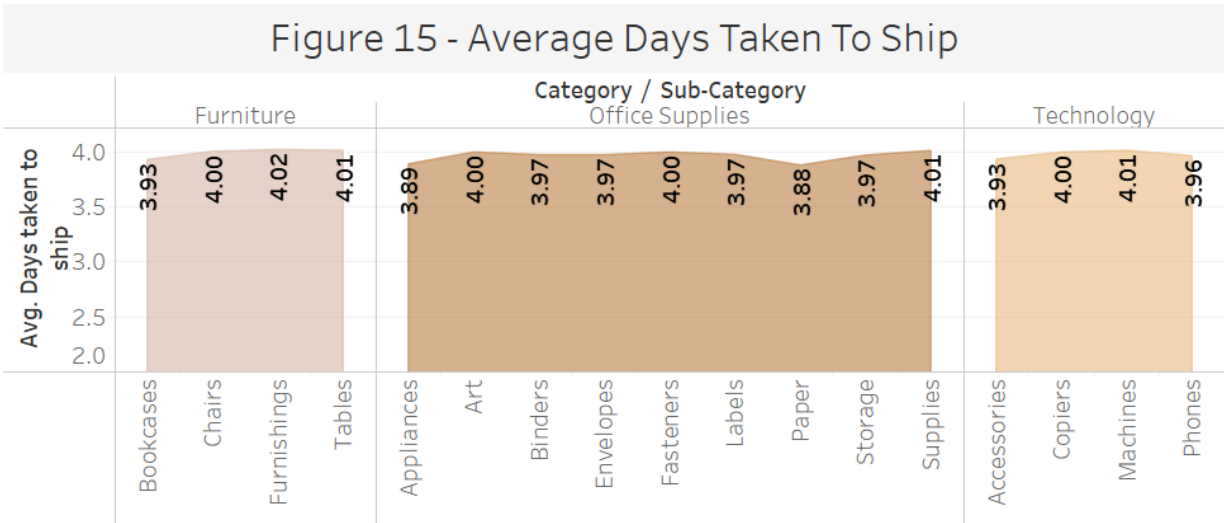
Shipping Status

```
IF [Ship Date]-[Order Date] = 0 THEN "Shipped Early"
ELSEIF [Ship Date]-[Order Date]>0 AND
      [Ship Date]-[Order Date]<= 3 THEN "Shipped On Time"
ELSE "Shipped Late"
END
```

- 68.18% of the orders were delivered late, mainly orders of medium priority (24,290 orders). Only 5.07% of orders were shipping early while 26.75% of orders were shipped on time.
- There is a notable delay rate in orders of high priority with 8,015 orders shipped late.



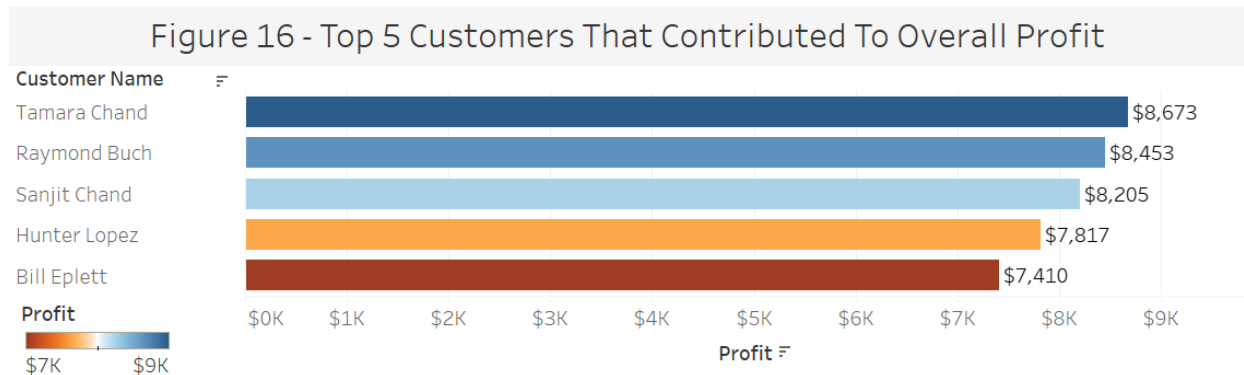
- Overall shipping costs have risen significantly during the years 2020-2023 across all ship modes. The highest shipping costs in 2020, 2021, 2022 and 2023 were \$111K, \$131K, \$163K and \$209K respectively, all achieved when the chosen ship mode is Standard. This indicates a rise in transportation costs over the years, especially between the years 2022 and 2023.
- Same Day shipping costs maintain the lowest shipping costs throughout the years while gradually increasing.



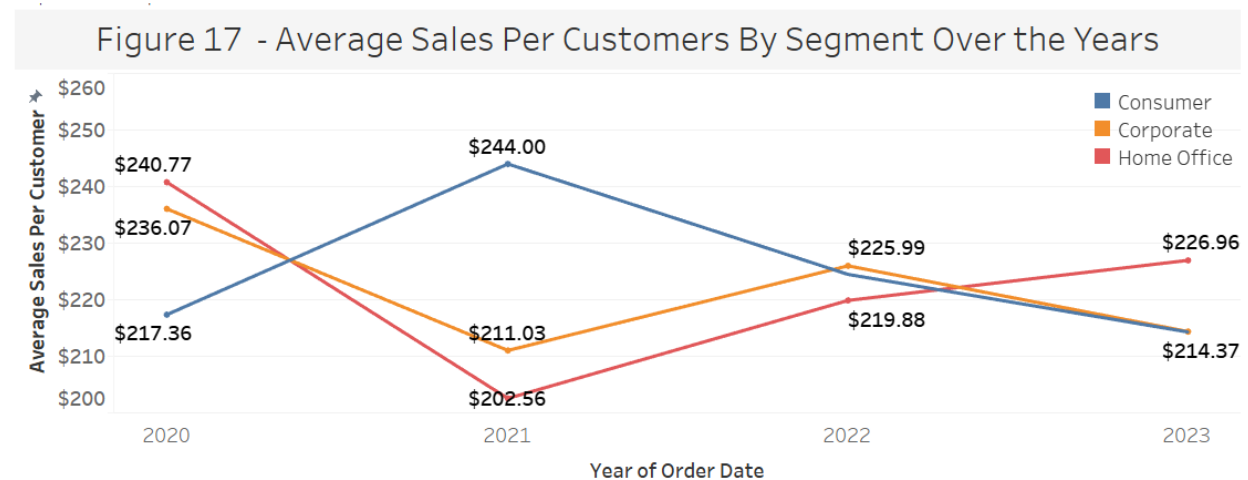
- The range of Average Days Taken to Ship lies in between 3.88 and 4.02 days, which shows very little variation. Most Subcategories however have a mode of 4 days on average taken to ship.

- Sub-Categories: Paper (3.88 days) and Appliances (3.89 days) take the least number of days to be shipped while Chairs (4.02 days), Tables (4.01 days), Supplies (4.01 days) and Machines (4.01 days) take the greatest number of days to be shipped.
- Assuming that the order is shipped late, if the order is shipped three days after the order date, it is noticeable that all the categories are shipped late on average.

## 2.5 Customer Analysis



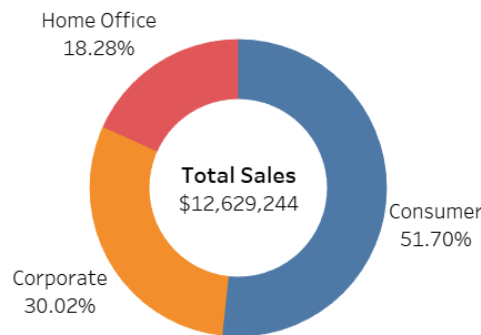
- By spawning a profit of \$8,673, Tamara Chand with customer ID TC-20980, dominates as the highest contributor, followed by Raymond Buch with customer ID RB – 19360, generating a profit of \$8,453.
- The profit ranges between \$7000 and \$9000, depicting a small variance in their profitability.



- The highest average sale achieved: \$244.00, were during the year 2021, from the consumer segment. Moreover, the consumer segment shows a substantial performance, while the Home Office and Corporate segments had fluctuations. The lowest average sale of \$202.56 was achieved in 2021 as well by the Home Office Segment.

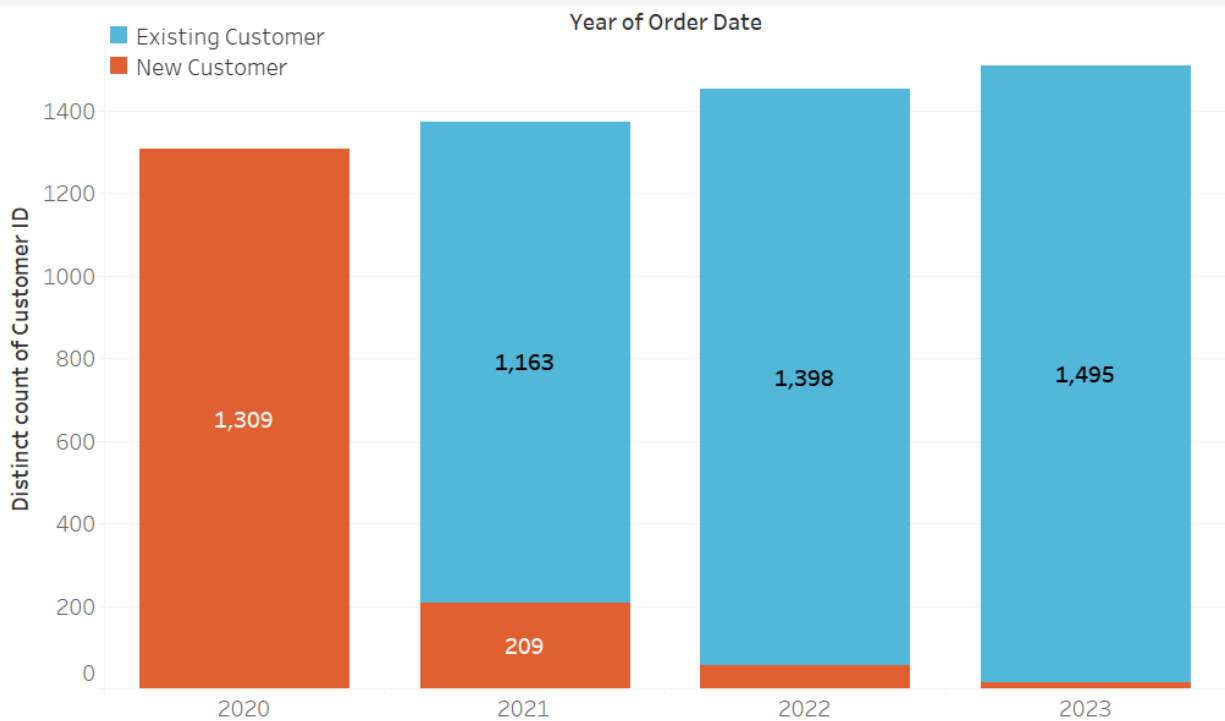


Figure 18 - Overall Sales By Customer Segment

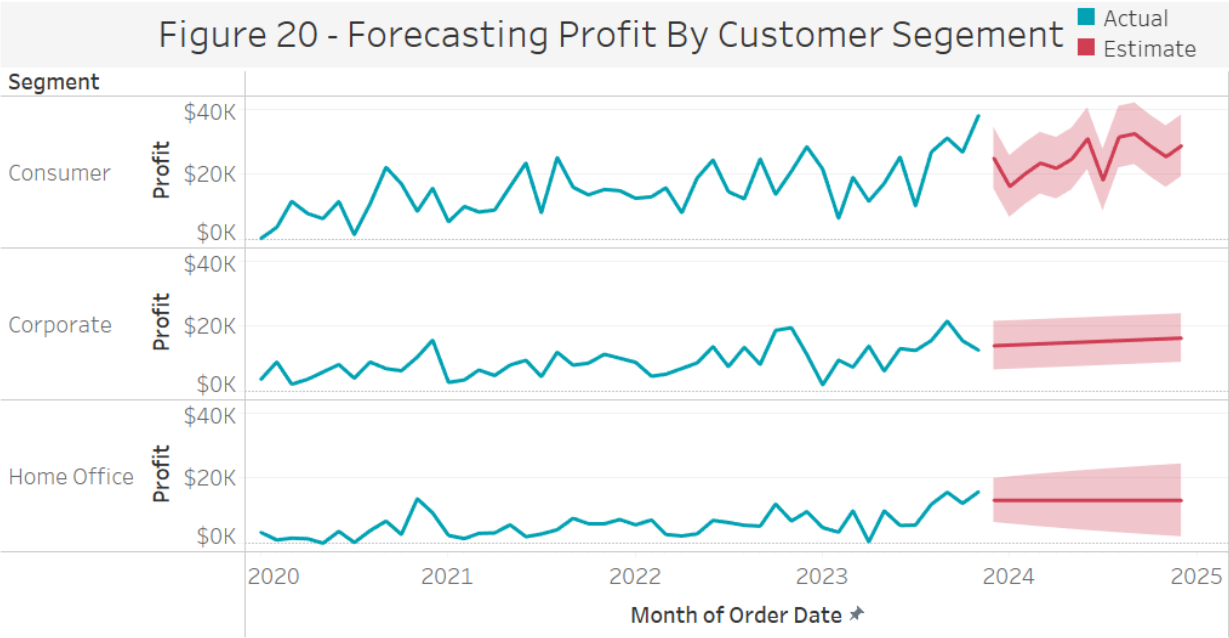


- The consumer segment dominates revenue by generating 51.70% of the total sales, while the Home Office contributes the least number of sales: 18.28% of the total sales.

Figure 19 - The Number of New And Existing Customers Per Year



- There is a significant drop in the number of new customers from 2020 to 2021, dropping from 1309 new customers to 209 new customers. The company is performing poorly in making a new customer base.
- There is a visible trend in a slight increase in the existing customer base over the years.



- The consumer segment exhibits steady growth and future estimates for the segment suggest a profit increment. In contrast, the Corporate and Home Office segments show slow growth, and future estimates indicate constant profit over the years.

### **3. Recommendations & Conclusions**

With reference to the analysis done, conclusions (*in bold italics*) are outlined below, as well as recommendations which are proposed to improve decision making and enhance the company's profitability.

- ***APAC, EU, US, Technology and Consumer are known to be the most profitable markets, categories and segments respectively:*** Focusing more and additional investments in resources to refine strategies to offer improved services would be of high value. By dedicating more resources to allow room for improvement on operational efficiency, customer satisfaction and overall service quality, the company can reinforce its competitiveness and foster long-term growth.
- ***Tables subcategory makes a significant loss:*** High discounts are offered in this sub-category, and it also incurs a high average shipping expenses due to tables being greater in weight. As a result, the company may be faced with risks of increased logistical expenses, making an impact on the overall profitability of the product. The company could opt for pickup locations instead of delivery. This approach would be more cost effective, as the company would be able to eliminate the need for expensive shipping fees and only have to cover a fixed rental fee for the designated pick-up spot.
- ***Low priority shipping costs are higher than medium priority shipping (ship mode – standard class):*** If this trend continues, future sales may decline. A potential solution to this could be to utilize packaging material and practices that minimize parcel size and weight for orders of low priority. By optimizing packaging efficiency, the company can bring down shipping costs and improve cost-effectiveness. Additionally, slim and airy items are usually much better in attaining a reduced delivery fee.
- ***Low Sales of Office Supplies:*** A new system can be implemented to enable businesses to contribute surplus office supplies to institutions, organizations and communities in need of them. This would help highlight their commitment to social responsibility. Moreover, initiating physical workshops where customers can explore various office supply and brand perception and experience the brand as a whole.
- ***Decrease in the number of new customers over the years:*** To resolve this issue, initiatives can be taken to improve promotional campaigns to encourage existing customers to refer the company to new clients, thereby increasing customer recommendations. Implementing incentive-based referral programs, such as discounts, rewards, and exclusive benefits can motivate customers to be more involved in expanding the customer base. This not only enhances brand awareness but also strengthens the customer relationship and long-term engagement, ultimately contributing to a sustained economic growth.

- ***Late shipments affect customer satisfaction:*** The company must aim to reduce the delay in shipments by decreasing the current average of three days to a shorter time period. Taking this initiative is more likely to enhance logistical efficiency, optimizing supply chain operations and allowing better time management strategies so that the organization can ensure faster deliveries. This would not only improve customer satisfaction but also strengthen the company's reputation for reliability and punctuality.