SUPERSTORE SALES AND PROFIT

A BUSINESS REPORT
DATA VISUALIZATION

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INTRODUCTION

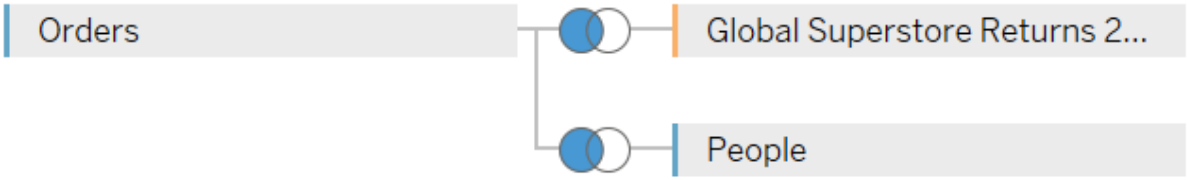
This business report is created by the analytics team for generating a data-driven business for the enterprise's performance over the last few years and presenting to the CEO of the Global Superstores company. The main purpose of this report is to gain insight and thus provide valuable knowledge for better decision making. To enhance the business performance, data visualization is significant to explore the meaning, trends, and patterns of the data as visual images, graphs, and dashboards. All visualizations in this report are generated using Tableau.

DATASETS

The company has gathered all information from all branches. For this report, there are two main datasets to consume in all data visualization.

1. **Global Superstore Orders 2016.xlsx:** Order information includes the sales, profits, salespersons etc. in terms of shop's performance from 2012 to 2016 in an excel file.
2. **Global Superstore Returns 2016.csv:** Returns information includes product returns from 2012 to 2016 in a csv file.

The data connections between both datasets in Tableau:

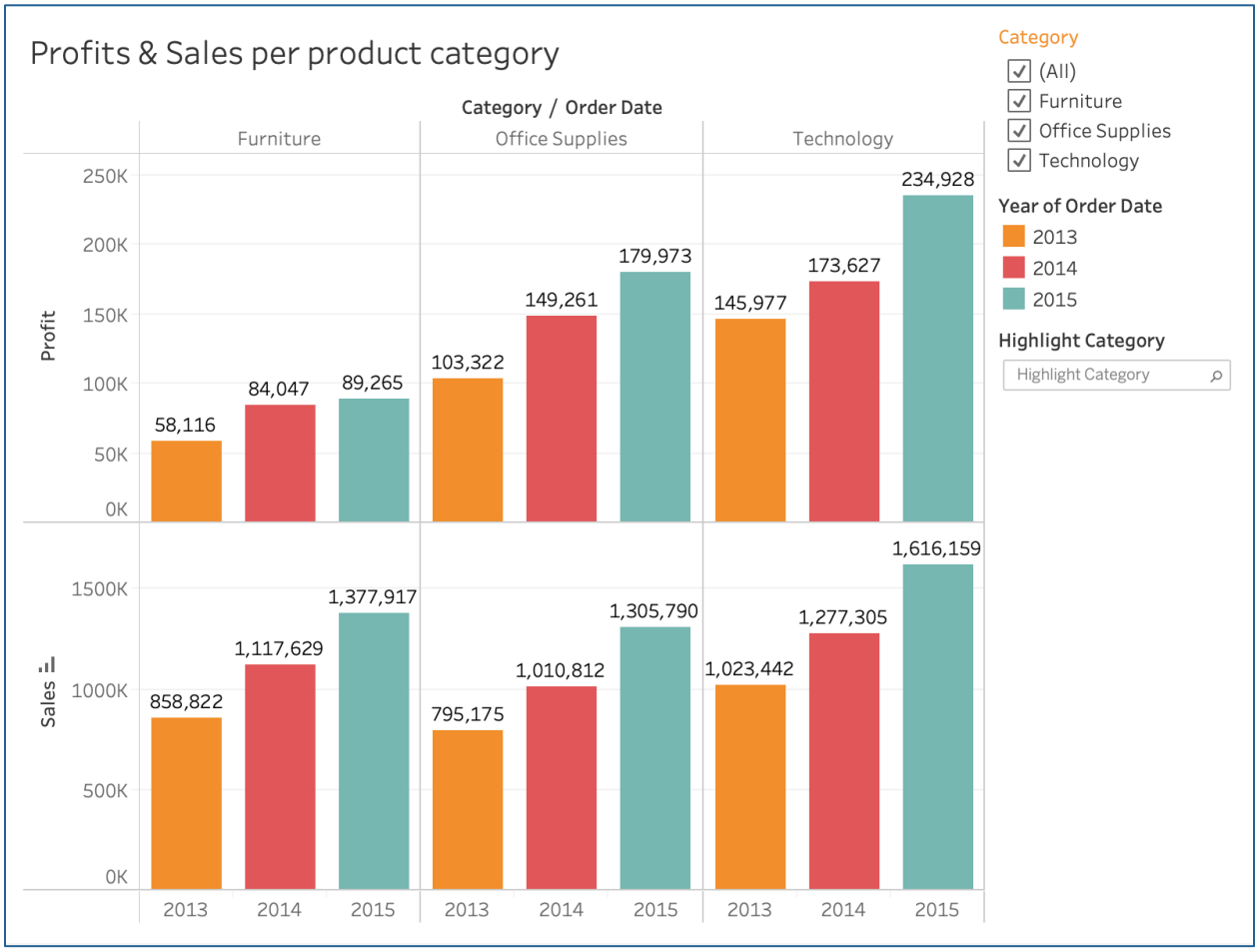


- Global Superstore Order 2016 provides the Orders and People information.
- Global Superstore Return 2016 provides the Return information.

DATA VISUALIZATION

Profits and sales per product category

This data visualization presents the profits and sales in the company per product category during the last three years.



Graph Caption:

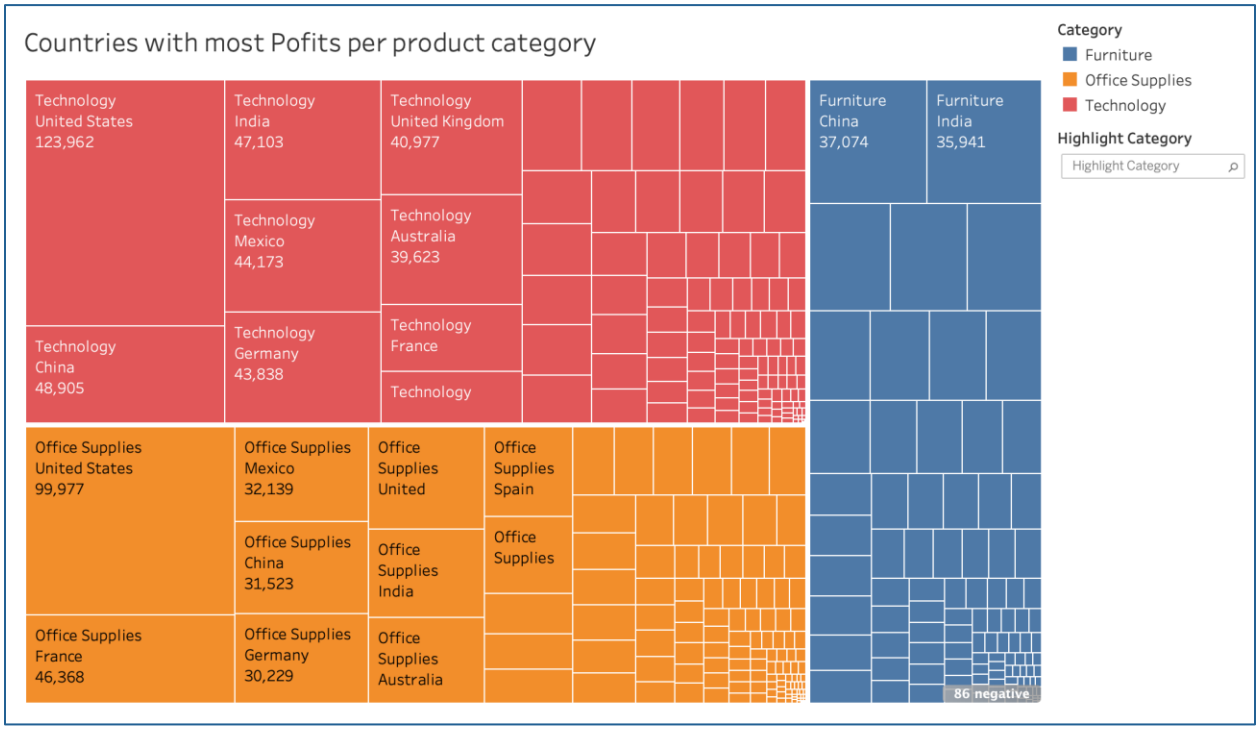
The above bar charts illustrate the Sum of Profit and Sum of sales for each Order Date Year broken down by Category. Colors show the Year of Order Date that the orange, red, and blue-green indicate the years (2013, 2014, and 2015 respectively). For Sum of Profit Pane: The marks are labeled by sum of Profit. For Sum of sales Pane: The marks are labelled by sum of Sales. The above graphs are filtered with 2013, 2014 and 2015 Order Date years.

Observation:

This bar charts show the profits and sales each product category from 2013 to 2015 in the company. Overall, the both profits and sales of three kinds of products constantly increased every year. The technology category was the most viable, but the least profitable category was furniture.

Most profitable countries per product category

This data visualization presents the most profitable countries per product category over time.



Graph Caption:

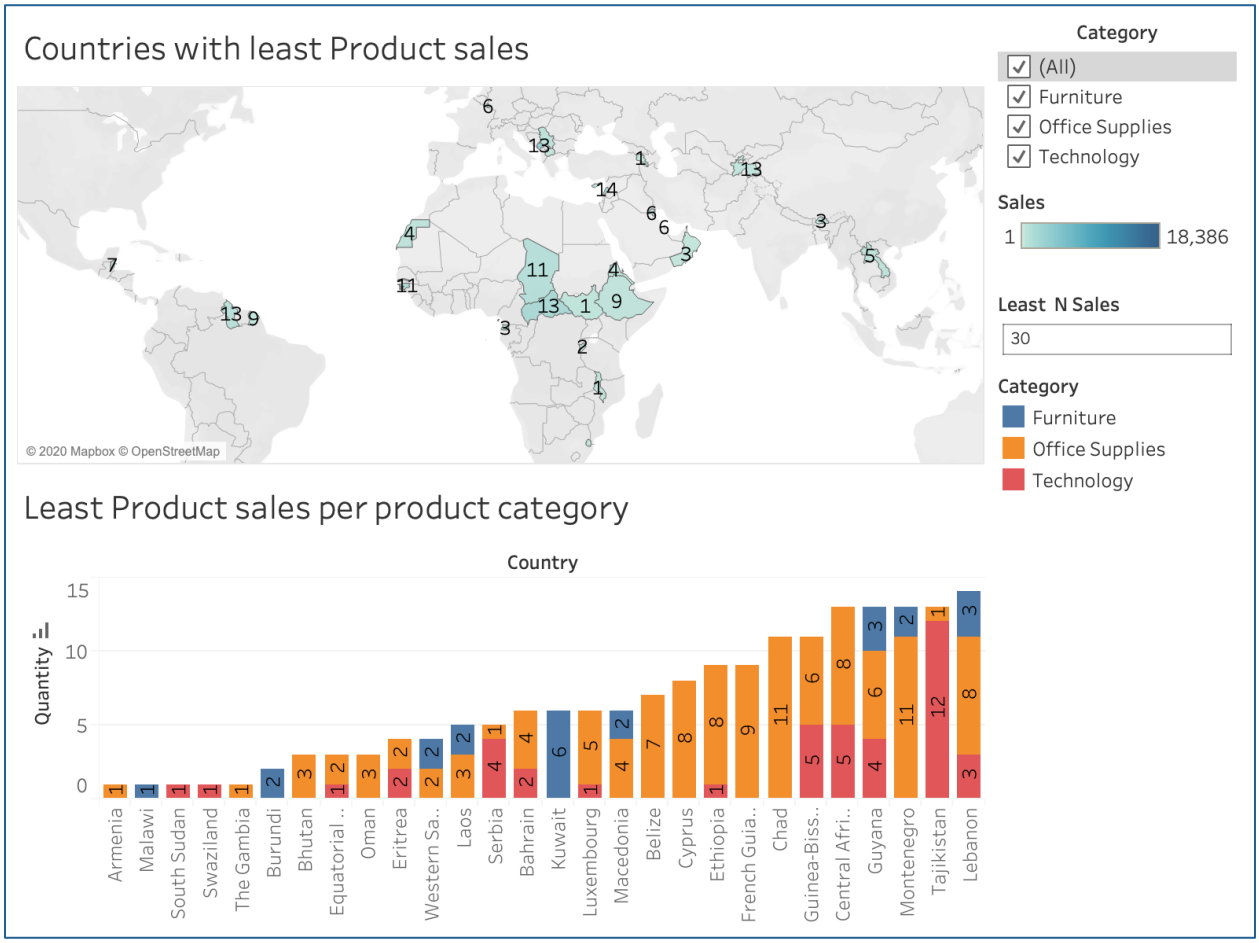
The above diagram illustrates the countries that are most profitable per product category. Color shows the category of Product that blue, orange, and red colors indicate the category of Furniture, Office Supplies, and Technology, respectively. The marks are labelled by Category, Country and Sum of Profit. The Order Date year 2013, 2014 and 2015 are considered for the above graph. The size of each tile is proportional to Sum of Profit. Thus, showing the countries with most profits in each category.

Observation:

The above diagram shows the most profitable countries per product category. Overall, United States is the most profitable in Technology and Office supplies category; However, in Furniture category, the most profitable country is China.

The least sales countries per product category.

This data visualization presents the countries with the least sales per product category during last three years.



Graph Caption:

The above Map illustrates the Least product sales. The color in the map shows sum of Quantity i.e. number of items sold. The Bar charts display the Sum of Quantity for each country in ascending order. Color shows the category of Product that blue, orange, and red colors indicate the category of Furniture, Office Supplies, and Technology, respectively and marks are labelled with Sum of Quantity.

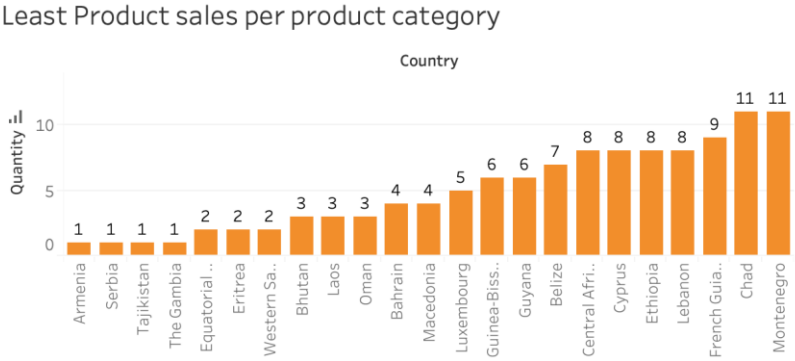
The data is filtered on Order date year and Least N Sales. 2013, 2014, and 2015 years data is filtered in Order date year. The least N Sales keeps the N countries with least product sales over all categories.

Observation:

The map illustrates all countries with the least product sales for the last three years (2013, 2014, and 2015), and the bar charts show the number of sales in different countries per product category. Overall, the least sales countries in Office supplies were Armenia, Serbia, Tajikistan, and the Gambia; furthermore, Malawi was the lowest sales in Furniture category, then in Technology area, Equatorial Guinea, Ethiopia, Luxembourg, South Sudan, and Swaziland were the minimum sales countries.

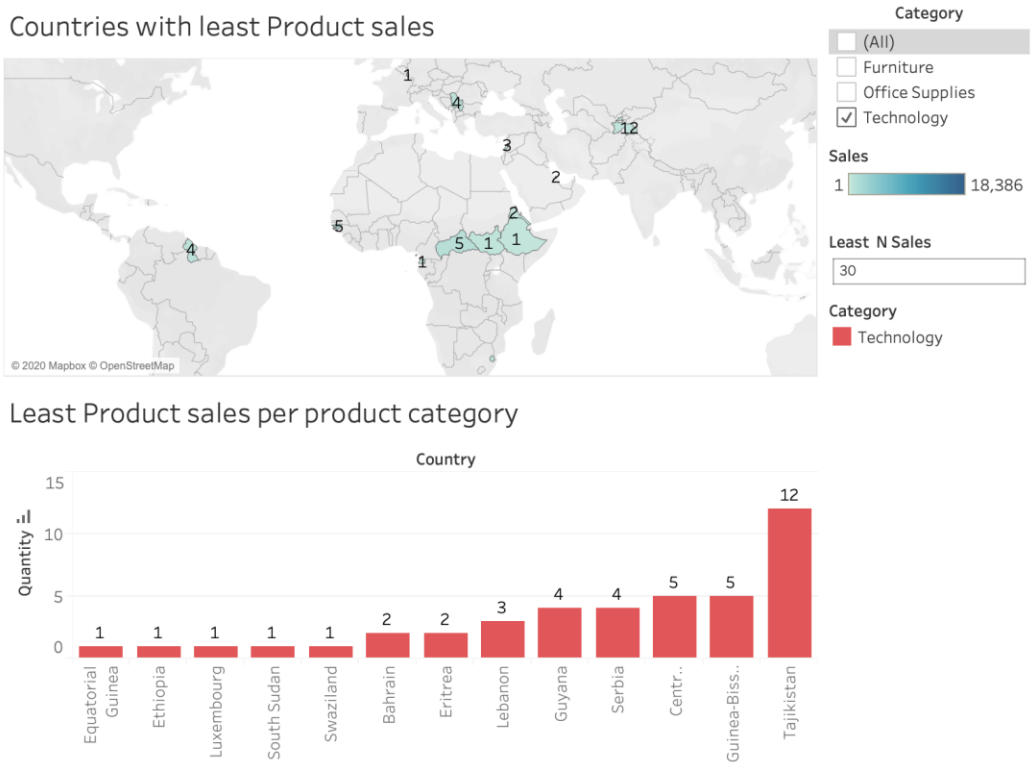
The detailed graphs in each category

- Office Supplies Category:



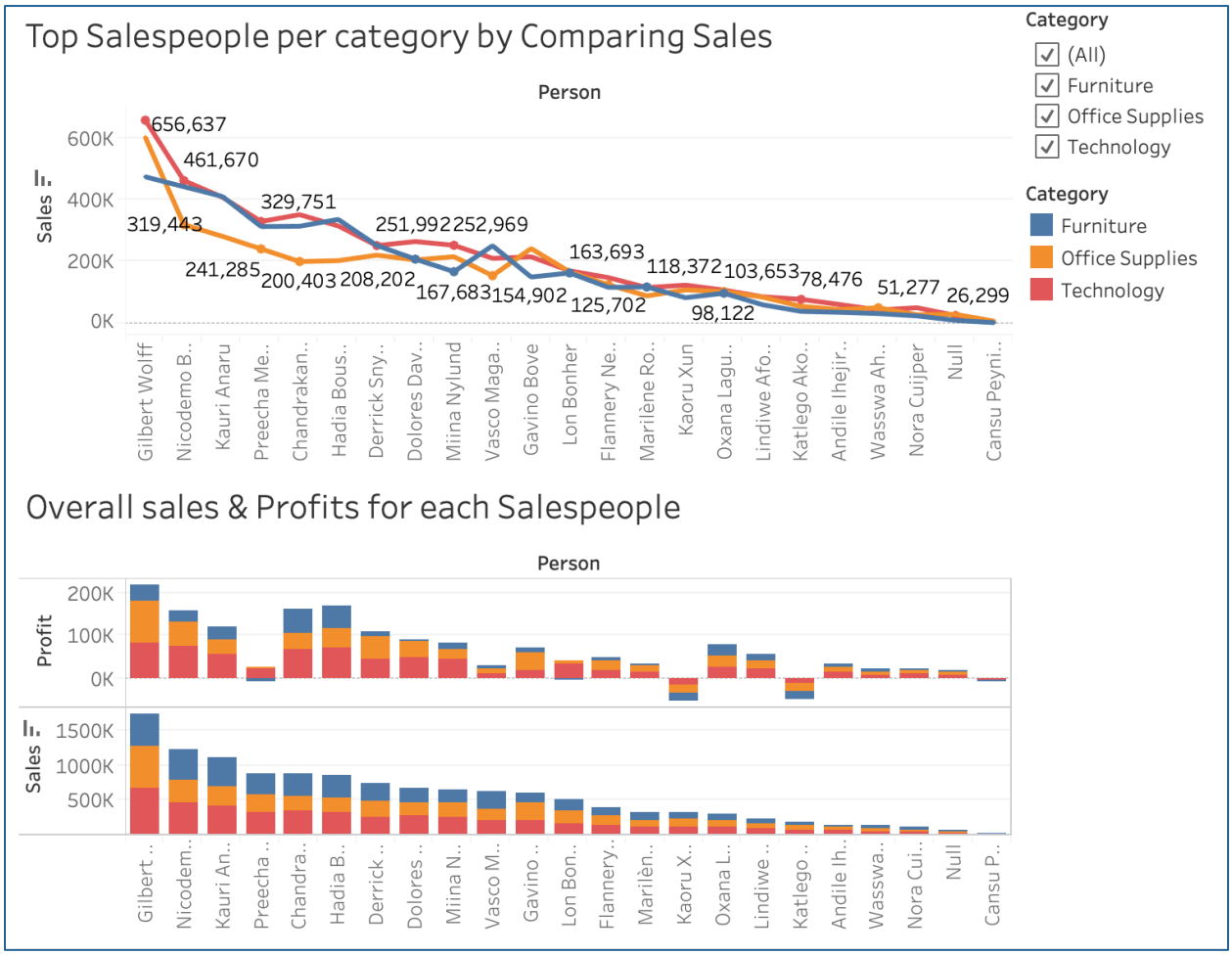
- Furniture Category:

- Technology Category:



Top salespeople in the company per product category

This data visualization presents people who sell the most in each product category for last five years and depict their performance per product category. The company can use this visual to provide a bonus for the top salespeople.



Graph Caption:

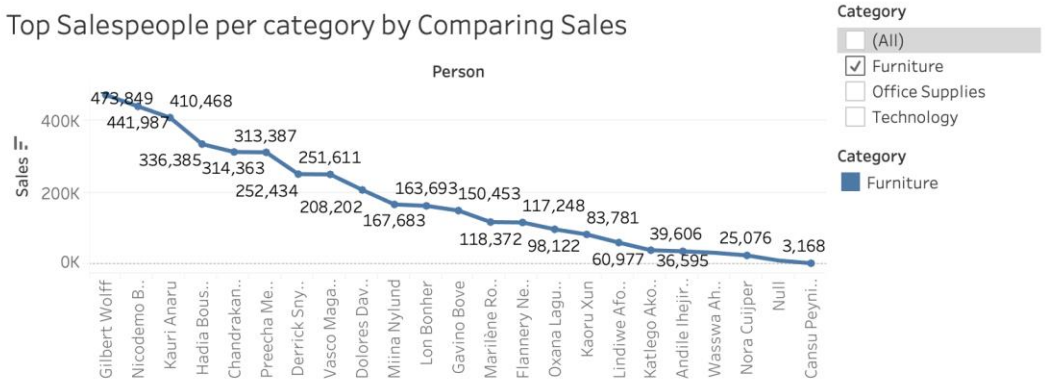
The above graphs illustrate the trend in sum of sales for each salesperson. Color shows the category of Product that blue, orange, and red colors indicate the category of Furniture, Office Supplies, and Technology, respectively. The marks are labelled with sum of sales. The Below Bar charts show the overall Sales and Profits for each Salesperson. Same as above graph, Color shows details about Category.

Observation:

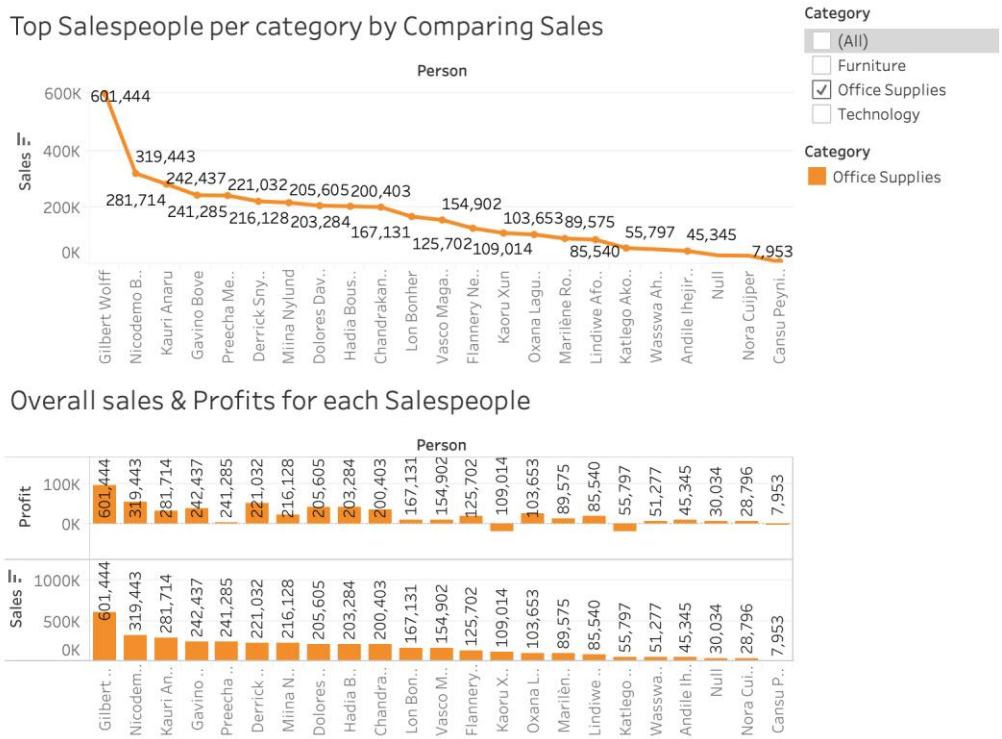
The line graphs illustrate the top salespeople each product category from 2013 to 2015, and the bar charts show the profits and sales each salespeople in different category over the period. Overall, Gilbert Wolff was the top salesperson in every category. Gilbert totally sold 473849, 601444, and 656637 in Furniture, Office Supplies, and Technology, respectively.

The detailed graphs in each category

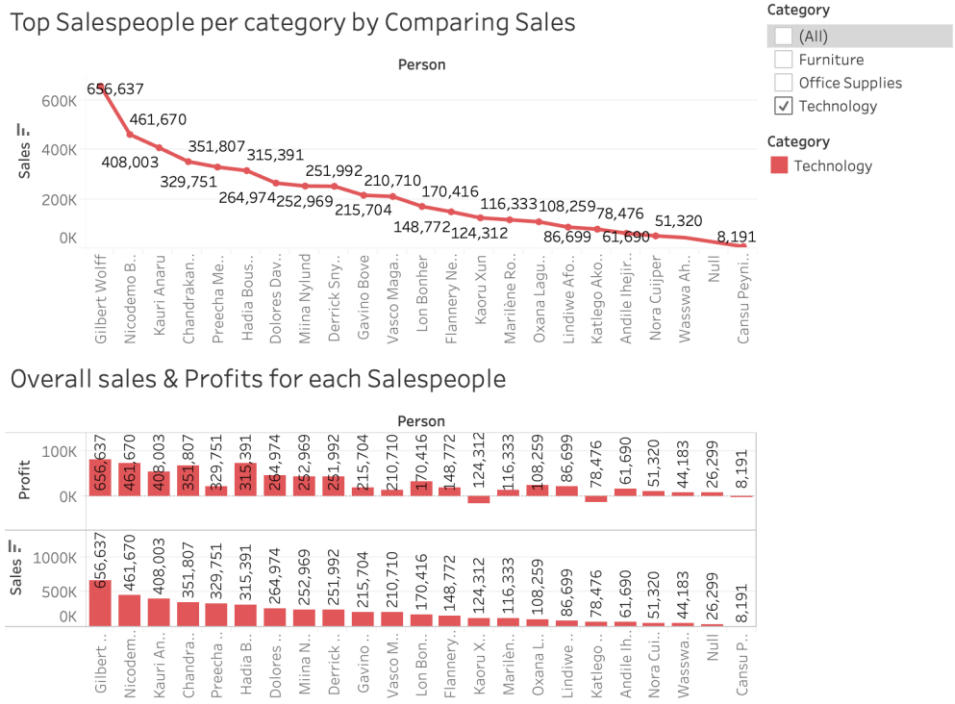
- Furniture Category:



- Office Supplies Category:

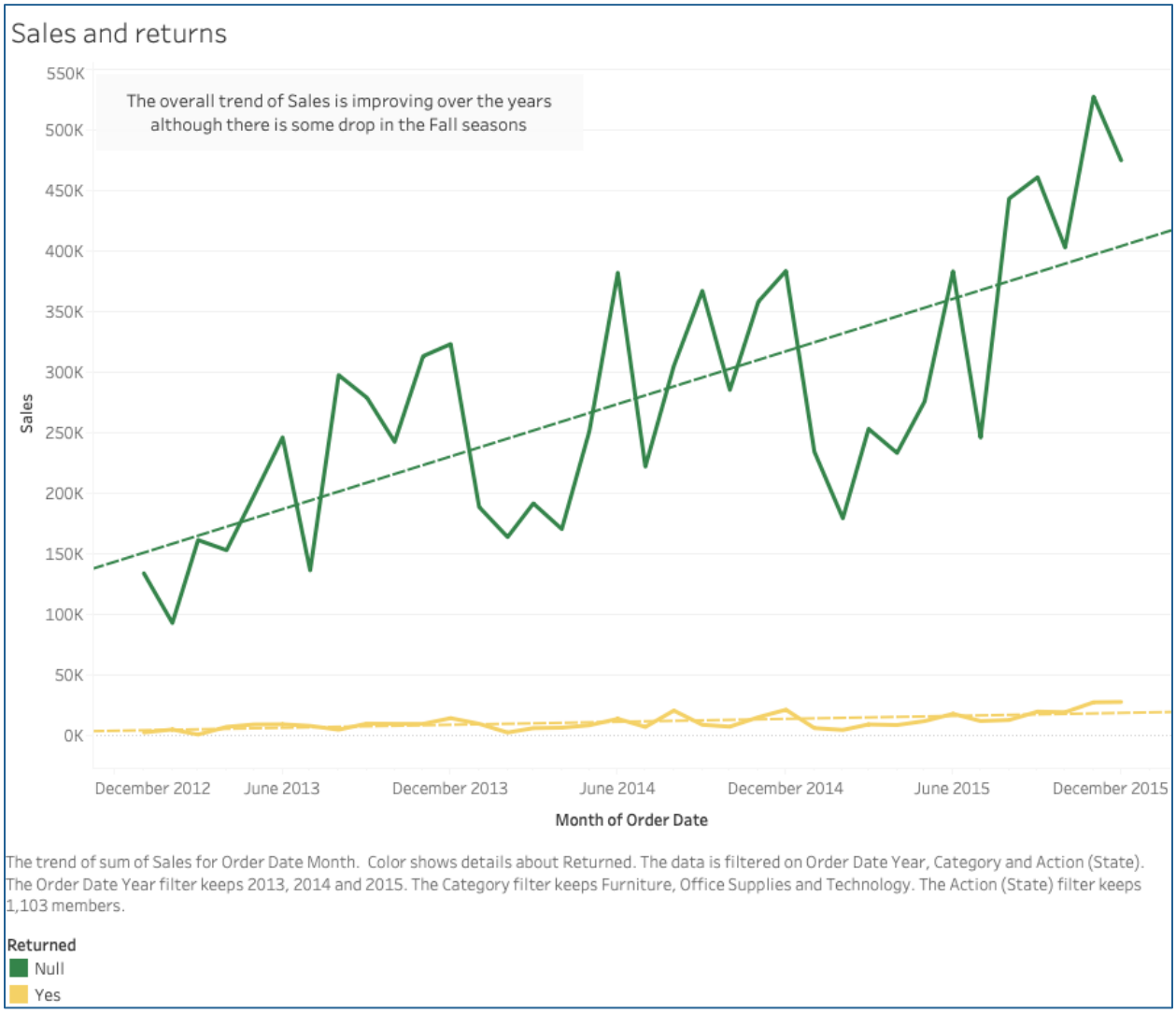


- Technology Category:



Comparison between the number of returns and sales order

This data visualization presents the number of returns compared with the number of sales orders for the last three years.



Graph Caption:

The line graphs show the trend of sum of Sales for Order Date Month. Color shows details about Returned where green indicated not returned and yellow indicates returned items. The data is filtered on Order Date Year, Category and Action (State). The Order Date Year filter keeps 2013, 2014 and 2015. The Category filter keeps Furniture, Office Supplies and Technology. The Action (State) filter keeps 1,103 members. The trend of sum of Sales for Order Date Month. Color shows details about Returned. The data is filtered on Order Date Year, Category and Action

(State). The Order Date Year filter keeps 2013, 2014 and 2015. The Category filter keeps Furniture, Office Supplies and Technology. The Action (State) filter keeps 1,103 members.

Observation:

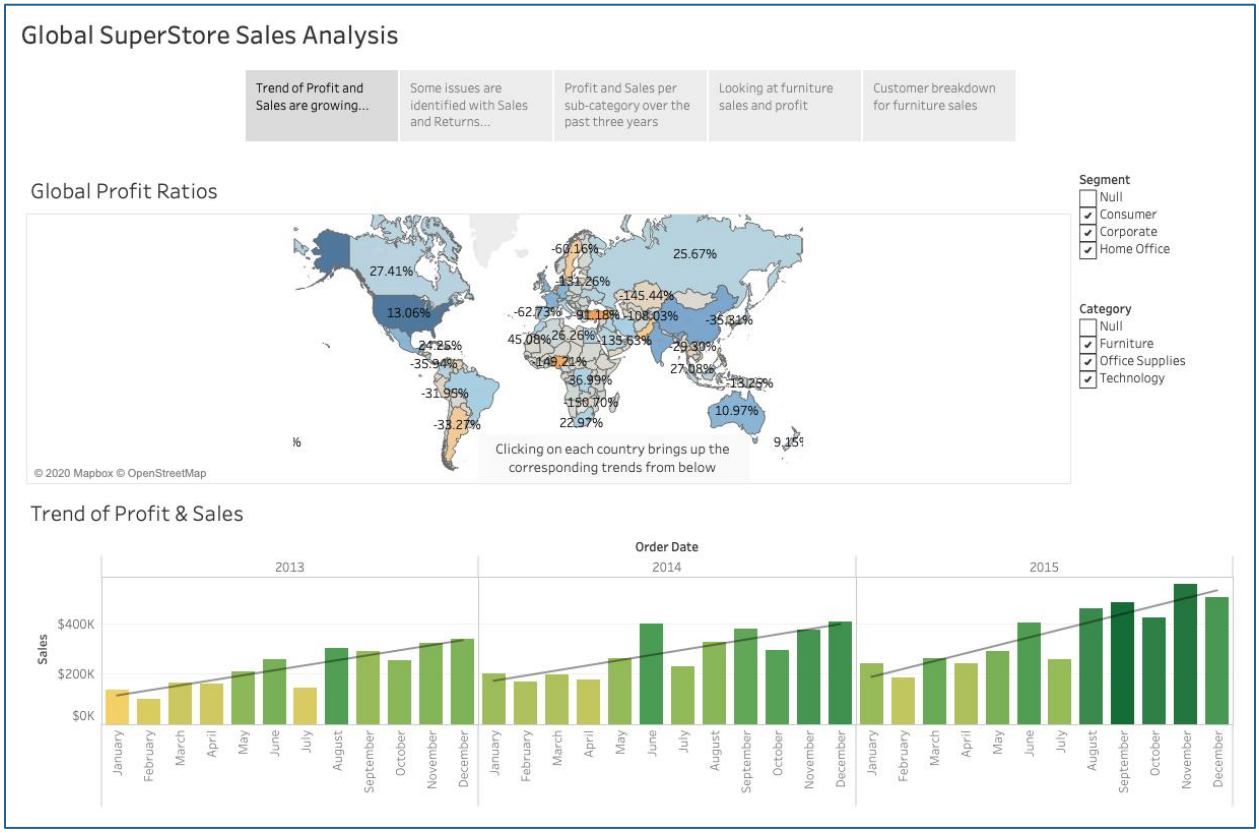
The line graphs illustrate the number of sales compared with the number of returned orders from 2013 to 2015. Overall, the sales line fluctuates, but the growth of sales is increasing, however, the number of returns slightly inclined every year.

Data-driven story for the last three years

The story provides the key points of the company for the last three years and suggestions about future action.

Key points – Data Driven Story:

1. Global profits ratios (Top)



Graph Caption:

The Map based on Longitude (generated) and Latitude (generated). Color shows sum of Profit. The marks are labeled by Profit Ratio. Details are shown for Country. The data is filtered on Category and Order Date Year. The Category filter keeps Furniture, Office Supplies and Technology. The Order Date Year filter keeps 2013, 2014 and 2015.

Observation:

The map shows the global profit and profit ratios (calculated by the sum of Profit divided by the sum of Sales). The profit ratios indicate the share of each country's profit to the company. Selecting on each country, performs an action and brings up the details of profit and sales from the second graph below. This helps in a deeper look into each country's performance in terms of sales and profit, across the three years. It also has the capability of filtering down to the category – Furniture, Technology or Office Supplies to that particular country.

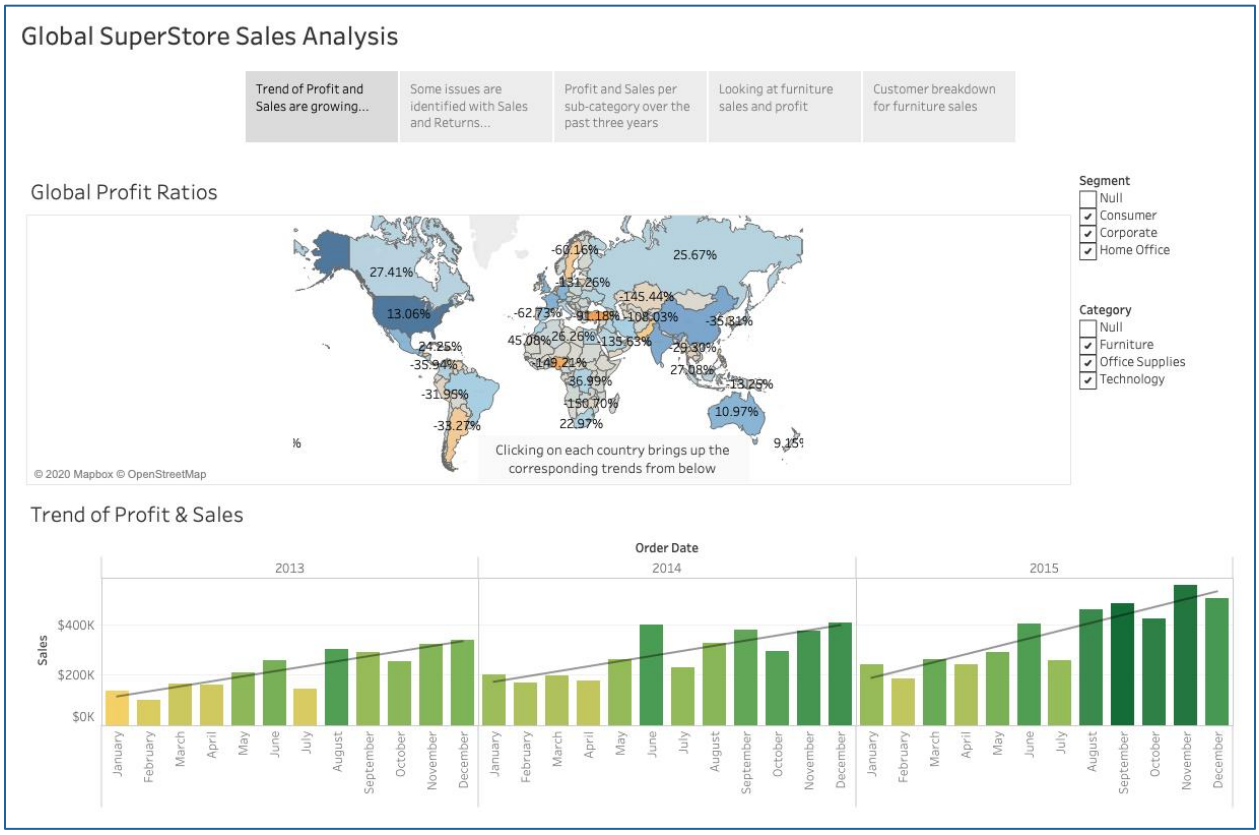
Suggestion for Future Action:

For example, selecting India and choosing Furniture, brings up the sales and profits in the past three years in that particular category.

Although the overall trends are increasing, clicking on loss producing countries and categories gives the capability of understanding the problem areas.

Losses were incurred three years in a row in Phillipines even with increased sales. The company could therefore plan for taking orders that assure a good profit margin in these areas.

2. Trend of profits and sales (Bottom)



Graph Caption:

The color- coded bar graph shows the sum of Sales for each Order Date Month broken down by Order Date Year. Color shows sum of Profit where darker green indicates higher profit and yellow indicating lower profit. The data is filtered on Category, which keeps Furniture, Office Supplies and Technology. The view is filtered on Order Date Year, which keeps 2013, 2014 and 2015.

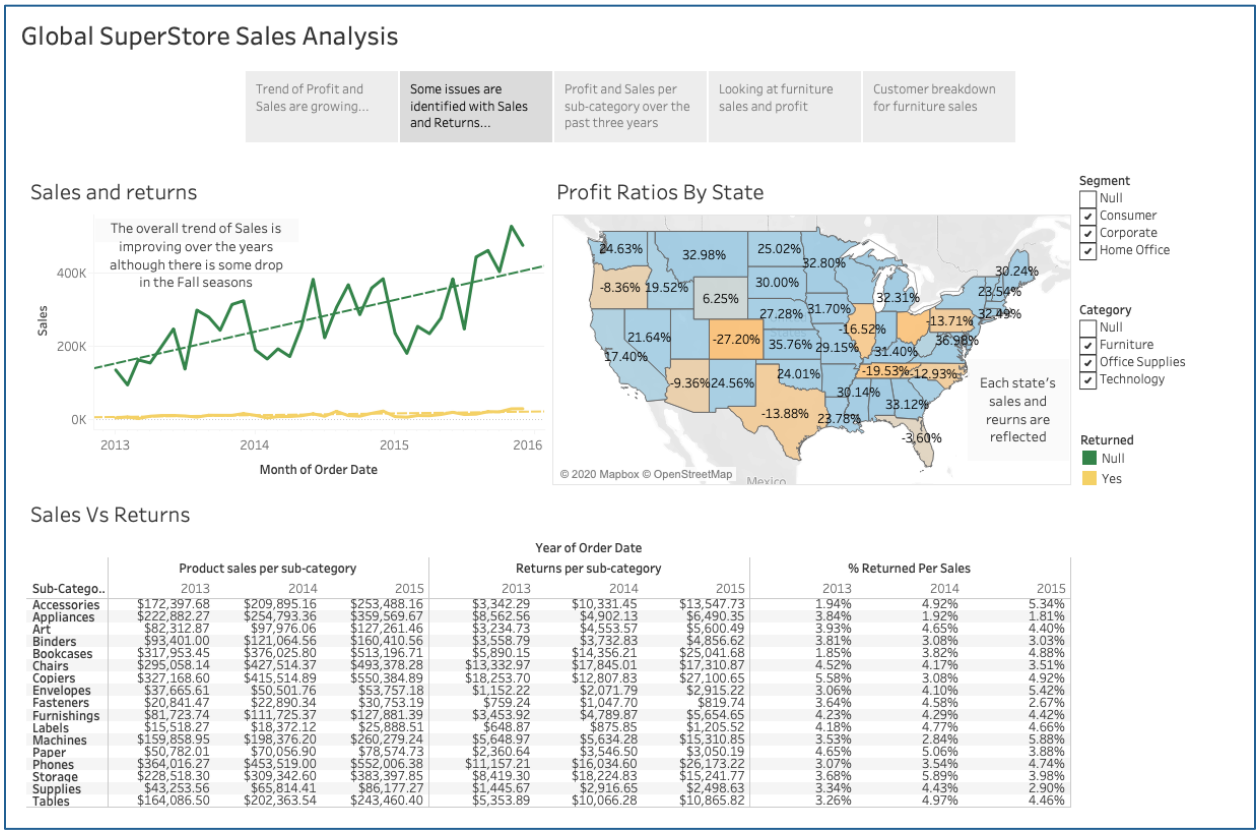
Observation:

The overall trends of profit and sales have been increasing in the past years, with fluctuations in the Fall months.

Suggestion for Future Action:

The steady upswing in profits is not reflected in the Furniture category and a de-emphasis on the sale of tables and other items with much higher shipping costs can be promoted to steady the losses.

3. Profit and returns Sheet (Top left)



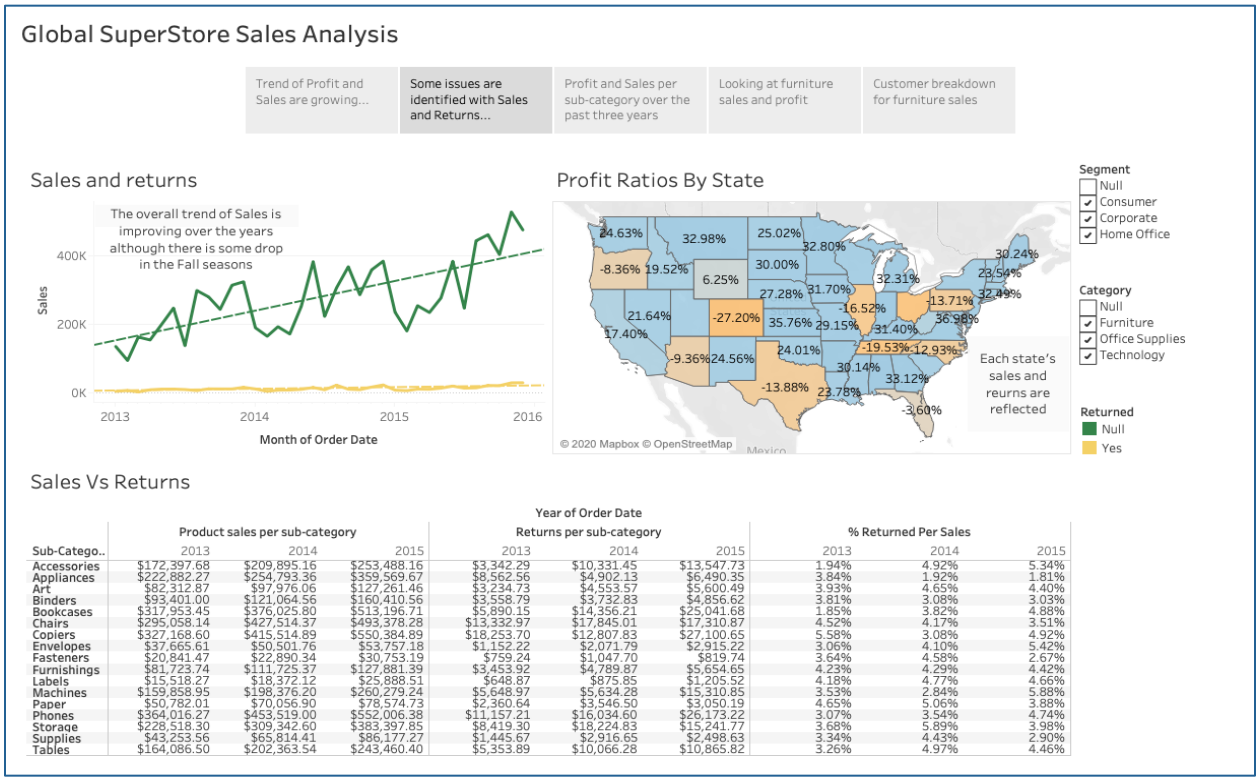
Year of Order Date

Sub-Catego..	Product sales per sub-category			Returns per sub-category			% Returned Per Sales		
	2013	2014	2015	2013	2014	2015	2013	2014	2015
Accessories	$172,397.68	$209,895.16	$253,488.16	$3,342.29	$10,331.45	$13,547.73	1.94%	4.92%	5.34%
Appliances	$222,882.27	$254,793.36	$359,569.67	$8,562.56	$4,902.13	$6,490.35	3.84%	1.92%	1.81%
Art	$82,312.87	$97,976.06	$127,261.46	$3,234.73	$4,553.57	$5,600.49	3.93%	4.65%	4.40%
Binders	$93,401.00	$121,064.56	$160,410.56	$3,558.79	$3,732.83	$4,856.62	3.81%	3.08%	3.03%
Bookcases	$317,953.45	$376,025.80	$513,196.71	$5,890.15	$14,356.21	$25,041.68	1.85%	3.82%	4.88%
Chairs	$295,058.14	$427,514.37	$493,378.28	$13,332.97	$17,845.01	$17,310.87	4.52%	4.17%	3.51%
Copiers	$327,168.60	$415,514.89	$550,384.89	$18,253.70	$12,807.83	$27,100.65	5.58%	3.08%	4.92%
Envelopes	$37,665.61	$50,501.76	$53,757.18	$1,152.22	$2,071.79	$2,915.22	3.06%	4.10%	5.42%
Fasteners	$20,841.47	$22,890.34	$30,753.19	$759.24	$1,047.70	$819.74	3.64%	4.58%	2.67%
Furnishings	$81,723.74	$111,725.37	$127,881.39	$3,453.92	$4,789.87	$5,654.65	4.23%	4.29%	4.42%
Labels	$15,518.27	$18,372.12	$25,888.51	$648.87	$875.85	$1,205.52	4.18%	4.77%	4.66%
Machines	$159,858.95	$198,376.20	$260,279.24	$5,648.97	$5,634.28	$15,310.85	3.53%	2.84%	5.88%
Paper	$50,782.01	$70,056.90	$78,574.73	$2,360.64	$3,546.50	$3,050.19	4.65%	5.06%	3.88%
Phones	$364,016.27	$453,519.00	$552,006.38	$11,157.21	$16,034.60	$26,173.22	3.07%	3.54%	4.74%
Storage	$228,518.30	$309,342.60	$383,397.85	$8,419.30	$18,224.83	$15,241.77	3.68%	5.89%	3.98%
Supplies	$43,253.56	$65,814.41	$86,177.27	$1,445.67	$2,916.65	$2,498.63	3.34%	4.43%	2.90%
Tables	$164,086.50	$202,363.54	$243,460.40	$5,353.89	$10,066.28	$10,865.82	3.26%	4.97%	4.46%

<u>Observation:</u>

According to the graph the comparison between the number of returns and sales order, the action of selecting a state makes corresponding changes to the line graph to indicate the profit and returns of that specific selected state.

4. Profit ratios by State (Top right)



Graph Caption:

The USA Map based on Longitude (generated) and Latitude (generated). Color shows Profit Ratio. The marks are labeled by Profit Ratio. Details are shown for State. The data is filtered on Category and Order Date Year. The Category filter keeps Furniture, Office Supplies and Technology. The Order Date Year filter keeps 2013, 2014 and 2015.

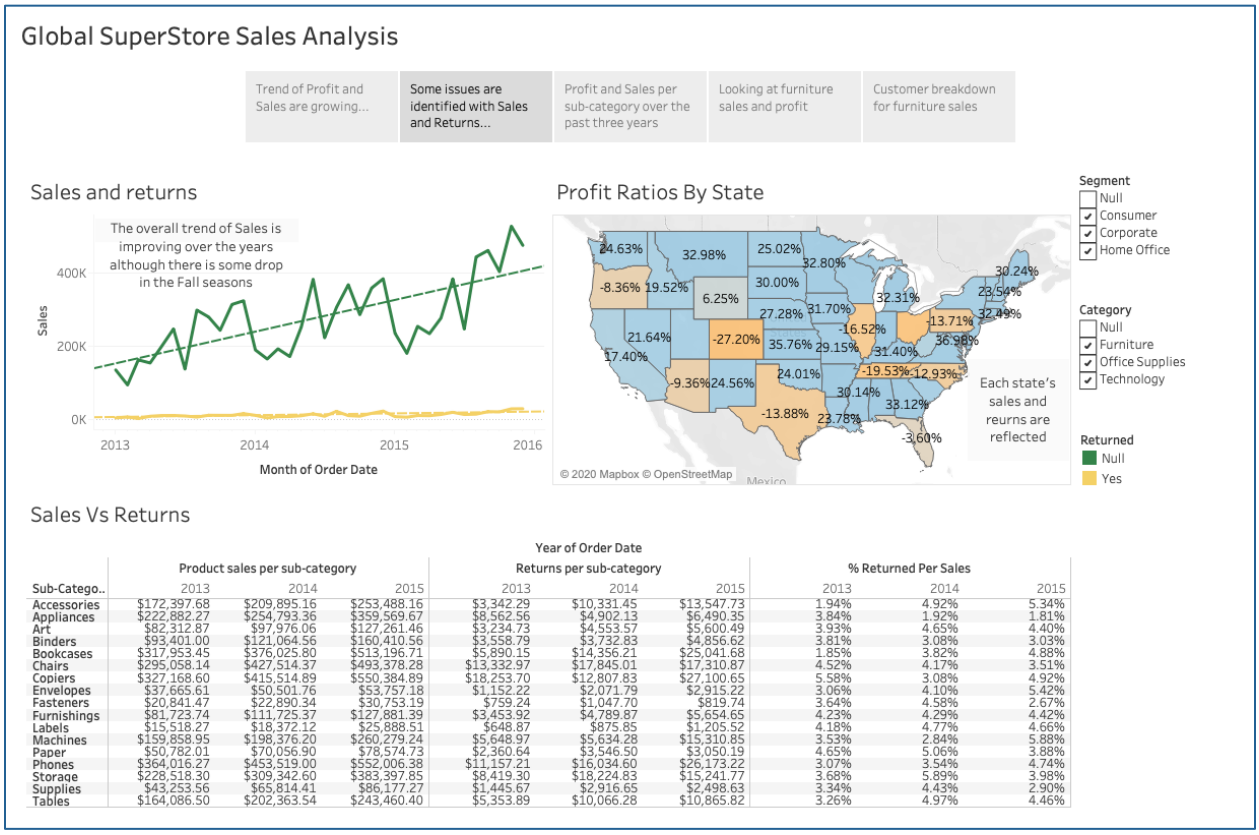
Observation:

The general profit ratios of the individual states are displayed with some states performing better than others. Selecting a state reveals more detailed information in the other two graphs on the same page. The category of sales can also be chosen and analyzed for understanding the relationship between the profit and returns.

Suggestion for Future Action:

Tennessee, North Carolina and Colorado are some poorly performing states and their sales and returns is investigated further, and the profit margin of lot of products are low, this can be calibrated.

5. Sales Vs Returns (Bottom)



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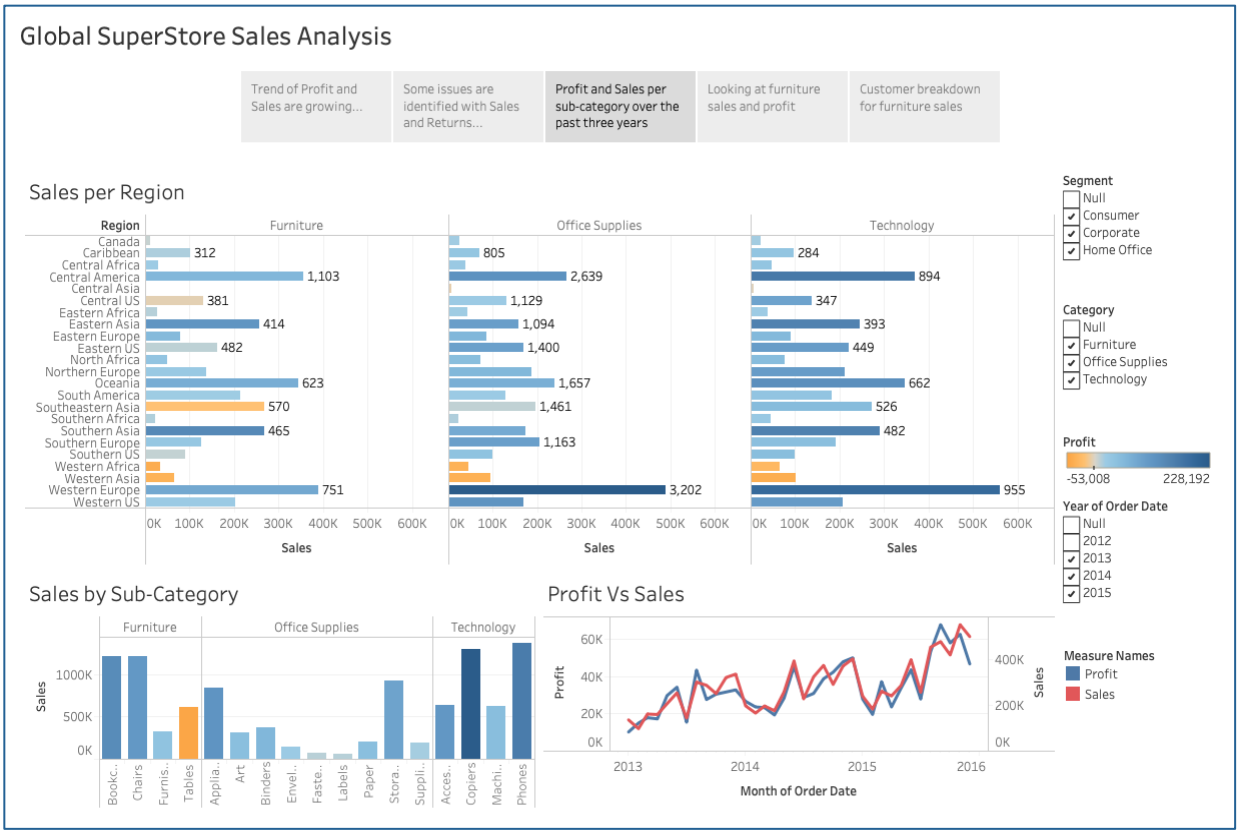
Observation:

Product sales per sub-category is calculated by including the sum of sales per sub-category. Returns per sub-category is similarly identified by taking the sales of only the returned items. And the percentage of returned sales per sales is given by Returns per sub-category divided by Product sales per sub-category. This establishes a percentage of the returned items in comparison to the total items sold.

Graph Caption:

The test table at the bottom of the page provides a detailed account of the Product sales per sub-category, Returns per sub-category and % Returned Per Sales broken down by Order Date Year vs. Sub-Category. The data is filtered on Order Date Year, Category and Action (State). The Order Date Year filter keeps 2013, 2014 and 2015. The Category filter keeps Furniture, Office Supplies and Technology. The Action (State) filter keeps 1,103 members.

6. Sales per Region (Top)



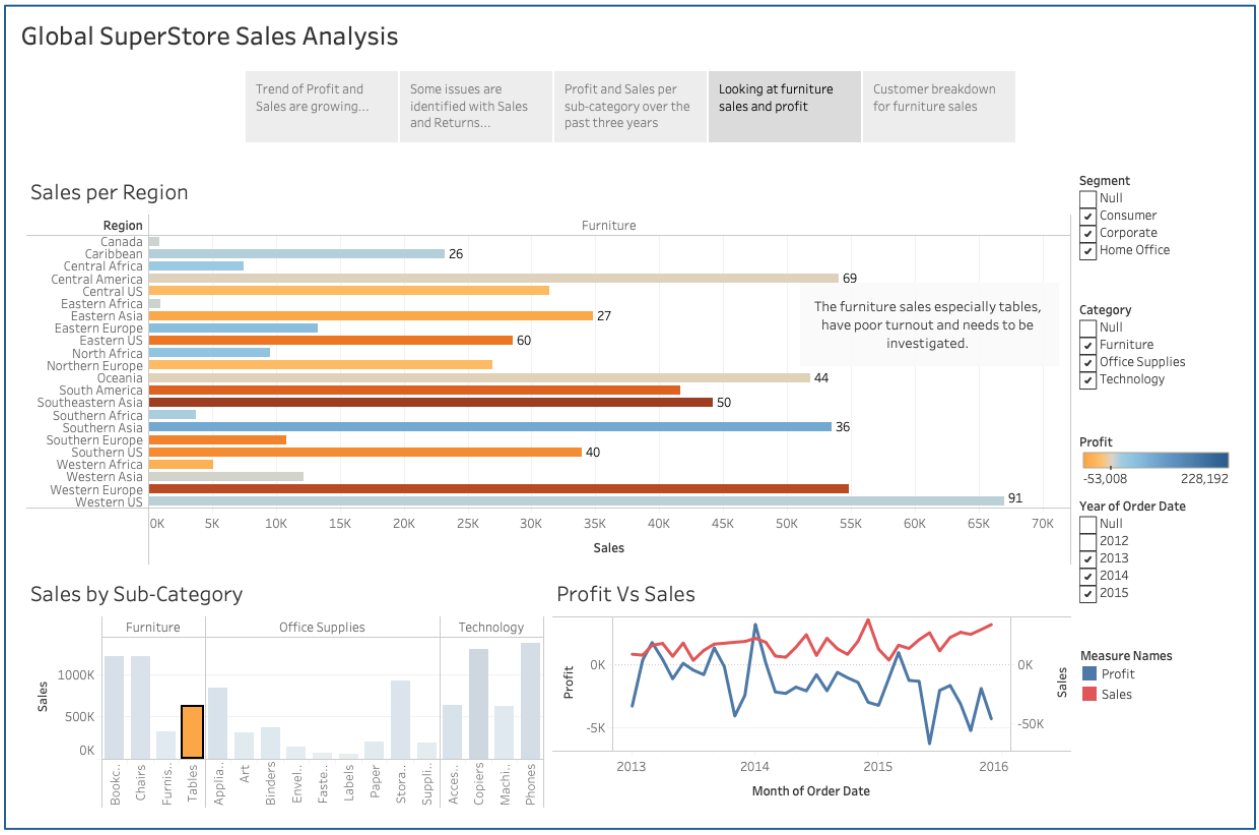
Graph Caption:

The horizontal bar graph indicates the sum of Sales for each Region broken down by Category. Color shows sum of Profit where blue indicates higher profit and orange denotes lower profit. The marks are labeled by sum of Number of Records. The data is filtered on Order Date Year and Action (Category,Sub-Category). The Order Date Year filter keeps 2013, 2014 and 2015. The Action (Category,Sub-Category) filter keeps 18 members. The view is filtered on Category, which keeps Furniture, Office Supplies and Technology.

Observation:

The category-based sales of each products based on the number of records indicate the sales across the regions and immediately makes clear, the regions that have lower sales namely, Africa, Asia and Canada. There is some improvement of sales in these regions over the years and by selecting the sub- category from the Sales by Sub-Category graph, the action reveals the performance of sales in all these regions according the items selected. Action can be taken to account for the higher sales of Technology products especially copiers in the future.

7. Sales by Sub-Category (Bottom left)



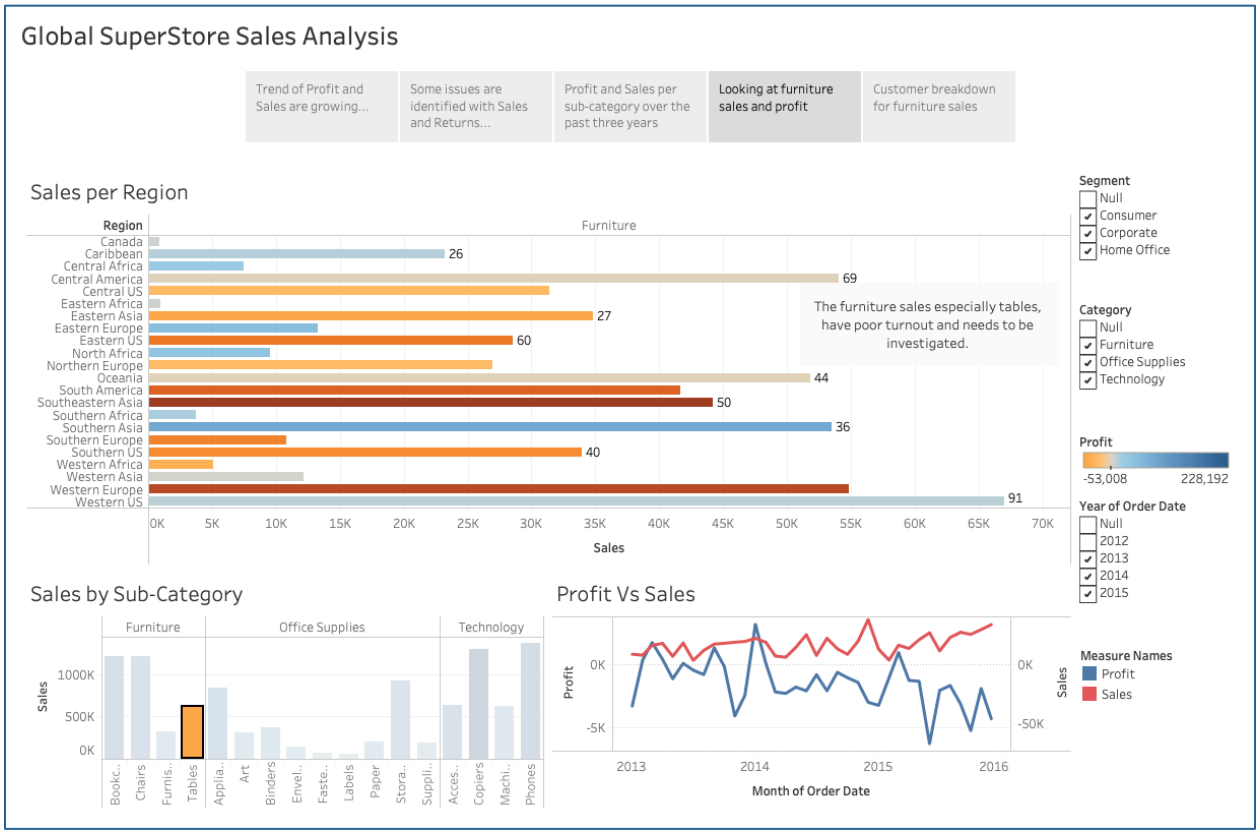
Graph Caption:

The vertical bar graph is the Sum of Sales for each Sub-Category broken down by Category. Color shows sum of Profit where blue indicates higher profit and orange denotes lower profit. The data is filtered on Order Date Year, which keeps 2013, 2014 and 2015. The view is filtered on Category, which keeps Furniture, Office Supplies and Technology.

Observation and Suggestion for Future Action:

From the graph it is evident that the sales of tables have performed poorly, although some of the office supplies are sold in very less quantity, they still contribute to the profit positively unlike the Tables, which cause a loss of about $53,000. This can be an important starting point for the company to analyze why tables have performed poorly and across which regions.

8. Profit Vs Sales (Bottom right)



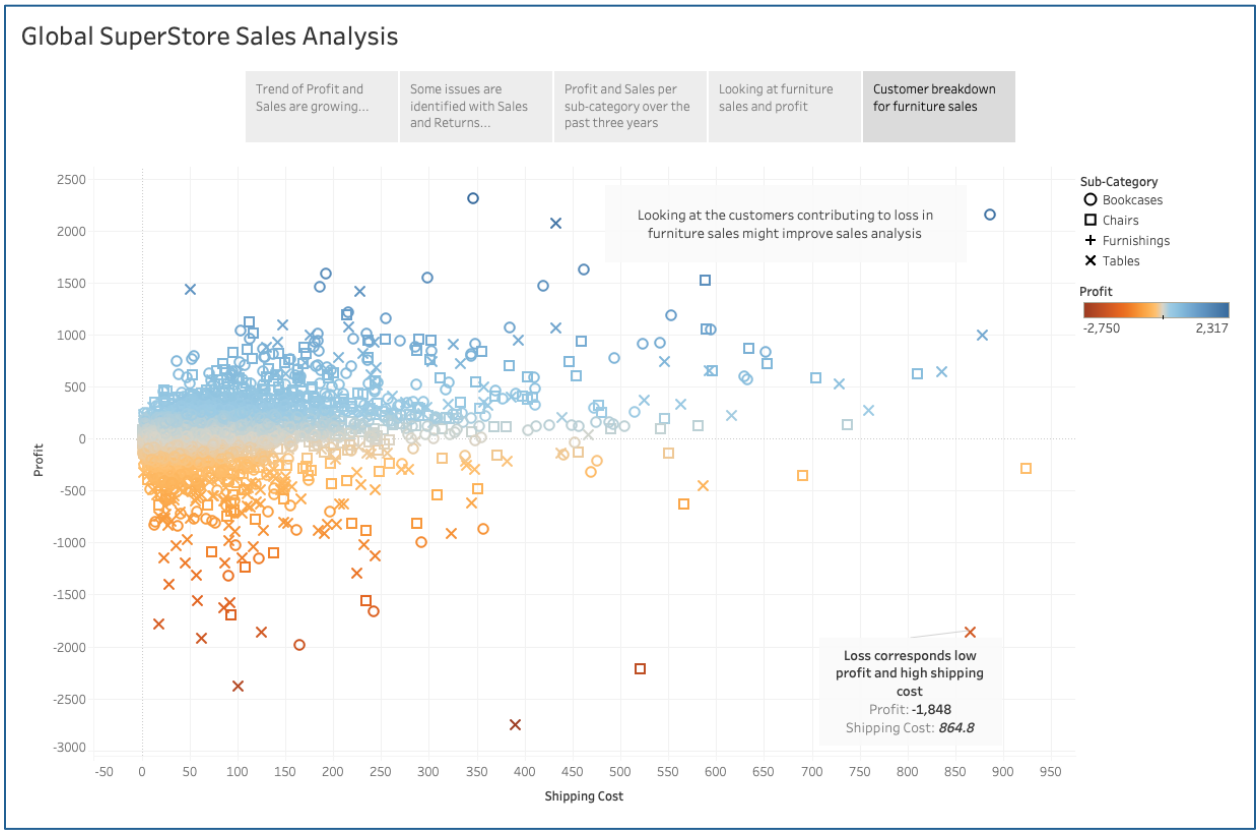
Graph Caption:

The line graph at the bottom left of the page shows the trends of Profit and Sales for Order Date Month. Color shows details about Profit and Sales where blue indicates Profit and red indicates Sales. The data is filtered on Order Date Year, Category, Action (Category,Region) and Action (Category,Sub-Category). The Order Date Year filter keeps 2013, 2014 and 2015. The Category filter keeps Furniture, Office Supplies and Technology. The Action (Category,Region) filter keeps 70 members. The Action (Category,Sub-Category) filter keeps 18 members.

Observation and Suggestion for Future Action:

We see that profit and sales closely follow each other and the action of selecting a sub-category reveals the profit and sales for that sub-category. Majority of products have a low profit margin, hence explaining increased sales not directly corresponding to a profit increase.

9. Customer Breakdown for furniture sales



Graph Caption:

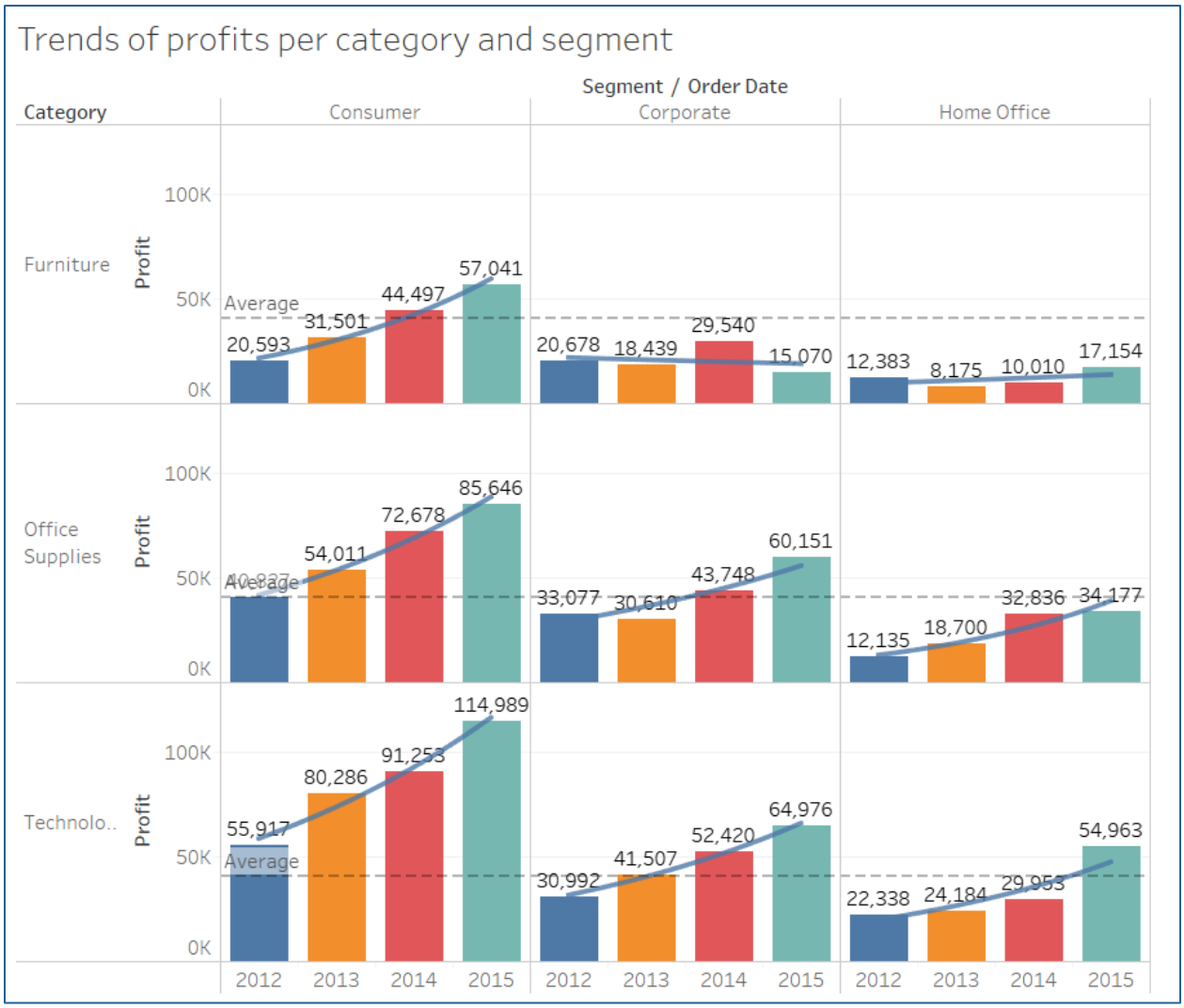
The Scatterplot information gives the sum of Shipping Cost vs. sum of Profit. Color shows sum of Profit, blue indicating profit and orange indicating a loss. Shape shows details about Sub-Category – Furniture where circle is for bookcases, square is for chairs, plus sign for furnishings and cross sign for tables. Details are shown for Customer ID. The data is filtered on Category, Action (Category, Region) and Order Date Year. The Category filter keeps Furniture, Office Supplies and Technology. The Action (Category, Region) filter keeps 70 members. The Order Date Year filter keeps 2013, 2014 and 2015. The view is filtered on Sub-Category, which keeps Bookcases, Chairs, Furnishings and Tables.

Observation:

The reason for specifically looking the furniture sales per customer is because of the poor turnover of these products across all regions. This information can be used to identify if the cause of loss in product sales because of higher shipping cost.

Trends of profits per category and segment

This data visualization presents the trends of profits each category and segment over time. This visual also include the trend line model and the result of analysis.



Graph Caption:

The bar graphs illustrate the Sum of Profit each Segment and Category for Order Date year. Color shows details about Order Date year. The above graphs are filtered with 2012, 2013, 2014 and 2015 Order Date years. The average line is created for each category to show the average of profits, and the trend line model is an Exponential model.

Creating a trend model in Tableau depend on many factors, such as P-value, R-squared value, Standard Error, Sum Squared Error (SSE), Mean Squared Error (MSE) and the distance between the line and the data. For this visual, we calculated the line based on P-value, R-squared, and Standard Error.

First, P-value, in statistics, is the probability of observing a t-value that large or larger in magnitude if the true value of the coefficient is zero. In Tableau, P-values is scaled on 0 to 1 to illustrate the apparent trend of the data. The small number of P-values shows the more confidence of the line that the true value is zero. Furthermore, the P-value will be less important if the data is very big.

Second, R-squared value is a statistical measure of how close the data are to the fitted trend line. It is the ratio of the variance of the model's error, or unexplained variance, to the total variance of the data. In Tableau, R-squared value is scaled on 0 to 1, and the large value demonstrates the model fit the data. However, if the R-squared value is extremely large, the model might be misleading.

Finally, Standard Error (SE) of the trend line in Tableau is the square root of Mean Squared Error (MSE) of the model. The standard error is estimated from the standard deviation (variability), randomly. If the standard error of MSE is small that means all values are closed to the average value from random, the model is great.

Observation:

The bar graphs illustrate the profits per category and segment from 2012 to 2015, and the dash and blue lines in the graphs show the average and trend of the profits, respectively. Overall, almost trend lines gradually increased; however, the trends of the profits in Furniture-Corporate category slightly fell down. Additionally, the trend lines of Furniture-Corporate and Furniture-Home Office were less than the average line.

The result of analysis

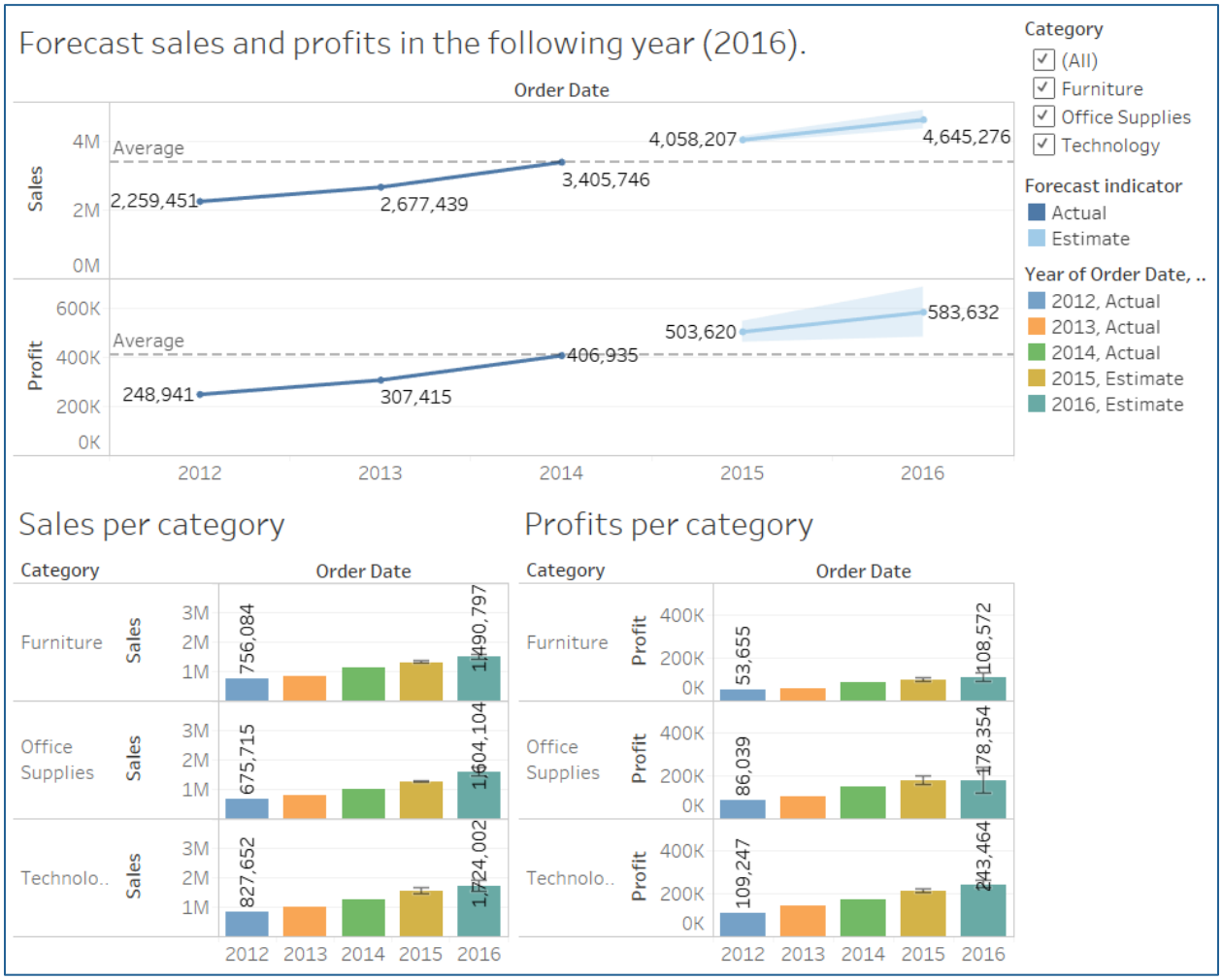
As considered, the Exponential model is suitable for this data based on the three significant values. The information below:

Model	P-value	R-squared	Standard Error
Linear	< 0.0001	0.979729	5044.84
Logarithmic	< 0.0001	0.97972	5046.02
Exponential	< 0.0001	0.95574	0.192355
Power	< 0.0001	0.955737	0.192362
Polynomial (Degree 2)	< 0.0001	0.993066	4172.66

In Linear, Logarithmic, and Polynomial models, the Standard Error values are larger than both Exponential and Power models. Clearly, the three significant values in Exponential and Power models are almost the same, so we chose the Exponential model for this data.

Forecast of sales and profits in the following year

This data visualization presents the forecast how sales and profits will be evolved in the next year (2016).



Graph Caption:

The line graphs show the Sum of Profit and Sum of Sales for Order Date year. Colors between 2015 and 2016 illustrate the Forecast indicator (Actual and Estimate). In addition, the below bar charts in the left side indicate the Sum of Sales each Category for Order Date year, and the right bar charts demonstrate the Sum of Profit every Category for Order Date year.

In part of Forecast option, the forecast lengths of both models are the next five quarters (Automatic) from 2015 Q4 to 2016 Q4, and the Source Data normally ignores the last quarter that is 2015 Q4. Therefore, the information to create the

forecast is based on from 2012 Q1 to 2015 Q3. For the forecast models are automatic setting which is a multiplicative forecast.

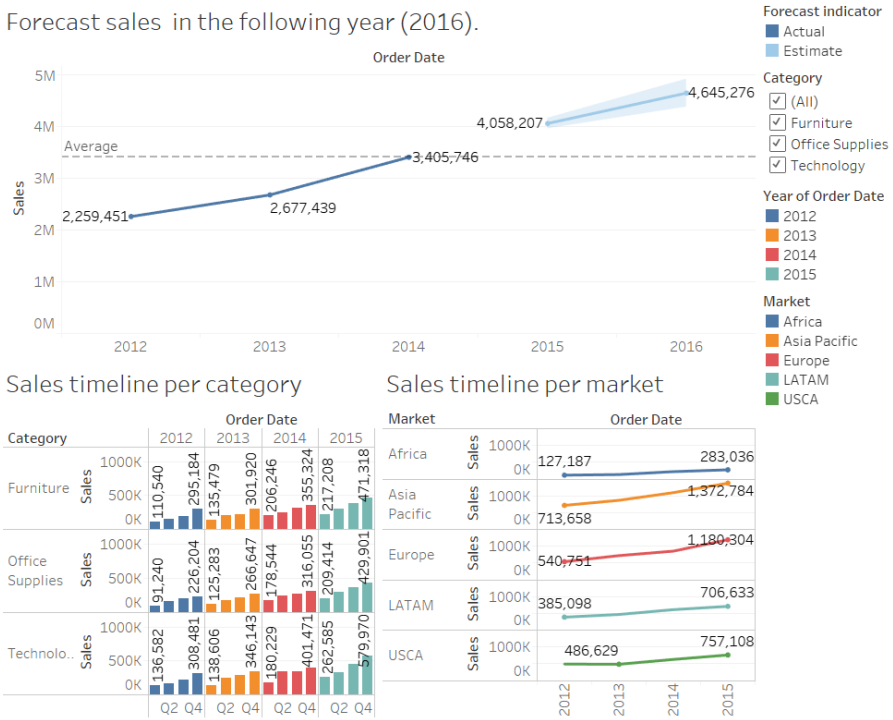
According to Tableau, Tableau automatically selects the most appropriate method for a given view, so the both forecast model of sales and profits are Multiplicative. In addition, the forecasts were computed using exponential smoothing because the value of each level is influenced by every preceding actual value to an exponentially decreasing degree. As a result, the quality of model is good for this data based on the settings of creating the forecasts.

Observation:

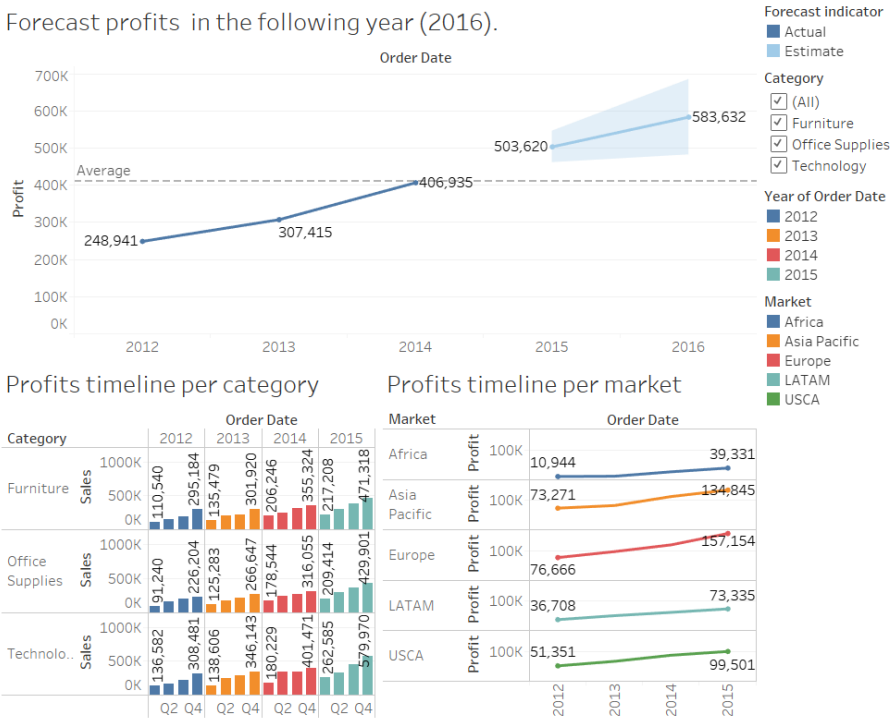
The line graphs illustrate the forecast of the sales and profits in the following year based on the previous four years (2012, 2013, 2014, and 2015), and the dash line states the average of sales and profits. Furthermore, the bar graphs in the left side show the forecast of sales per category from 2012 to 2015, and the right bar graphs indicate the forecast of profits per category in the same year. Overall, the forecast of both sales and profits will gradually increase in the next year (2016), and all the sales and profits each category product will gradually grow up in 2016.

The detailed graphs

- Sales



- Profits



CONCLUSION

In this report, using Tableau provides us an opportunity to create data visualizations that effectively explore and present the meaning, trends, and patterns in both datasets for every subject. All these visualizations are initial steps to create business strategy that would optimize the enterprise's performance and make company's decisions better in terms of business promotion and strategy.

The countries with most profits in each product category are displayed along with their profits during the last three years. This helps the company in identifying the countries that are most profitable.

Least product sales across the countries are identified and displayed in three product categories. These visualizations provide the insights about the countries are least performing in product sales.

Sales persons with their corresponding sales and profits are clearly displayed. This helps the company in identifying the top salespeople and their performance across three product categories.

Clear visualizations are displayed to show the sales and product returns. This visualization is used to identify the trends in sales and product returns over the past three years.

A detailed data driven story is created on key points to provide clear analysis on profit ratios, detailed trends in sales and return in individual states, sales across the regions and sub-categories, and shipping cost in relation to profits.

Finally, profits and sales trends are clearly presented across product category and segment. These visualizations provide the insights about current profits and sales and helps in identifying the projected future values.

TASK LIST

1. **Task 1-3:** Yashwanth Gangapuram
2. **Task 4-5:** Poorani Jagadeesan
3. **Task 6-7:** Thanate Banchonhattakij
4. **Task 8:** - Content creation, editing and analysis Thanate Banchonhattakij, and Yashwanth Gangapuram
5. **Task 8:** – Task 4,5 and minor editing Poorani Jagadeesan

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