**Analysis of Sales Performance Using Tableau**

**Introduction: -**

Data visualization is an important part of any business to show different visual representations which allows stakeholders to understand and interpret data more easily. Additionally, it helps to identify hidden patterns and make business decisions accordingly. Furthermore, it also helps businesses to communicate ideas more effectively which will eventually help them to grow. It becomes important to identify the trends and make more precise decisions. Apart from this research done by Hoyle et al. states that when it comes to predictive analysis there is a lack of effort from the sales manager and other salesperson side. According to (Long and Linsen [2011](https://link.springer.com/chapter/10.1007/978-3-030-44999-5_39#ref-CR21)), visualization helps to discover unseen patterns and trends such as data distribution and correlations within the data.

This paper will discuss the sales dashboard made using Tableau and PowerBi. For any business, visualizing product sales to analyze the best-performing product is essential to make the decisions accordingly.

**Data Description: -**

about toy sales which contains different product categories, various dealers across the world where the products are distributed, and other important features used in the visualization. The dataset contains a total of 2748 rows and 20 columns ranging from 2018 to 2020 which provides a broad spectrum of features to visualize the sales.

The source for this dataset is Kaggle which is an open data repository: <https://www.kaggle.com/datasets/ddosad/auto-sales-data/data>.

The table below shows all the different features/columns that are used to make a final dashboard:

|  |  |  |
| --- | --- | --- |
| Column Name | Description | Type/Domain |
| QUANTITYORDERED | Number of items ordered | Integer |
| SALES | Total sales of each order/product | Float |
| ORDERDATE | Date when the order was placed | Date Time |
| PRODUCTLINE | Category for each product | Object |
| CUSTOMERNAME | Name of the dealer/Customer | Object |
| CITY | City where the dealers store is located | Object |
| COUNTRY | Country where the dealer is located | Object |
| DEALSIZE | The size of the order/deal | Object |

The above table shows what features have been used to make the dashboard along with the description and their types.

**Persona: -**

The user would be a business analyst in the manufacturing company whose main aim is to focus on market trends, patterns, and the best-performing product. The analyses should not only interpret the positive outcomes but also reveal the potential area of improvement which helps the company to grow. There are a total of four questions and their requirements that will be answered to perform the analyses:

***Q1.*** *What were the maximum quantity of products ordered by the deal size?*

**R1:** To answer this question, the user needs to analyze the Deal Size and Order Quantity features to identify the order quantity by the deal size.

**R2:** To visualize this, a bar chart would be beneficial where each bar states the number of quantities ordered for each deal which is small, medium, and large. To achieve this, the chart should be able to display the relationship between both features.

**R3:** To get deep insights about each dealer/customer, a filter option can be added to see the specific information for each customer.

***Q2.*** *How volatile were the sales between 2018 to 2020 signifying the minimums and maximums during the period?*

**R1:** To answer this question, the user needs to visualize the total three pieces of information which are sales, Date and total quantities ordered. This will help the user to understand the sales over time and the fluctuations during the period.

**R2:** To get a more detailed answer, order quantity can be added to the chart which shows the quantities order for each period.

**R3:** Geographical information can be used to visualize the maximum and minimum sales for each country.

**R3:** To answer this question, a line chart and map can be used along with the trend line which signifies the sales over time.

***Q3.*** *What product outperformed over the different categories during the sales period?*

**R1:** To answer this question, the user needs to visualize two pieces of information which are sales and product lines to analyse the best-performing product.

**R2:** To visualize this, a pie chart can be used to compare sales distribution across each product category and analyse the best-performing product.

***Q4.*** *How does the frequency of orders correlate with the actual sales amount and does the proportion of sales imply a relationship between deal size and product line?*

**R1:** This is a complex question where the user will be required to collect information from the combination of different charts.

**R2:** To visualize the sales proportion across the deal size based on the product line, a bar is suitable where each bar represents sales for each deal size.

**R3:** To visualize the data for each product category, a filter for the same is required to get the specific information.

To understand the questions and their requirements, the user should have a background in business with the skill to understand different charts and interpret them efficiently. Additionally, the user would require advanced analytics tools and a device with enough memory to run the tools along with a good resolution for visual clarity.

**Design: -**

A close-up of a graph

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Pie Chart showing sales for each product with relevant filter.

Geographical map showing Sales across countries.

Sales trends over time

Bar Chart showing sales for each deal.

The prototype follows an HCI (Human-Computer Interaction) UCD method whose main aim is to make computers more usable to the end user. As different filters will be used and to use these filters, the user will need to interact with the computer. Additionally, it should fulfil the requirements of the users effectively.

**Tableau Dashboard: -**

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**Implementation: -**

**Chart-1:** Product Sales by Category – Donut Chart

To analyse the sales distribution across different product categories, a donut chart is created. Two dimensions, “Productline” and “Sales”. Since there is no direct option to make a donut chart which is an issue in Tableau, to implement the donut chart, drag product lines to the color tab inside the “Marks” card and change the chart type to the pie chart. Then drag the same dimension to the size tab and change the measure to count. Create a data point sum(0) in the y-axis (rows) and duplicate the same data point so there are two data points in total. Now there are two pie charts, remove all the contents from the second data point and convert the data point to the dual axis and the donut chart will be created. After making the dual axis, change the size and color of the second data point. To visualize the total sales drag sales to the label tab of the second data point, this will display the total sales in the center of the pie chart. Additionally, to calculate the percentage (%), change the sales value to the total percentage. To create the filter, drag the “customer” data to the filters pane and apply the filter. This will allow user to analyse the information for the selected customer name. The chart is visualized using the “Lighting Bluegrass” color palette by dragging “Productline” to the color tab.

**Chart-2:** Deal Size by Order Quantity – Bar Chart

To analyse how Dealsize contributes to the actual sales, a bar chart is implemented using “Dealsize” and “Quantitiordered” as the dimensions. First drag “Quantitiordered” to the rows and “Dealsize” to the columns and make sure that the measure for “Quantitiordered” is sum. To apply color to each bar, drag “Dealsize” to the color tab in the Marks pane which will help to categorize each bar using different colors. The color used for this chart is the “Lighting Bluegrass” which categorizes Dealsize into different colors. The same filter used for the Donut chart is linked to this chart.

**Chart-3:** Sales by Country – Map

To analyze the sales distribution across different countries and cities, geographical data such as “country” and “city” are. To create a map, a hierarchy “Location” has been created using country and city. After creating the hierarchy, drag “Location” to the canvas and the map will be created automatically, as Tableau will recognize the data type and will create a map. To add color to the map, drag the country to the color tab and the “Tableau Classic 20” color palette has been used to segment each country into different colors. To add more detail to the map, city, customer, and sales data have been to the Label tab under the marks pane. To locate each customer/dealer location the same filter “Customer” is linked to this chart.

**Chart-4:** Sales Trend by Month – Line Chart

To visualize the sales trend over time, a line-chart has been created using “sales” and “orderdate” dimensions. To implement this chart, drag sales to the rows and orderdate in the column fields. Make to change measures for both the data, for sales change measure to sum and for orderdate change measure to month (Month 2015). This will create a line chart showing the monthly sales distribution. To add more detail to the chart, drag sales, orderdate and quantityordered to the label. To prevent the data from overlapping, specific points have been selected using the “Mark Label” option. To visualize the trend, a trend line has been drawn using the “Trend Line” option in the Analytics pane. To add color to the chart, drag sales to the color tab and choose the “Red-Green diverging” color to show the intensity of the line. “Productline” has been used as a filter and all the dimensions are used as a label on the chart.

**Chart-5:** Product Sales by Deal Size – Bar Chart

To visualize what type of deal contributes to higher sales, a bar chart has been created using “Dealsize” and “sales” as dimensions. Drag sales to the row and Dealsize to the column fields. To categorize each chart into different colors, drag Dealsize to the color tab and choose “Lighting Bluegrass” as the color palette. To add details to the chart, drag sales to the label tab and for this chart, the “Productline” filter is linked.

**Chart-6:** Sales Performance: Actual Vs. Forecast – Area Chart

This chart displays the sales forecast for the next year. To implement this chart, make the line chart made earlier, but instead of a line choose the area chart from the “Show me” tab. This will create an area chart with sales and orderdate as the dimensions. Now, to add the sales forecast, select the “Forecast option” from the analytics pane and it will visualize the estimated sales. Then add forecast and sales capsules to the label tab to add more details to the chart. To add color, drag the sale to the color tab.

**Dashboard Implementation: -**

To create a final dashboard, drag each sheet into the dashboard in a logical sequence. To link the filters to other charts/sheets, click on the filter tab, then more options and select apply to worksheets and select the sheets that the filter needs to be linked. The selected filter conveys specific information, therefore select the charts that are specific to the filter.

**PowerBi Dashboard: -**

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Cannot be linked with a line chart as linking one filter to different chart is an issue.

Forecasting is possible but projections are not clearly visible.

Cannot interpret the chart easily due to the issue of data labelling.

The same color palette is not applied due its Limitation.

Similar to the Tableau dashboard but here gauge is used for total sales and easy to implement.

Adding data labels is an issue and therefore it is less detailed.

**Dashboard Comparison: -**

Implementing both the dashboard using Tableau and PowerBi has its benefits and limitations. For Tableau, making a donut chart is complex because PowerBi provides a direct implementation of the donut chart. Furthermore, for the design process, Tableau provides more flexible features than PowerBi, for instance, data labels can be added to the chart easily but for PowerBi, it’s an issue to apply data labels which decreases the readability of the chart. Apart from this, applying colors in Tableau is much easier than PowerBi because it provides several color palettes and colour-diverging options that can be applied to charts easily. But for PowerBi, applying color divergence is a complex process. Moreover, applying one filter to multiple charts can be easily done in Tableau as compared to PowerBi which is a complex process.

Overall, making a dashboard in Tableau is easier than PowerBi due to the features and flexibility it provides while designing the chart. Although making complex charts such as donut charts as mentioned before, it is a complex process. While PowerBi provides a variety of charts, the user might need more experience to work with the tool as the features are not directly available.

**Improvements: -**

From the prototype design, improvements have been made during the implementation of the actual dashboard such as using a pie chart, donut chart has been created which visualized total sales across the products. Apart from this, a forecasted area chart has been added visualizing actual and estimated sales. Different labels have been added to the map which provides detailed information about the sales. Additionally, filters are linked to different charts in the final dashboard. A second bar chart has been added which visualizes the deal size by the order quantity.

**Walkthrough: -**

**Quantity by Deal: -**

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When answering the Q1, the bar chart helps the user to analyse what deal size has the highest amount of quantity ordered. It shows that the maximum number of products ordered is from the “Medium” deal size with around 51 thousand order quantity. The least amount of quantity ordered is from the “Large” deal with 7 thousand order quantity. Having comprehended the distribution of products, which product category dominated the sales channel.

**Sales Breakdown: -**

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When answering Q3, the donut chart helps the user to analyse the overall performance of the product and the total sales in a single view. The overall analysis illustrates that from all the product categories, “Classic Cars” contributes 39.39% of the sales which is the highest among all the categories and the lowest is “Ships” with 7.17% of the contribution. It is significant to understand how the sales were volatile during the period 2018-2020.

**Monthly Fluctuations: -**

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When answering the Q2, the user can gain the information from the line chart which shows the monthly sales performance and the quantity ordered. Overall, according to the trend line, there is an increase in sales over time. The month with the highest sales is November 2019 with around $1 million sales. There are some fluctuations in sales with the least sale in February 2018 with $141 thousand sales. After understanding the volatility of the sales and given the overall aggregation, the curiosity intricates in understanding the significance between deal size and product line.

**Monthly Fluctuations and Earnings by Size: -**

A graph with numbers and lines

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To answer Q4 there is a requirement for user interactivity with the features. It can be answered by the combination of two charts which are monthly fluctuations and earnings by size. These two charts are linked with the filter Productline and give information about the chosen product from the filter option.

**Additional Insights: -**

Sales Geography: -

A map of the world

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The above map provides additional insights into the sales distribution across all the countries which will help the user to analyze the best-performing country and the respective customer.

**Forecast Comparison: -**

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To make more focused decisions and strategic plans the above chart illustrates the estimated sales for the next year based on the current year which is in this case 2020. The estimated sales are $453.79 thousand which doubles the current sales.

**Discussions: -**

The above implementation of a dashboard comprising different charts using sales data clearly states the importance of data visualization in the business to make informed decisions. According to (Eigner, 2013) data visualizations help sales executives to make quick decisions in a short time. Due to rapid business changes, it becomes very important for the business team to grasp these changes quickly. Furthermore, visualizations help employees to get some background information on the data so that they can understand the data easily (Roberts, R.; Laramee, R.; Brookes, P.; Smith, G.A.; D’Cruze, T.; Roach, M.J. A Tale). The main challenge for data visualization is that it requires a skillset, or data scalability and many packages have been developed to overcome these challenges, but this solution often requires special training (Murray, D.G., Sisense. 2004). In future, more focus on PowerBi will be given to using advanced features.

**Conclusion: -**

From the overall analysis, it is clearly understood that data visualization plays an important role in any type of business. For the sales dashboard implemented in this paper, it is visible that several factors such as geographical data, and customer data are responsible for the sales and with the help of this analysis, a user can make strategic decisions to reduce the risk factor and bring more sales. Furthermore, making a dashboard will allow users to interpret information efficiently.

While implementing the dashboard using Tableau and PowerBi, various complexities such as the implementation of the donut chart in Tableau and data labelling in PowerBi is a complex process. But overall, making a dashboard in Tableau is simpler due to the features it provides and its simplicity. While using PowerBi, a sufficient amount of background is required as it has some advanced features.

**References: -**

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To create a Donut Chart: <https://youtu.be/o2kYP7OyNLM?si=9S9OrWoYYtQRMSqA&t=155>

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