

ENHANCING BUSINESSS TRATEGY WITH SALES DATA VISUALIZATION

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ABSTRACT

The significance of business intelligence is examined in this study, with an emphasis on using sales data visualization to get strategic insights. Starting with a review of the significance of data analysis and sales data visualization, the research highlights how important these tools are for spotting patterns, maximizing performance, and formulating strategic plans. Additionally, the article provides insightful information on how to create successful visualizations utilizing the US regional sales dataset, which includes customer, transaction, and sales data and is a powerful resource for examining sales trends, product popularity, and channel effectiveness. This research offers useful suggestions for displaying this information, appealing to a wide range of users looking to extract insights from their sales data. In order to help organizations fully use their sales data and promote data-driven decision-making in a constantly changing industry, this paper summarizes important discoveries, discusses limits, and highlights the complexity of sales data.

1. INTRODUCTION

Beyond what may be obtained from raw data tables or numerical reports, sales and transaction data visualization can help uncover valuable insights. The following are some benefits of visualizing sales data: First and foremost, sales data visualization may enhance comprehension of intricate and sizable information. Users may dig down into particular details, filter information, and get deeper insights into many facets of sales and transactions by creating interactive visualizations that facilitate dynamic data exploration. Finding trends and patterns in sales and transactions can be aided by visualizations. raw data that provides information on preferences, recurring sales cycles, and seasons, among other things.

Making judgments quickly and intelligently may be aided by this information's clear and succinct presentation. while being aware of the consequences. Furthermore, these perceptive visualizations are often more successful in communicating information to a variety of audiences, including stakeholders that are not technically inclined, which promotes cooperation and communication between teams inside a company. Using sales data to create visualizations has the added benefit of assisting in the detection of data abnormalities, such as fraudulent transactions or unforeseen sales swings. Additionally, by visualizing sales data, firms may better allocate their resources by determining which goods or services are selling well, which sales channels work best, and if there is room for operational improvement. By improving forecasts and

planning for inventory, manpower, and other resources, visualizing historical sales data may be useful in predicting future sales patterns. Data visualization enables stakeholders to proactively examine the data, test different hypotheses, ask targeted data-driven questions, and track and reveal insights in real time. The availability of easily comprehensible interactive data visualizations increases the likelihood that stakeholders will integrate data-driven insights into their decision-making procedures. This helps the company develop a data-driven culture. In order to get meaningful insights, facilitate data-driven decision-making, and effectively communicate complicated information within a company, it is imperative that sales and transactional data be visualized. It is essential to transforming raw data into information that is both relevant and practical.

2. RELATED WORK

Many visualization techniques have been suggested by writers as a result of the study and development of visualization tools and technology. The several methods used in data visualization are explained in detail in this section. Using Power BI, the authors of the study [1] created business intelligence dashboards to visualize Indomobil's sales summary, which can be consulted while making business decisions. By emphasizing how BI helps firms create insights regarding data, plans, profitability, and performances, the study [2] highlights the significant influence of BI on the IT sector. The main topics of the article are data collection, storage, processing, and Power BI visualization. The significance of a data-driven culture in making sound business choices has also been covered by the writers. By providing a useful method that integrates internal and external data sources for real-time analysis of overall sales KPIs, geolocated sales highlights, and forecasts for sales trends over time, the suggested model is based on Power BI as a working framework derived from regular sales data to improve understanding of sales outcomes. The principles of data

processing, modeling methods, and machine learning approaches are examined in the study [3], with an emphasis on forecasting sales for different BigMart retail locations. The implementation is creating a model on the Big Mart 2013 dataset using methods like xgboost, random forest, and linear regression to forecast sales of a particular outlet's merchandise. The findings show that the suggested strategy outperforms existing approaches, such as ridge regression and decision trees, in terms of prediction accuracy. In order to get insights into the data and the forecast outcomes, the project concludes by using PowerBI for data visualization. Decision-makers in the digital era have access to large and varied information, often known as "big data," which presents problems for conventional tools and processes. The research in the article [4] investigates how a business might use big data to get insights and performs extensive data analysis using a comprehensive analysis cycle. The research also highlights the need of investigating different approaches for extracting information from large, dynamic databases as their volume keeps increasing. The article emphasizes how social networks, ordinary transactions, and consumer interactions are only a few of the many themes covered. Data analytics is emphasized as a way to extract significant sales and profit information, especially when sophisticated analytics methodologies are used to massive datasets. In order to provide readers a thorough grasp of the area, the article will examine a variety of big data analytics methodologies and technologies, such as Google Data Studio and Big Data tools. The main goal of the study [5] is to show how Google Data Studio improves data analysis and visualization. It tackles the typical situation in which specialists interact with data from pre-existing databases and must comprehend them before doing analysis and visualization. For a more thorough analysis and additional insights, it also looks at the particular results, such as vendor, product, and personnel performance. Business leaders and salespeople often need to look closely at sales data in order to

comprehend how well their firm is doing. To deal with this problem According to the study [6], sales data visualization is essential for comprehending sales, and Google DataStudio is a useful tool that is a user-friendly program made to display complicated datasets in an interactive and understandable way. The Google cloud-based solution allows customers to exchange information smoothly and is available from any location. By supporting several data sources and making it easier to combine reports from diverse data sources, it offers organizations an option for visualizing and presenting data. Most significantly, Google Data Studio is a flexible tool for viewing and sharing sales data since it guarantees data security while sharing reports with users.

3. BACKGROUND

DataSource

The selection of the data source throughout the data visualization process is crucial to the visualization's success. Since the efficacy of the visualizations is directly impacted by the quality and relevancy of the data, creating powerful visualizations needs not only the correct tools but also the right data source. The information may be obtained from a number of sources, including:

- **Internal Databases:** These may be utilized as a source of data for visualization. Examples of these include sales and transactional databases, CRM systems, and other company-specific repositories. Having direct access to internal databases allows for the creation of precise and customized visualizations.
- **External APIs:** Real-time data may be retrieved from external platforms using external Application Programming Interfaces (APIs), in addition to internal data. These could include data sources exclusive to a certain sector, financial market APIs, or social media APIs.
- **Public Datasets:** Access to public datasets may also be used to improve internal data.

Government databases, business publications, or datasets from academic institutions may fall under this category.

- **Surveys and Feedback:** Survey information or employee and customer feedback may be utilized as a data source to comprehend employee or consumer feedback. This qualitative information may be displayed to convey feelings, inclinations, or viewpoints and converted into quantitative insights. Additionally, depending on the needs of the display, many data sources may be combined. Whether the data is relevant to the company goals, its quality and consistency, how often it is updated, and its security and compliance are some of the crucial factors to take into account when choosing a data source.

Data Visualization

After the data source has been chosen, visualization tools are crucial in turning unstructured data into insightful knowledge, and choosing the appropriate tools may have a big influence on how clear and powerful representations are. Let's talk about a few of the widely used visualization tools:

- **Tableau:** A popular tool for producing dynamic and interactive graphics is Tableau. Tableau's benefits include interoperability with several data sources, a variety of visualization choices, and an easy-to-use interface [7].
- **Google Data Studio:** Currently known as Looker Studio, Google Data Studio makes it easier to create visually appealing reports and dashboards. This tool's benefits include accessibility, cloud-based functionality, and smooth connection with other Google services [8].
- **Power BI:** A powerful Microsoft product that is often used for corporate analytics is Power BI. When it comes to data visualization, Power BI is beneficial because to its ease of interaction with Microsoft products, real-time reporting capabilities, and the ability to turn data into intelligent visuals [9].
- **Open-Source**

Options: When working in Python, you may generate static, animated, and interactive visualizations using other open-source visualization language-specific tools like Matplotlib [10], Plotly [11], Seaborn [12], etc. sources, scalability, and additional features like sharing and collaboration must all be taken into account when choosing the best visualization tool.

4. METHODOLOGY

The procedures used to analyze the data and produce insightful visuals are covered in depth in this section.

Data collection

In this stage, we gather the CSV files with the pertinent data for the study and make sure the data is consistent in structure and well-organized.

Data exploration

This stage entails exploring the CSV files using tools like spreadsheet software like Microsoft Excel to look for missing numbers, abnormalities, and evaluate the general quality of the data.

Data cleaning

This stage entails cleaning and preparing the data by addressing mistakes, missing values, and properly formatting the data. For the visualizations to be accurate and dependable, this step is essential

Understanding the requirements

In order to decide the questions we want to answer via the dashboards and visualizations, this stage is helpful in identifying the metrics and KPIs that are essential for the study.

Tableau data connection

This phase involves importing the CSV files into Tableau in order to load the data. For connecting to several data sources, including CSV files, Tableau offers an easy-to-use interface.

Visualization

Using Tableau's drag-and-drop interface, we generate a variety of visualizations, including bar charts, line charts, and more, depending on the specified measurements and KPIs. We then modify the visualizations to improve their readability and clarity.

Dashboard Creation

In order to create a coherent and perceptive data narrative, we integrate the many visualizations into interactive dashboards in this stage. We also apply filters, parameters, and actions to enable dynamic user involvement

5. DATASET

We utilized a Kaggle sales and transactions dataset with 17,992 rows and 15 columns for our study. This dataset includes a wide range of information, from sales performance indicators to order and product details. The dataset provides a thorough summary of sales transactions, allowing in-depth examination of sales trends and patterns as well as the discovery of new prospects..

6. RESULTS AND ANALYSIS

By analyzing the visualization and investigating the insights from each of these visualizations, we will delve deeply into the US Regional Sales Data in this part.

Trends In Orders

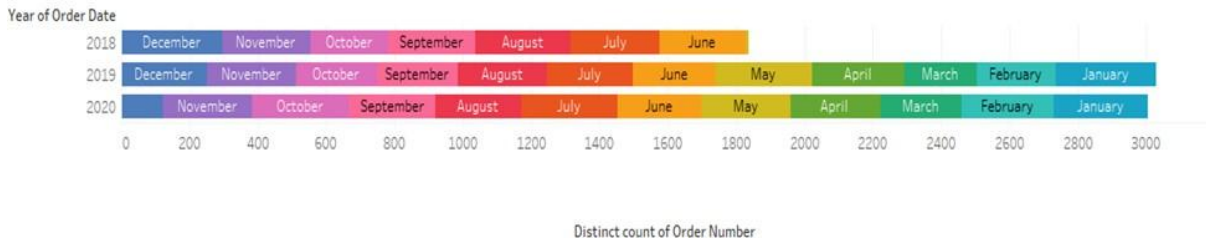


Fig.1.Trends inorders overtheyears

We have produced an archart that illustrates patterns in orders over time in Fig 1. We have the number of orders on the x-axis and the years on the y-axis. Sales have climbed significantly in 2019 compared to 2018 based on trends in order volume, and the number of orders has somewhat reduced in 2020, which may be brought on by the epidemic. Additionally, various colors have been used to illustrate the distribution of orders for each month. The company stakeholders may better comprehend sales trends throughout months and years with the aid of this kind of depiction.

Customer Preference

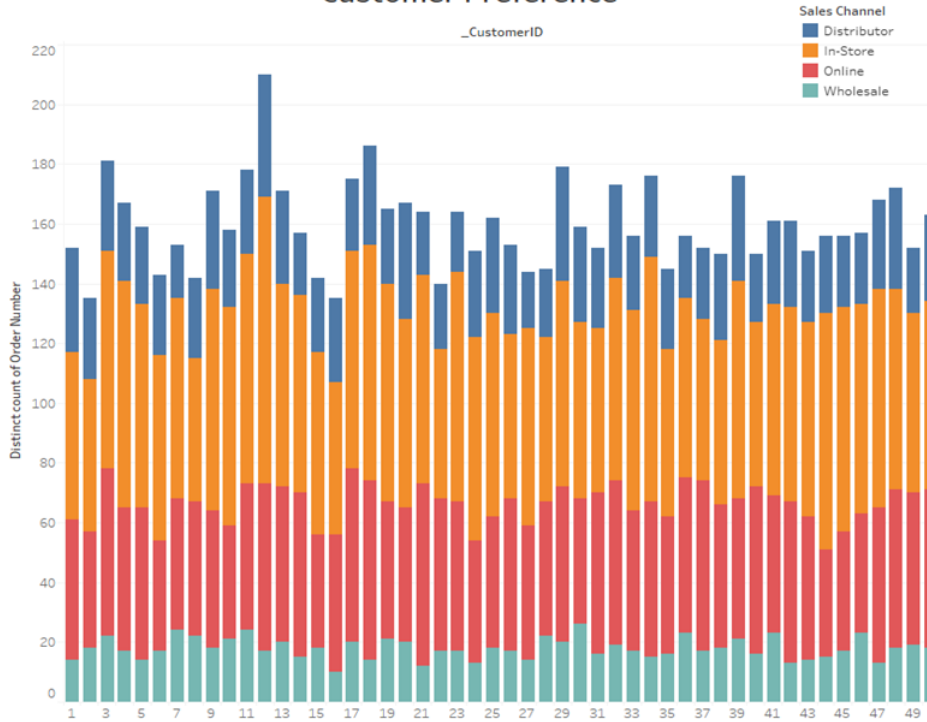


Fig.2.Customer Preferences with Sales Chanel distribution

Product Performance

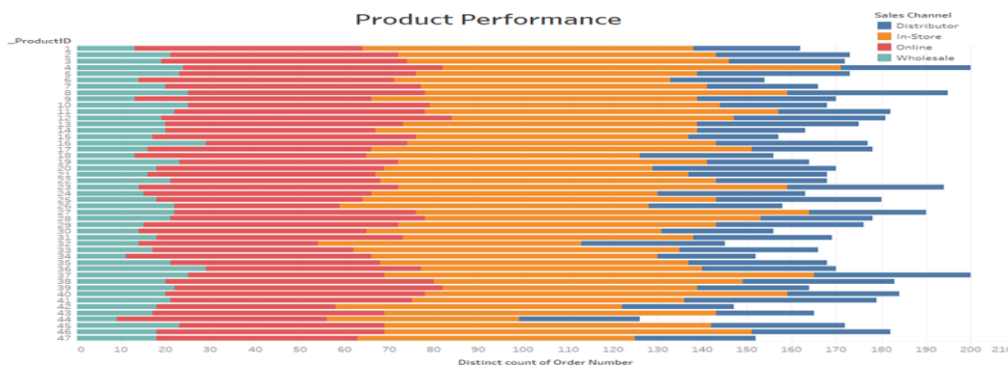


Fig.3.Product performance with Sales Chanel distribution

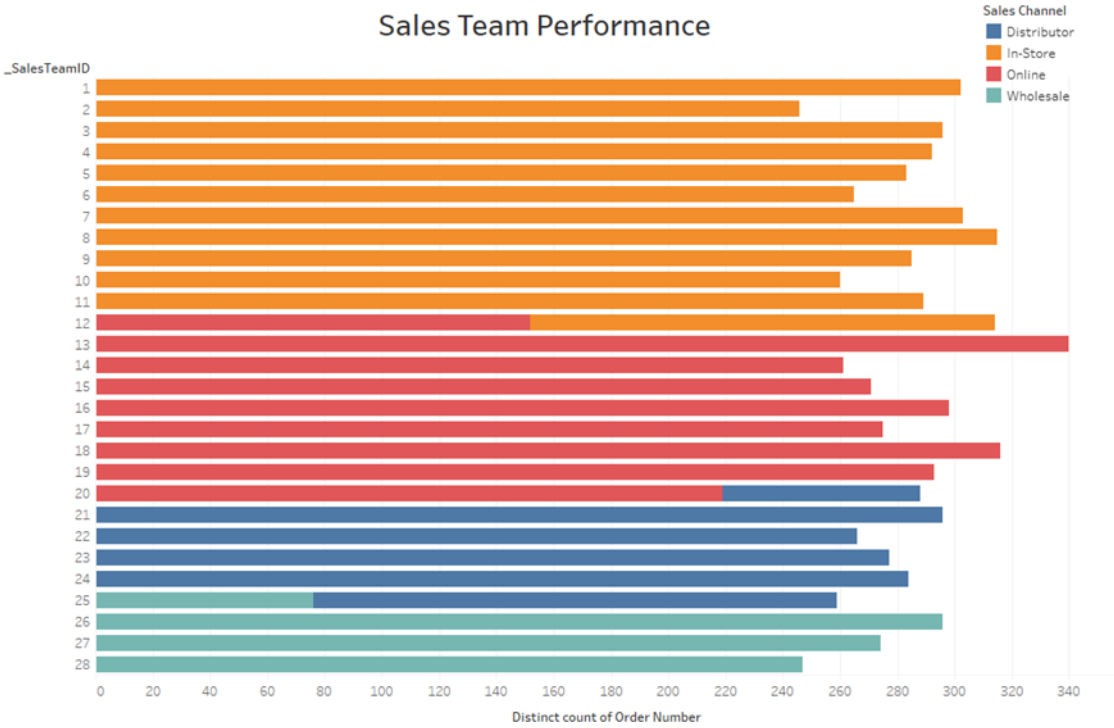


Fig.4.Sales Team Performance

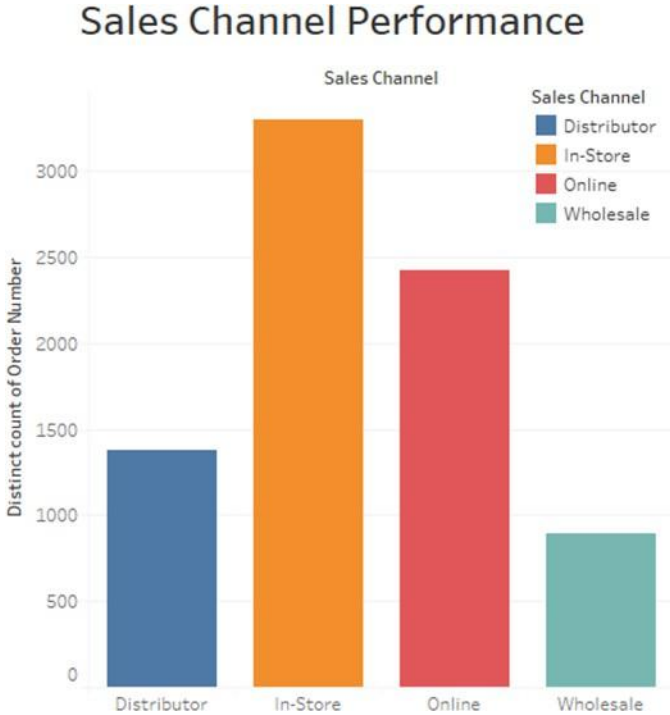


Fig.5.Sales Channel Performance

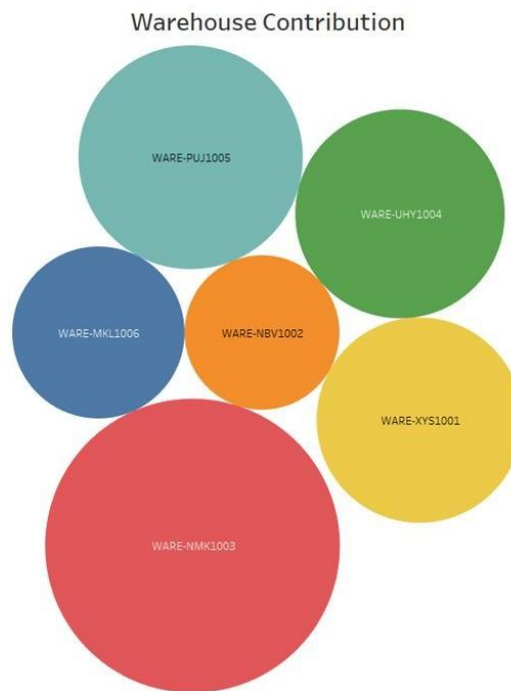


Fig.6.Warehouse Performance

In a similar manner, we have produced a bar chart in Figure 2 to illustrate the patterns in client orders. The sales channel is an extra component that we have included. The customer with ID12 has the most orders, as can be seen by looking at the visualization's x-axis (number of orders) and y-axis (customer IDs). Additionally, we can see that, on average, consumers place more orders when they purchase in-store. Businesses may utilize these information to make strategic choices that will maximize sales. For instance, because they place the most purchases, the client with ID 12 may get special offers to keep them loyal. We have built a barchart in Figure 3 to gauge product performance using sales data. items with IDs 4 and 37 have been ordered the most, and more items were bought in-store than via other channels, according to the barchart's x-axis (no.oforders) and y-axis (product IDs). As a result, the company stakeholders may take particular action by increasing the amount of popular items, including those with IDs 4 and 37, that are stocked in warehouses and shops. In a similar vein, we have produced a bar chart

in Figure 4 to illustrate how many offers are distributed across various sales teams. We may notice trends by looking at the chart with the x-axis (no.oforders) and y-axis (sales teams). For example, the team with ID 13 has the most sales, while the team with ID 2 has the fewest. Consequently, the ID 2 team and other teams with comparable numbers may need more attention and assistance than other teams. We can see trends in the sales channel performance with the barchart in Figure 5. The in-store sales channel has the most orders, followed by internet, distributor, and wholesale, according to the bar chart with x-axis representing sales channels and y-axis representing the number of orders. This may be the result of customers' preference for in-store shopping, which allows the company to increase its capital expenditures in the in-store sales channel. then on the internet. The marketing and sales objectives may also be updated with the use of such knowledge. In Fig. 6, we also have a bubble chart that displays patterns and trends in the quantity of items handled at eachwarehouse. The larger the bubble in this graphic, the more orders

each warehouse processes, and vice versa. The warehouse with code WARE-NMK1003 has received the most orders for processing and shipment, as shown in the chart, while the warehouse with code WARE-NBV1002 has got the fewest orders. This might be because of things like product availability and geography. For example, the warehouse WARE-NMK1003 may be situated in a more populated region, which may be worth investigating further. In order to boost efficiency in the busy warehouses, the company may utilize these data to make judgments about restocking, improving the warehouses, etc. Following the creation of these separate charts, we merge them into a full dashboard that tells a data narrative and provides users with interactive visualizations that include helpful elements like filters. The dashboard is made accessible on Tableau Public [13].

7. CONCLUSION

In summary, by going over important findings, this study has methodically investigated the display of sales and transactional data. We started out by talking about how important data visualization is to gleaning possible insights from data. By developing a variety of representations, we have explored the intricacies of data visualization and its approach throughout the paper, uncovering patterns, trends, and possible implications for regional sales and transactional data in the US. We were able to illustrate how data visualization can be used to comprehend data and make data-driven choices thanks to the study. Although data visualization may be highly useful for information extraction, its efficacy relies on a number of elements that we have emphasized in the background section, including contextual knowledge, user capabilities, visualization tools, and data quality and accuracy. The implementation process requires a thorough evaluation of these aspects. Nevertheless, this paper's study shows that visualization might be a useful tool

for comprehending data and data storytelling.

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