

# Competitive Analysis of BI Tools

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Submitted by: Himadri Neogi, Srijita Chakraborty & Sayali Nitin Doifode

Supervisor: Rudrajyoti Bhattacharya

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## **Abstract**

Effective data analysis is crucial for the growth and sustainability of businesses. **Business Intelligence (BI)** enhances business operations by promoting informed decision-making, improving efficiency, and providing valuable insights into customer behaviour and performance metrics. The objective is to explore how organizations leverage these technologies to understand customer behaviour, product performance, and operational efficiency, ultimately aiming for improved business outcomes. The methodology involves a competitive analysis of various BI tools, including **Tableau**, **Qlik Sense**, **Zoho Analytics**, and **BYOD**. This analysis emphasizes the capabilities of each tool in visualizing data through a range of chart types—from simple bar and line charts to complex correlation charts. The findings of the project serve as a selection benchmark for organizations looking to choose the most suitable Business Intelligence (BI) tool for their needs. Organizations that synchronize BI with advanced business analytics can navigate the challenges of an ever-evolving market, capitalizing on opportunities, and significantly increase profitability and reduce risks for businesses.

**Keywords:** Business Intelligence, competitive analysis, business analytics, BI tools

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## Introduction

The term BI (or Business Intelligence) can be defined as a “collection of techniques, methods, structures and processes that turn large data into assets and information that can be used to make effective decisions.” In today’s data-driven world, the businesses are relying on BI tools for transforming the raw data into valuable insights. BI tools help to analyze patterns and trends in the data and provide real-time visualization of the insights. With the availability of various BI tools in the market, it becomes crucial for the organizations to select the platform that caters to their needs in terms of data integration, visualization, and analytics. This comparative analysis helps identify the strengths and weaknesses of various tools, such as **Tableau**, **Qlik Sense**, **Zoho Analytics**, and **BYOD** enabling companies to make informed decisions that align with their marketing strategies and business objectives.

One of the key problems this analysis aims to address is the growing complexity of data environments. As businesses adopt multi-cloud and hybrid infrastructures, integrating and curating data from various sources becomes a significant challenge. BI tools vary in their ability to handle such complexities, offering different levels of customization, scalability, and support for advanced analytics and predictive modelling.

Moreover, **visualization** capabilities offered by each of these BI tools, which include customizable dashboards, and complex chart types (e.g., heatmaps, flow charts, and box plots), play a pivotal role in how users interact with the data. The analysis also highlights how well these tools support **data integration**, **data curation**, **collaborative workflows** and **self-service analytics**, enabling users of varying technical expertise to derive insights about their business model.

Ultimately, a comparative analysis not only highlights the unique features and performance metrics of BI tools but also addresses key user concerns such as ease of use, data security, and cost-effectiveness. This empowers businesses to select the right BI tool that streamlines operations, enhances customer satisfaction and achieve sustainable growth.

## Literature Review

The integration of **Business Intelligence (BI)** is becoming essential for organizations aiming to leverage data for competitive advantage. With advancements in technology and the proliferation of data, businesses are increasingly relying on BI tools to transform raw data into actionable insights that drive decision-making. We have explored the impact, methodologies, and challenges of implementing BI systems, focusing on their role in improving business operations, increasing profitability, and mitigating risks. Business Intelligence has been recognized as a pivotal tool in decision-making processes. According to Wixom and Watson (2010), BI tools enhance operational efficiency by automating data collection and visualization, which allows decision-makers to quickly identify patterns and trends in business performance. Davenport and Harris (2007) further state that BI tools allow for better alignment between data analysis and business strategy, facilitating data-

driven decision-making, which is crucial for maintaining a competitive edge in the marketplace. The literature on BI tools suggests that different platforms have unique strengths and limitations. Tableau, for instance, is widely regarded for its intuitive interface and powerful visualization capabilities, making it a popular choice for data visualization and dashboard creation (Khan et al., 2017). Town and Thabtah (2019) ranked Tableau higher than Power BI based on the evaluative criteria for end users for data analysis and reporting. Qlik Sense, on the other hand, excels in its ability to handle large datasets and perform complex queries using its associative data model (Gartner, 2020). While BI tools provide substantial benefits, several challenges persist, particularly in the areas of data integration and user adoption. Davenport (2006) identifies data quality and data governance as critical factors that can hinder the effectiveness of BI systems. Without clean, structured, and accurate data, BI tools may provide misleading insights, which can result in poor decision-making. The literature reviewed suggests that BI tools offer a transformative capability for businesses seeking to leverage data for decision-making. However, the choice of the right BI tool depends on the specific needs of the organization, the nature of the data, and the level of customization required. Through a comparative analysis of Tableau, Qlik Sense, Zoho Analytics, and BYOD, this project offers a practical benchmark for organizations to assess their BI tool options and align them with their strategic objectives.

## Methodology

For this project, we conducted a detailed comparative analysis of various BI tools using the ***Global\_Superstore*** dataset from Kaggle. The main goal was to visualize patterns and trends in the data of the superstore while also evaluating the performance and features of tools such as **Tableau**, **Qlik Sense**, **Zoho Analytics**, and **BYOD**, an emerging BI tool. This was conducted under trial access, limiting access to some premium features. Below is an outline of the methodology:

### 1. Tool Selection and Setup

Four BI tools were chosen to explore the dataset: **Tableau**, **Qlik Sense**, **Zoho Analytics**, and **BYOD**. Each tool offers a unique set of features for data analysis and visualization. The tools were selected to provide a range of capabilities from established BI tools (Tableau, Qlik Sense, Zoho) to a newer player (BYOD).

### 2. Data Loading

The dataset was imported into each BI tool using their respective data connectors:

- **Tableau:** Used a direct connector for CSV data.
- **Qlik Sense:** The dataset was imported, leveraging its in-memory processing for rapid analysis.
- **Zoho Analytics:** The dataset was uploaded to the cloud-based platform to explore the ease of data integration.

- **BYOD:** It simplifies the data loading process by allowing users to upload excel files or any other files without the need to specify their file type, making it more flexible and user-friendly when dealing with varied data formats.

### 3. Data Preparation

The **Superstore dataset** was downloaded from Kaggle, which contains detailed sales, profit, and customer information of a retail store. This dataset was cleaned and pre-processed to remove data inconsistency using each tool. The steps included:

- Missing or incomplete data was addressed through imputation or removal, depending on the severity and context of the missing values. Normalizing date and time fields.
- Certain columns in the dataset required data type changes to facilitate accurate analysis. For example: **Order Date** and **Ship Date**, initially recognized as text or string, were converted into the correct **date-time** format, **Sales** and **Profit** columns were checked to ensure they were correctly set as **numerical** data types to support mathematical operations.
- **Order Month and Order Year** were extracted from the **Order Date** column to create new features for time-based analysis. This enabled insights into monthly and yearly sales trends.

### 4. Visualization and Analysis

Each tool was then used to create various visualizations to analyze key metrics such as sales, profits, product performance, and customer trends. The steps were as follows:

- **Tableau:** Created interactive dashboards with drill-down functionality to explore sales by region, customer segment, and product category. Tableau's strength in **geospatial analysis** was also assessed.
- **Qlik Sense:** Qlik Sense was employed to explore data relationships and patterns using its **associative data model**. This helped uncover correlations and outliers in sales data through various charts like scatter plots and bar graphs.
- **Zoho Analytics:** Zoho Analytics was used to generate **automated reports** and dashboards. Its **natural language query** feature allowed easy access to insights without complex querying, focusing on key trends.
- **BYOD:** Although a newer tool, BYOD offers a diverse range of visualization options that were utilized to analyze. Starting with simple visualizations like **bar charts** and **line charts**, which were used to depict sales trends and product performance over time, BYOD also provides more advanced charts. For deeper insights and complex visualizations, **correlation charts** were used to reveal relationships between different variables like sales, profit, and customer segments. Additionally, BYOD's

**geographical maps** were instrumental in analyzing country-wise sales performance.

## 5. Comparison of Insights and Performance

After visualizing the data, insights were derived from each tool:

- **Tableau's** Ask Data feature allows users to ask questions in natural language, generating relevant visualizations and insights.
- **Qlik Sense** excelled in its ability to uncover hidden trends through its unique associative engine.
- **Zoho Analytics** stood out for its ease of use and self-service analytics capabilities.
- **BYOD** empowers users to effectively capture valuable insights from the visualizations it generates.

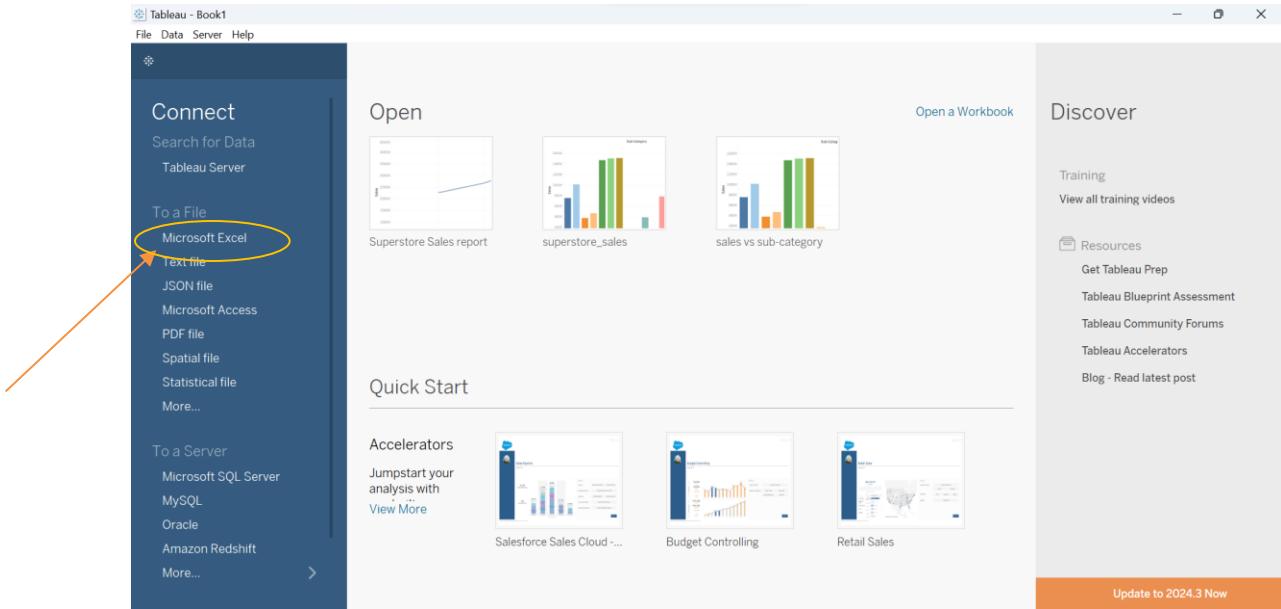
In addition to extracting insights about the Superstore, the analysis allowed us to evaluate the strengths and weaknesses of each BI tool in handling large datasets, customization, ease of use, and their ability to generate actionable insights. Now we will briefly discuss about steps of creating dashboards using each BI tool.

### Tableau

To create a dashboard or charts using Tableau, follow the steps:

Step 1: Open Tableau Desktop or install it using institutional mail ID to avail free license for one year.

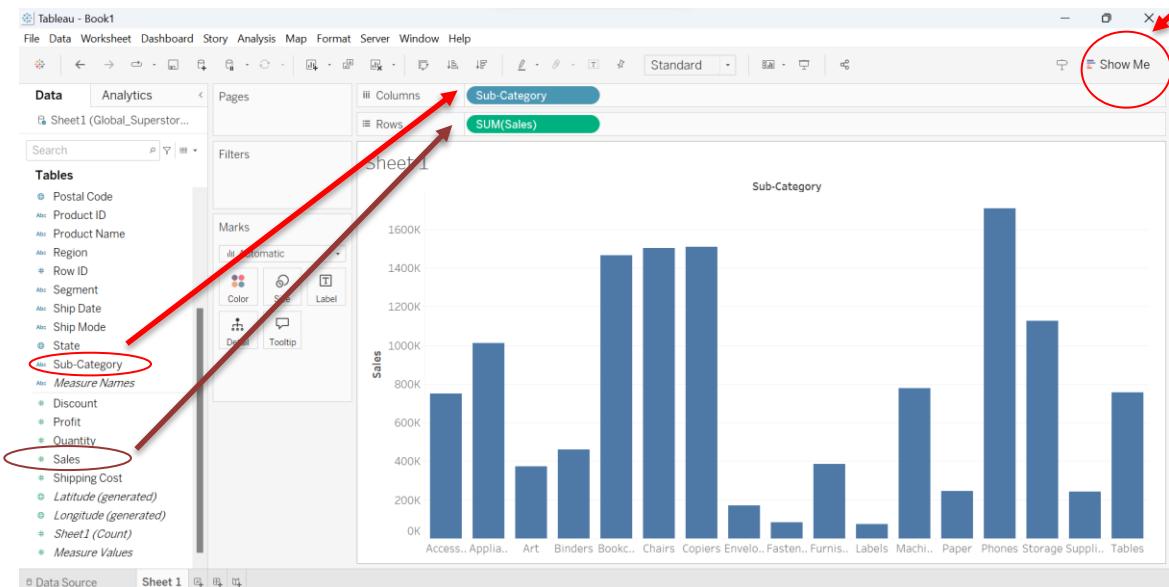
Step 2: Click on Microsoft Excel and select the ***Global\_superstore*** dataset from the device.



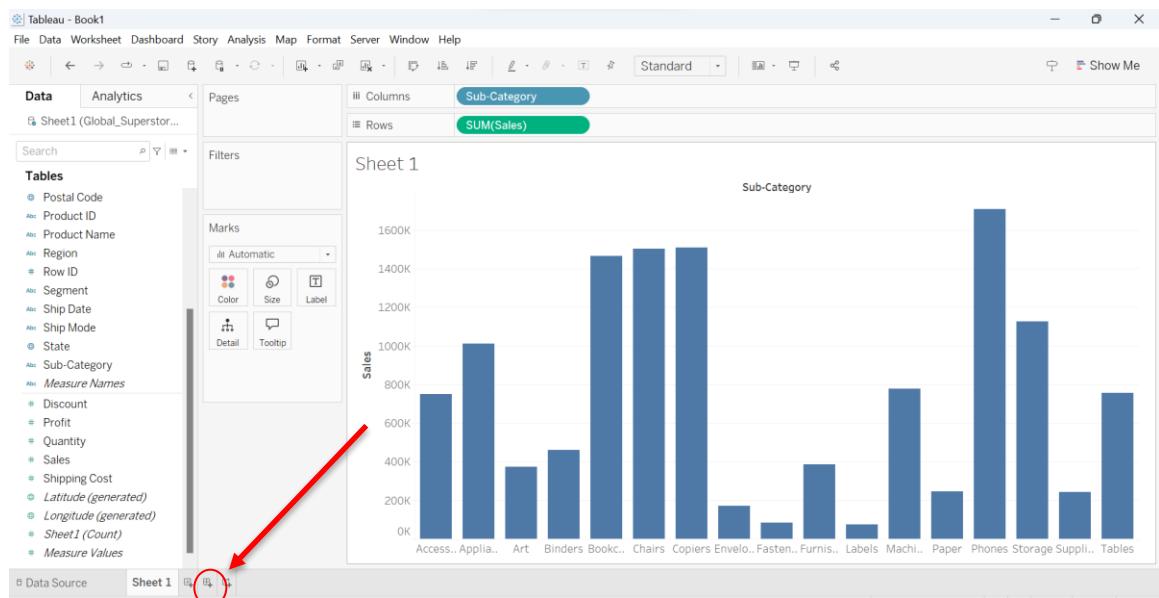
Step 3: Click on Sheet 1 to open a new worksheet.

#	Abc Sheet1	Abc Sheet1	Abc Sheet1	Abc Sheet1
Row ID	Order ID	Order Date	Ship Date	Ship Mode
32298	CA-2012-124891	31-07-2012	31-07-2012	Same Day
26341	IN-2013-77878	05-02-2013	07-02-2013	Second Class
25330	IN-2013-71249	17-10-2013	18-10-2013	First Class
13524	ES-2013-1579342	28-01-2013	30-01-2013	First Class

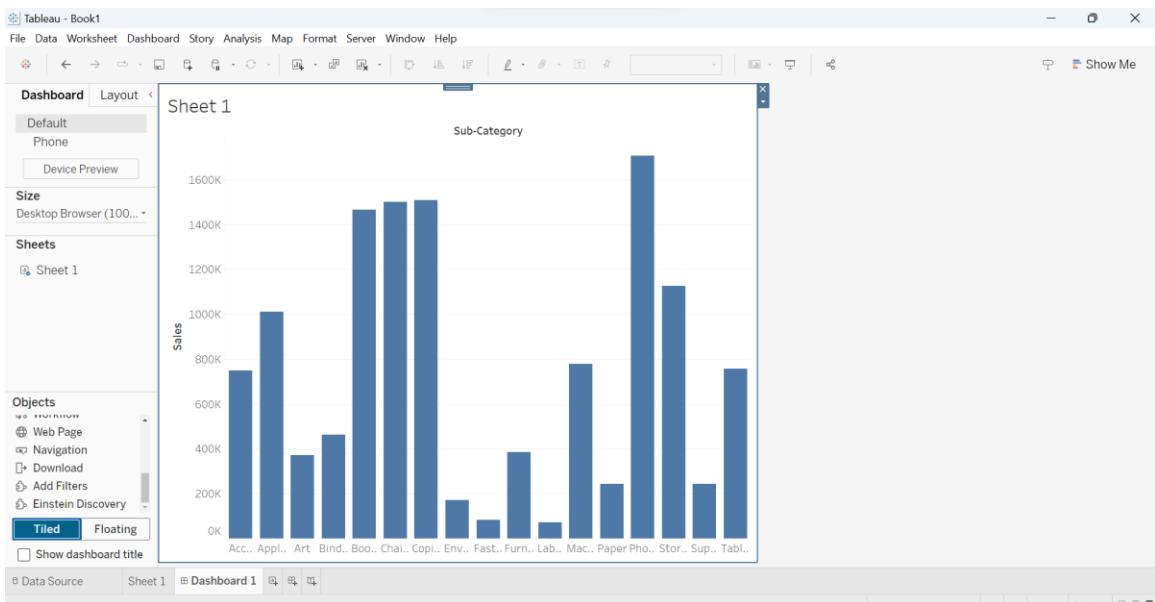
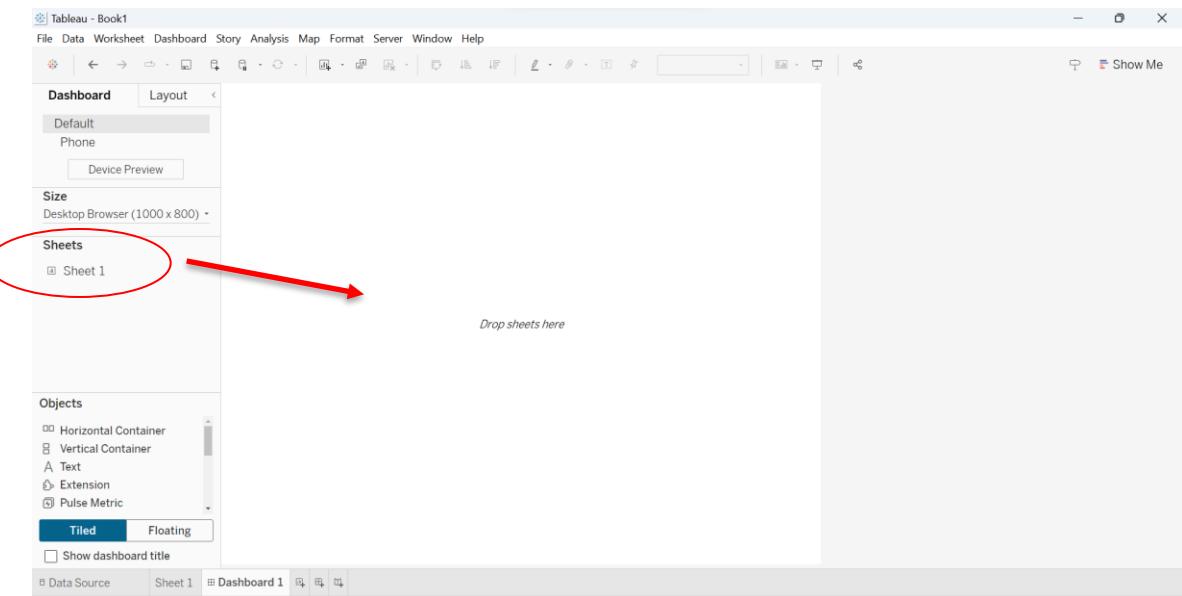
Step 4: Now we are ready to create our first chart using the dataset. Suppose we want to visualize the Sales for various sub-categories. First select Sub-Category from the tables and drag-and-drop in the columns field. Similarly, select Sales from the tables and drag-and-drop in the rows field. We can add more charts from Show Me at the top-right corner of the screen.



Step 5: Click on New Dashboard.



Step 6: Once a new dashboard opens, select the recently created worksheet named as Sheet 1 from the Sheets and drag-and-drop in the centre, white field.

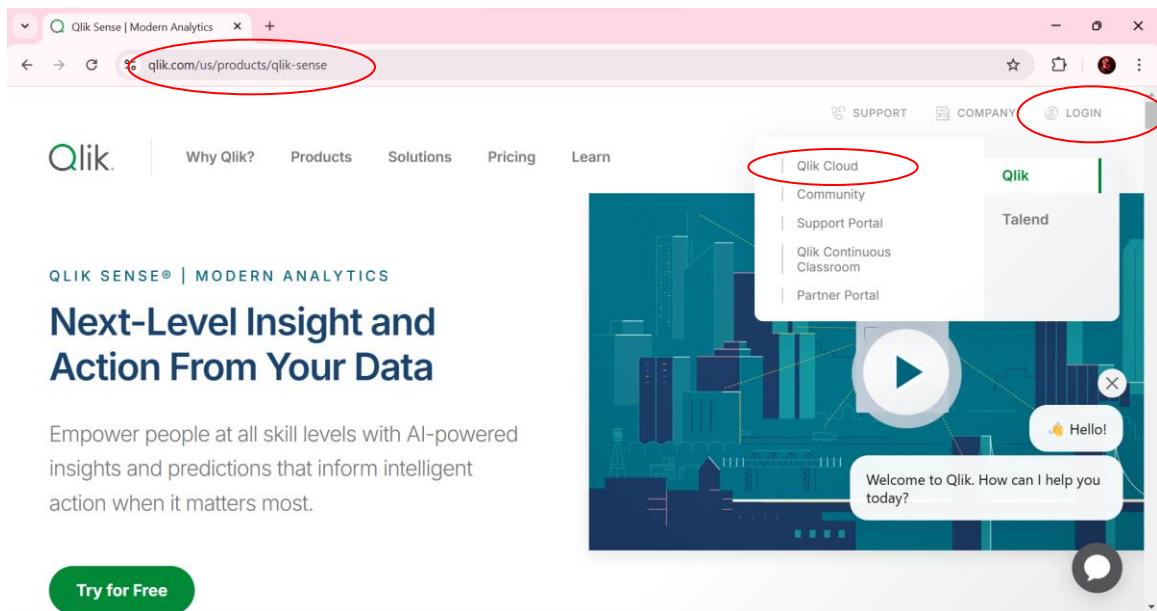


Step 7: Repeat the above steps to create more charts on a new worksheet and add them to the Dashboard 1.

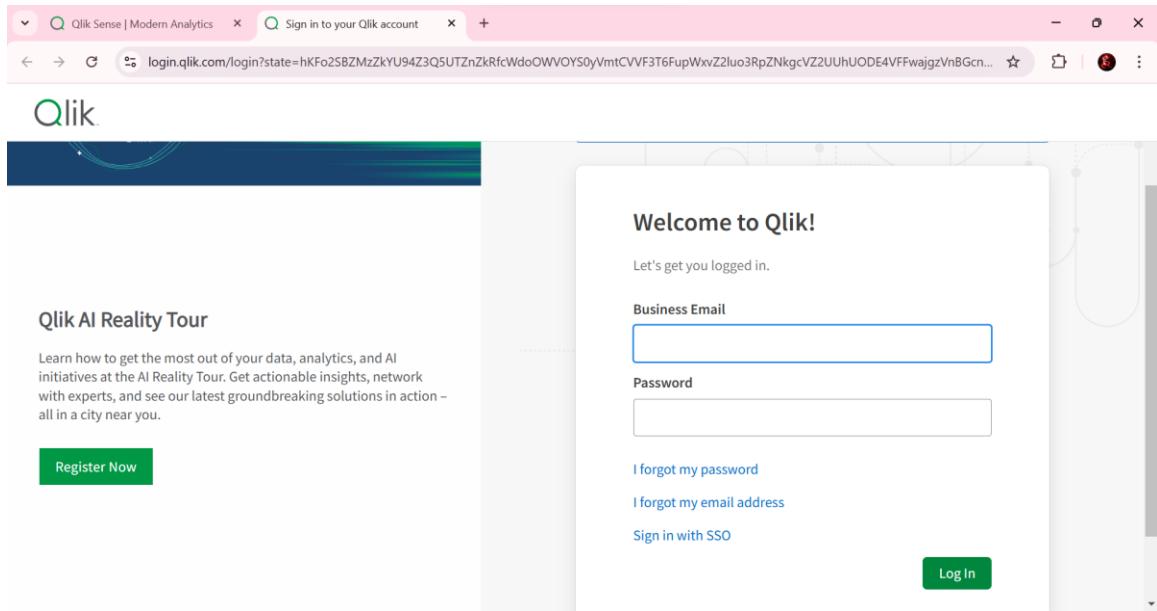
## Qlik Sense

To create a dashboard or charts using Qlik Sense, follow the steps:

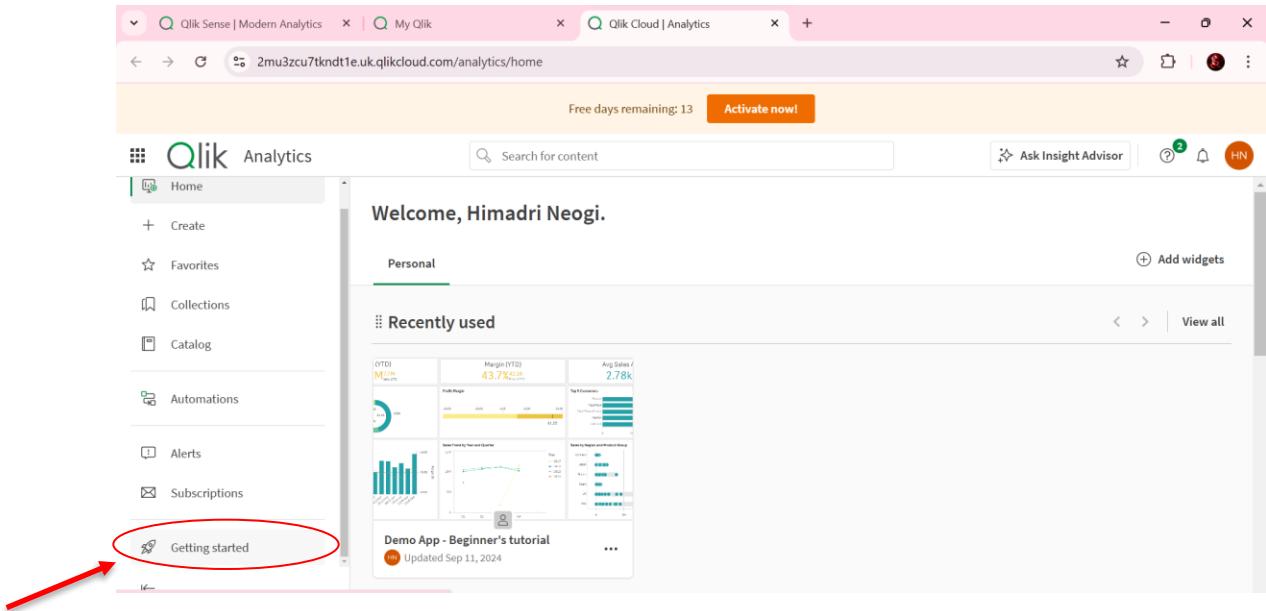
Step 1: Open Qlik Sense- Modern Analytics from the web browser. Click on login and select Qlik Cloud.



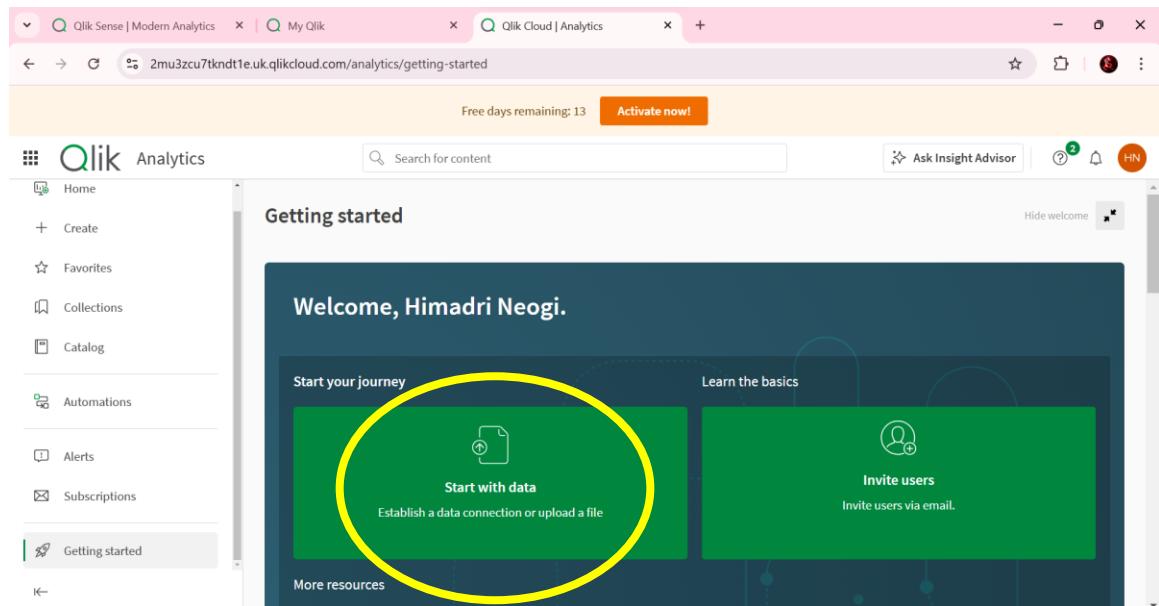
## Step 2: Login/ Register using mail Id.



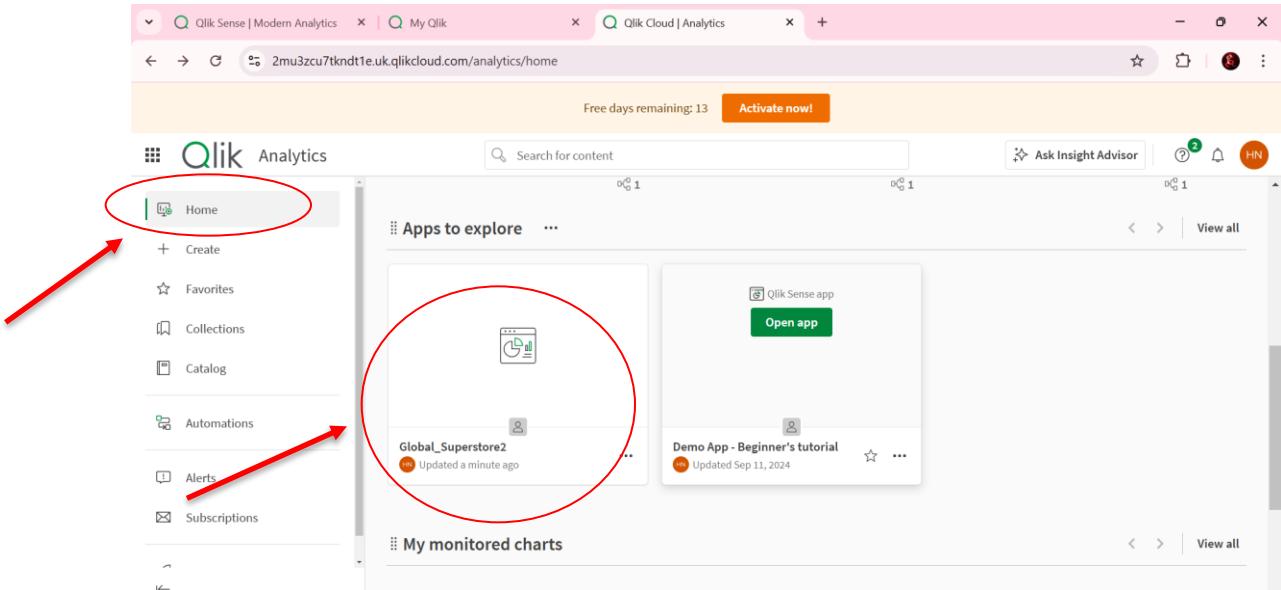
## Step 3: Click on Getting started.



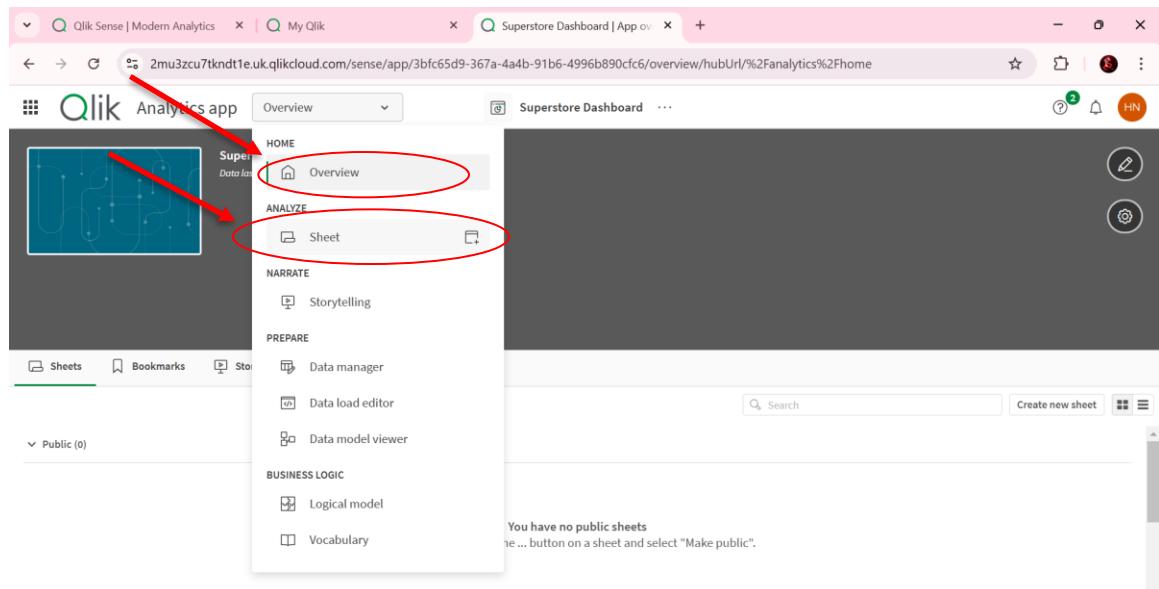
Step 4: Click on Start with data to upload the dataset from the device. After selecting the dataset, click on upload and analyze.



Step 5: Click on Home and the recently uploaded dataset from Apps to explore then click on Open app.



Step 6: Once the app opens, click on Overview and select sheet to create a new dashboard.



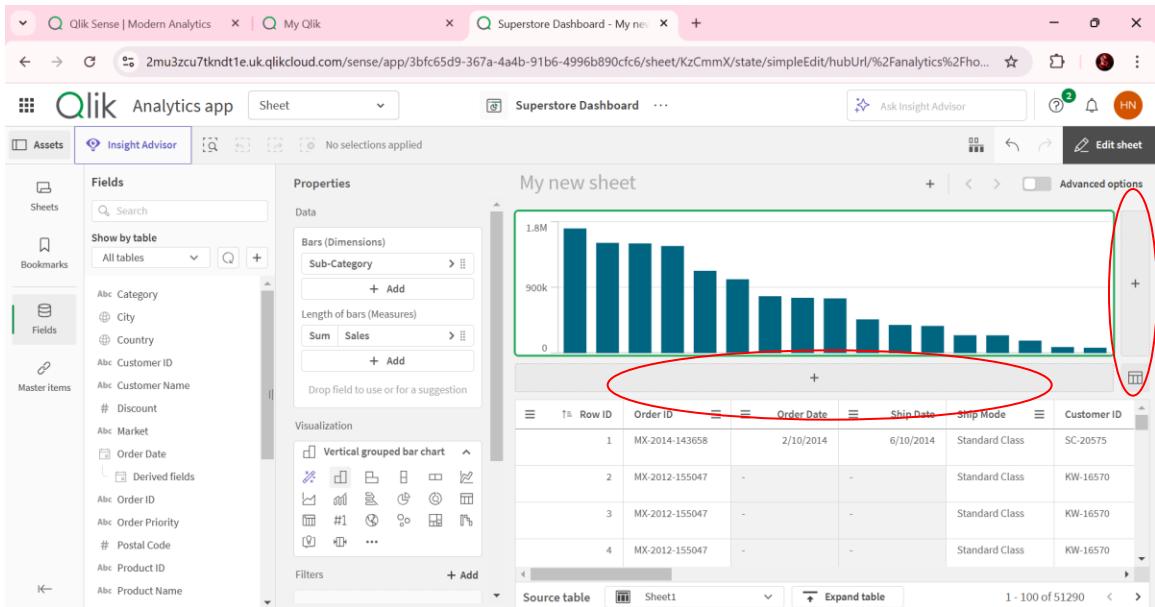
Step 7: Once a new sheet opens, Click on Add dimension and Add measure and the select the desired feature from the Show by table on the left of the screen. Select the desired chart from the visualization.

The screenshot shows the Qlik Sense Analytics app interface. On the left, the 'Fields' panel is open, displaying various dimensions and measures. In the center, the 'Properties' panel shows the 'Data' and 'Visualization' tabs. The 'Visualization' tab is selected, showing icons for different chart types. On the right, a new sheet titled 'My new sheet' is being created. It features a large empty area with 'Add dimension' and 'Add measure' buttons. A red circle highlights the 'Fields' panel, another highlights the 'Visualization' panel, and a third highlights the 'Add dimension' button.

Step 8: Suppose we want to visualize the Sales for various sub-categories. First select the desired chart from Visualization. We are selecting vertical grouped bar chart. Click on add dimension and select Sub-Category. Similarly click on add measure and click on Sales and select Sum (Sales).

The screenshot shows the Qlik Sense Analytics app interface. The 'Fields' panel on the left is visible. In the center, the 'Properties' panel shows the 'Data' and 'Visualization' tabs. The 'Visualization' tab is selected, showing icons for different chart types. On the right, a new sheet titled 'My new sheet' is being created. It features a large empty area with 'Add dimension' and 'Add measure' buttons. A red circle highlights the 'Add dimension' button. Below it, a dimension list is open, showing 'Sub-Category' highlighted with a red circle. Other options like 'YearMonth', 'YearQuarter', 'YearsAgo', 'Ship Mode', 'Shipping Cost', and 'Status' are also visible.

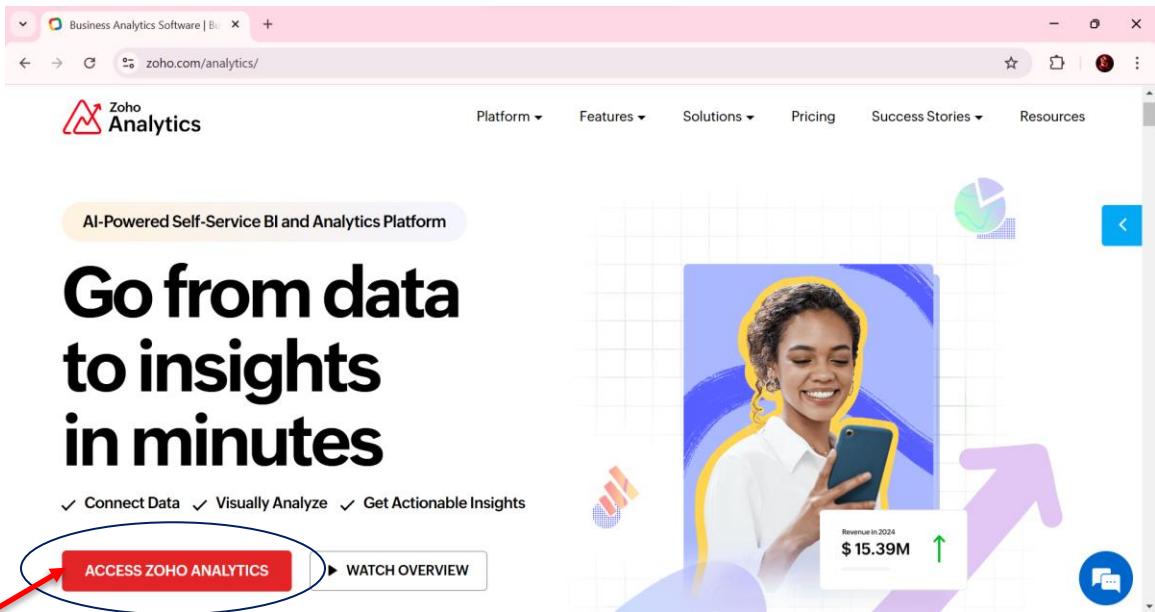
Step 9: We can add more charts on the dashboard by clicking on the "+" and the repeating the above step. We have successfully created our first dashboard.



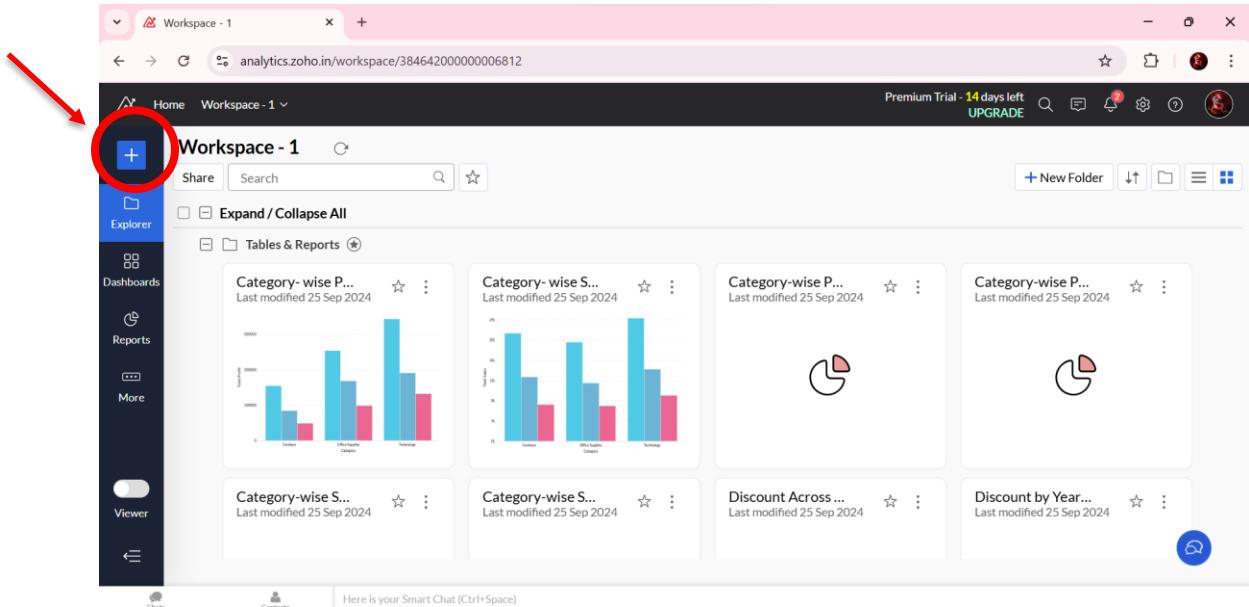
## Zoho Analytics

To create a dashboard or charts using Zoho Analytics, follow the steps:

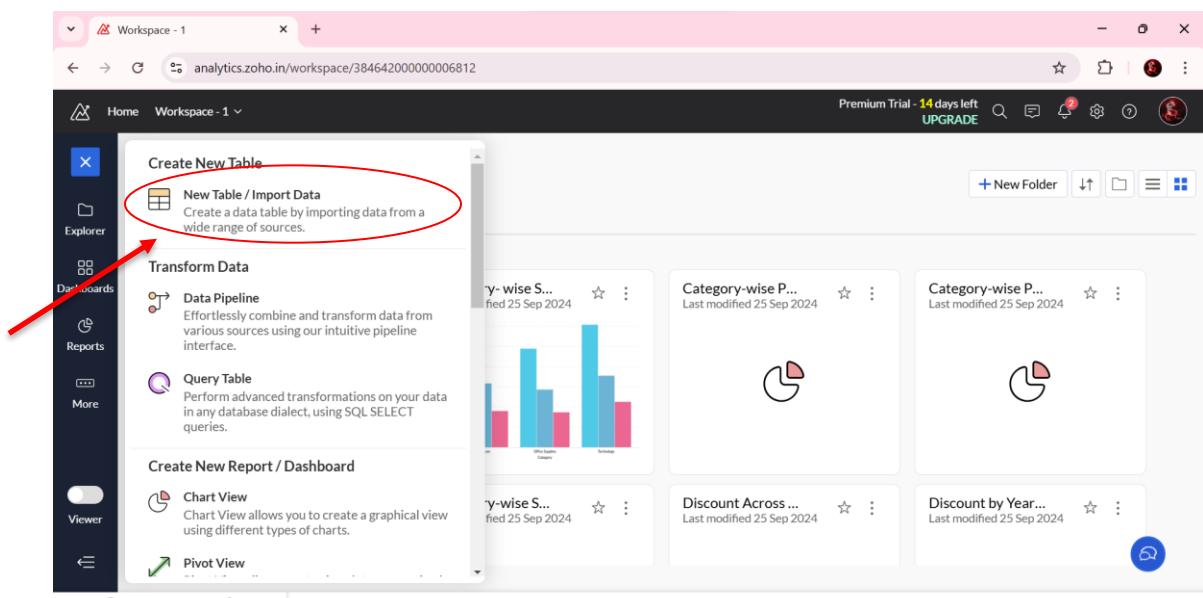
Step 1: Open Zoho Analytics from the web browser. Click on Access Zoho Analytics. Then login/ Sign up using the mail Id.



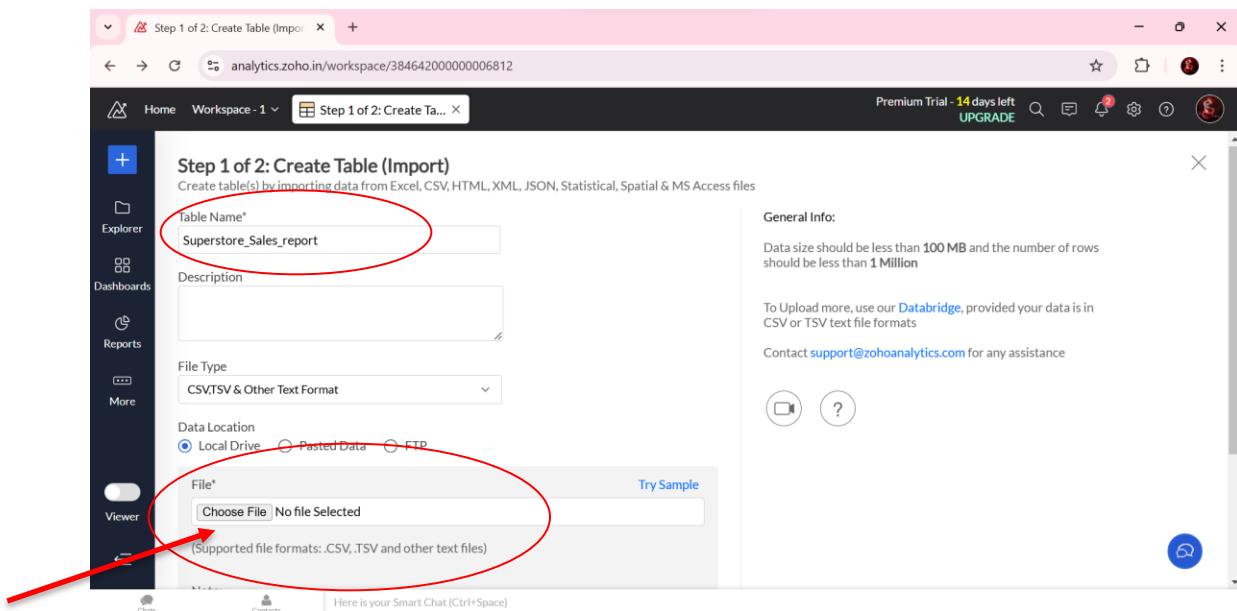
Step 2: Click on Create on the top-left corner of the screen.



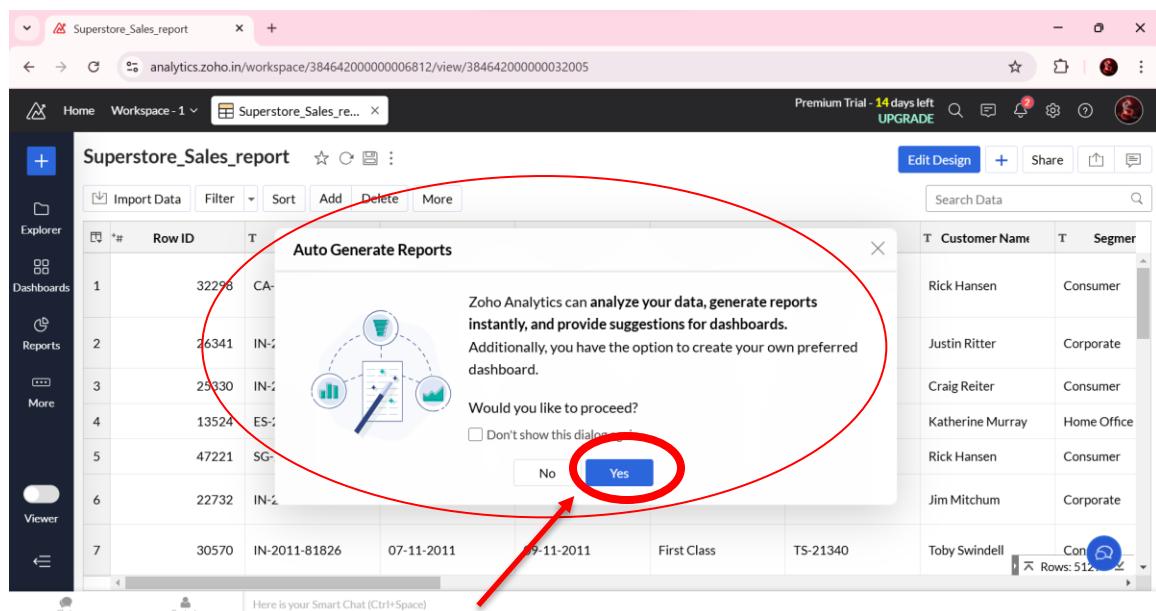
Step 3: Click on New table/ Import data and select all files.



Step 4: Give a Table name and click on choose file and select the dataset from the device.  
Click on next. Again, click on next. Then click on Create.



Step 5: A message pops up on the screen for Auto generating reports. Click on Yes.



Step 6: Select the desired dashboard and click on save dashboard.

The screenshot shows the Zoho Analytics interface. On the left, there's a sidebar with 'Explorer', 'Dashboards', 'Reports', 'More', and 'Viewer'. The main area displays a table titled 'Superstore\_Sales\_report' with columns: '#', Row ID, Order ID, Order Date, Ship Date, and Status. Below the table is a search bar. To the right, there's a 'Suggestions' section with four cards: 'Sales Analysis', 'Discount Analysis', 'Profit Analysis', and 'Sales VS Discount'. A red arrow points from the 'Save Dashboard' button in the 'Sales VS Discount' card towards the center of the dashboard.

Step 7: We can edit the dashboard by clicking on Edit Design.

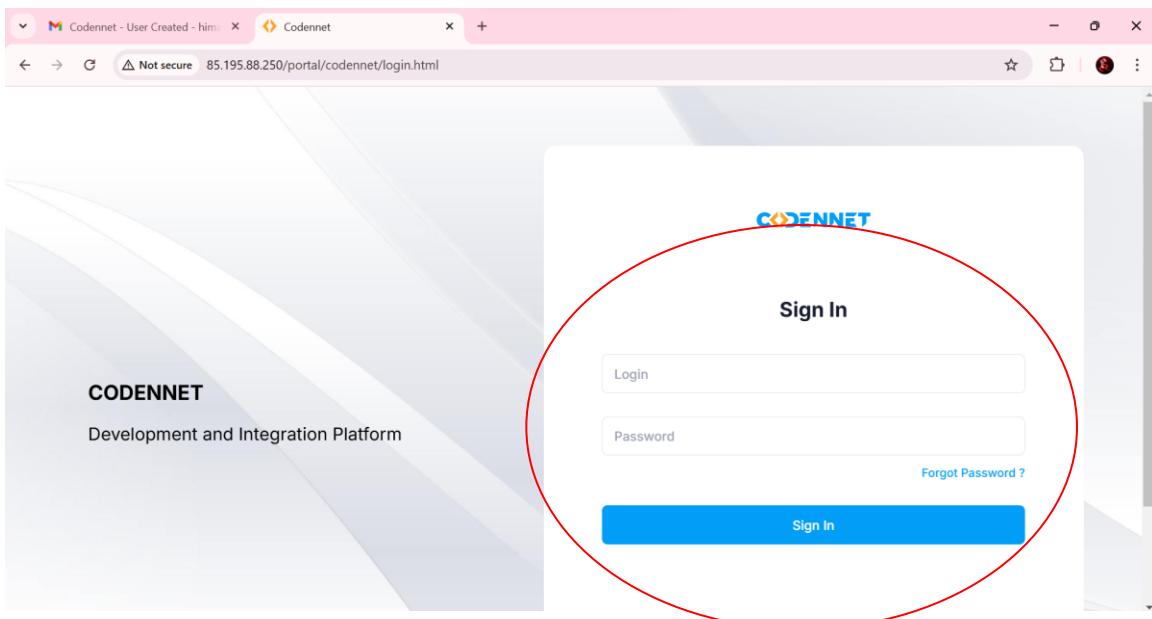
The screenshot shows the 'Sales Analysis Dashboard(1)' page. At the top, there's a toolbar with 'Edit Design', 'Ask Zia', 'Share', 'Themes', and other options. A red circle highlights the 'Edit Design' button. The dashboard itself features several cards: 'Total Sales in 2014' (43.00L), '% Difference from previous year' (26.25% up), 'Country with MAX Sales(United States)' (22.97L), 'Segment-wise Sales(1)', and 'Distribution of Sales(1)'. The sidebar on the left includes 'Filters' and dropdowns for 'Order Date', 'Country', and 'Segment'.

Step 8: We have successfully created our Sales dashboard using Zoho Analytics.

## BYOD

To create a dashboard or charts using Zoho Analytics, follow the steps:

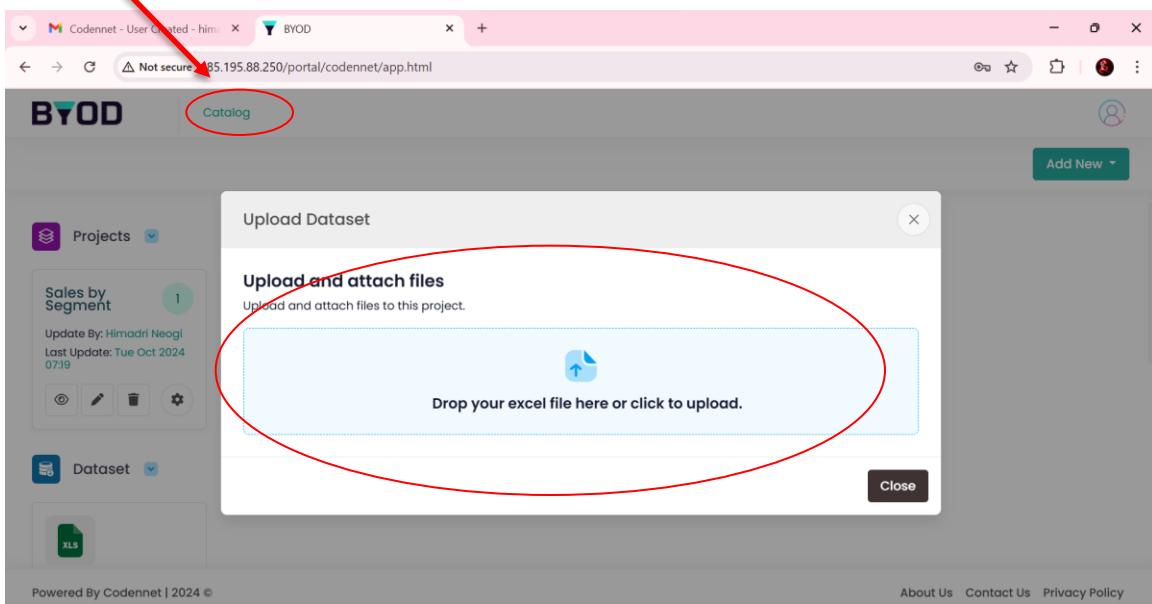
Step 1: Open BYOD using the link received through e-mail from Codennet and login using the mail Id and password attached with the e-mail.



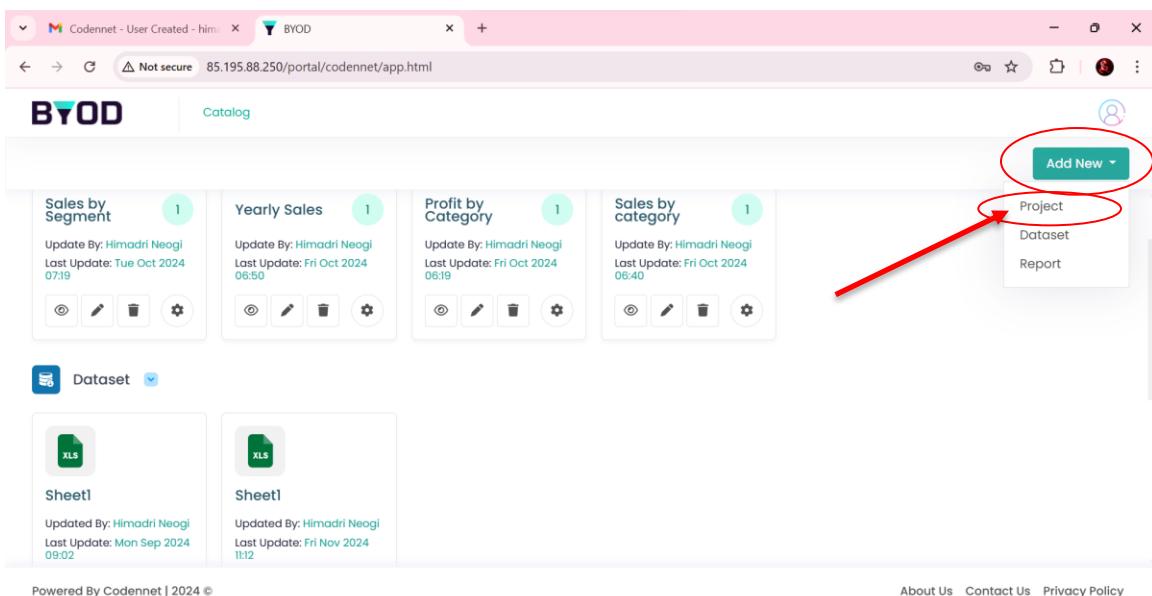
Step 2: Click on Add New and select Dataset.

A screenshot of the BYOD application interface. At the top, there's a header with the BYOD logo and a 'Catalog' tab. Below the header, there are two sections: 'Projects' and 'Dataset'. The 'Projects' section shows four items: 'Sales by Segment', 'Yearly Sales', 'Profit by Category', and 'Sales by category', each with a small preview and edit/delete icons. The 'Dataset' section shows one item: an 'XLS' file. On the right side of the screen, there's a green 'Add New' button with a dropdown arrow. A red circle and arrow point to this 'Add New' button, indicating where the user should click to upload a new dataset.

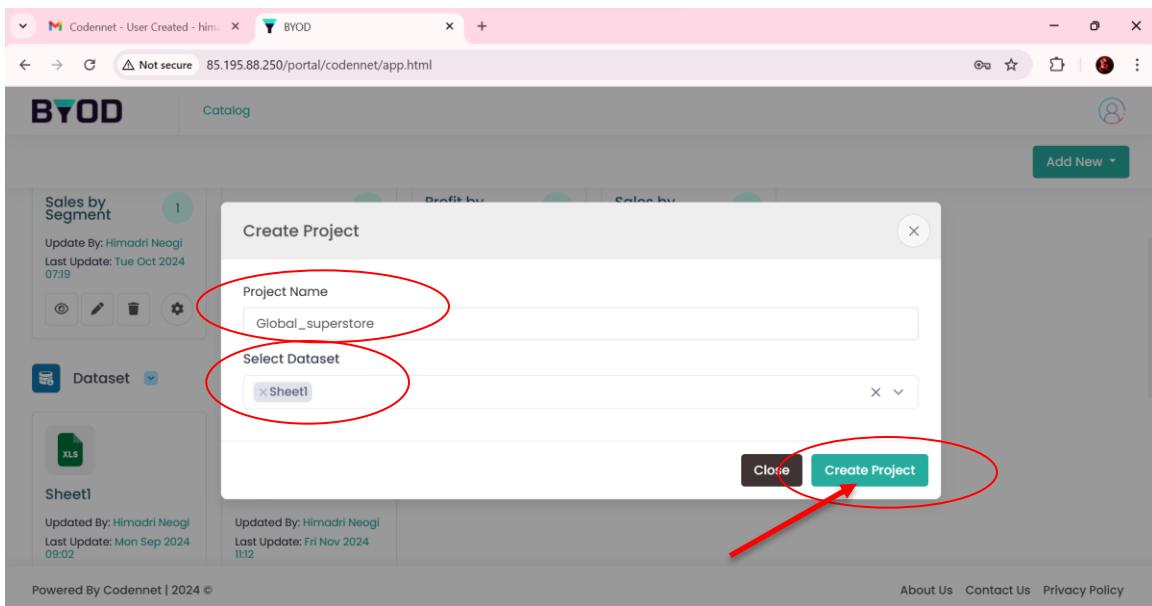
Step 3: Upload the dataset from the device. Then click on Catalog.



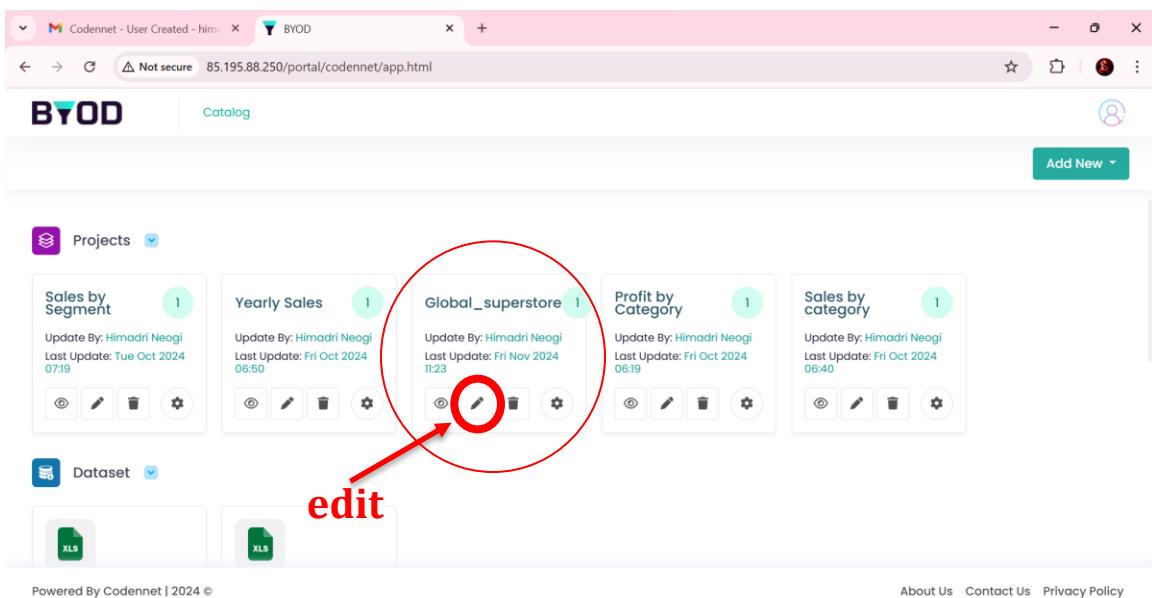
Step 4: Click on Add New and select Project.



Step 5: Give a Project name and select the dataset from the drop-down. Then click on Create project.



Step 6: Select the recently created project from the Project menu and click on edit.



Step 7: Click on Dimensions and Measures and the select the desired feature from the Columns on the left of the screen. Select the desired chart from the Chart Properties.

**Catalog**

**Data Manager**

- Sheet1
- AXIS**
- Dimensions
  - + Add
- Measures
  - + Add
- Columns
  - # Row ID
  - ABC Order ID
  - ABC Order Date
  - ABC Ship Date
  - ABC Ship Mode
  - ABC Customer ID

**Canvas**

**Chart Properties**

- Comparison
- Trend
- Contribution
- Correlation
- Map

**Style**

- Legend
- Tooltip
- Sorting

**Chart Filter**

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Step 8: Suppose we want to visualize the Sales for various customer segment. First click on Dimensions and select Segment. Similarly click on Measures and click on Sales. Select the desired chart from Chart Properties. We are selecting Pie chart from contribution. Then save the chart and click on catalog. Repeat these steps to create various types of charts.

**Catalog**

**Data Manager**

- Sheet1
- Dimensions
  - Segment
    - + Add
- Measures
  - sum Sales
- Product ID
- Category
- Sub-Category
- Product Name
- # Sales
- # Quantity
- # Discount

**Canvas**

**Chart Properties**

- Comparison
- Trend
- Contribution**
- Correlation
- Map

**Item Name**

Home Office: 18.69%

Corporate: 30.69%

Consumer: 50.62%

Consumer 50.62%  
Corporate 30.69%  
Home Office 18.69%

**Raw Data** **Chart Data**

Export to Excel

Search...

Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer

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Step 9: Click on Add new and select Report.

The screenshot shows the 'Catalog' section of the BYOD application. At the top right, there is a red circle around the 'Add New' button. Below it, a dropdown menu is open with three options: 'Project', 'Dataset', and 'Report'. A red arrow points from the 'Report' option towards the 'Create Report' dialog box. The main area displays a grid of five report cards. From left to right: 'Sales by Segment' (1 item), 'Yearly Sales' (1 item), 'Global\_superstore' (1 item), 'Profit by Category' (1 item), and 'Sales by category' (1 item). Each card includes update details and edit/delete icons.

Step 10: Give a report name and click on create report.

The screenshot shows the 'Create Report' dialog box overlaid on the Catalog interface. Inside the dialog, a red circle highlights the 'Report Name' input field, which contains the text 'Superstore\_sales\_report2'. At the bottom right of the dialog, another red circle highlights the 'Create Report' button, which is highlighted in green. The background shows the same grid of report cards as the previous screenshot.

Step 11: Select the recently created report from the report menu and click on edit.

The screenshot shows the 'Catalog' section of the BYOD application. There are three report items listed:

- Superstore\_sales\_report1: Update By: Himadri Neogi, Last Update: Fri Oct 2024 06:42
- Superstore\_sales\_report: Update By: Himadri Neogi, Last Update: Fri Oct 2024 06:37
- Superstore\_sales\_report2: Update By: Himadri Neogi, Last Update: Fri Nov 2024 12:00

Each report item has a set of icons below it: a circular icon with a dot, a pencil, a trash can, and a gear. A red circle highlights the third report item, and a red arrow points from the 'Add New' button at the top right to the circled item.

Step 12: Click on Add Report Item and select the charts we want to add in our dashboard.

The screenshot shows the 'Byod Reports' page. At the top, there are buttons for 'Save Report', 'Download', and 'Add Report Item'. The 'Add Report Item' button is highlighted with a red circle. Below it is a 'Report Item Catalogue' section containing a pie chart and some text:

Report Item Catalogue

Search:

Select an project to:

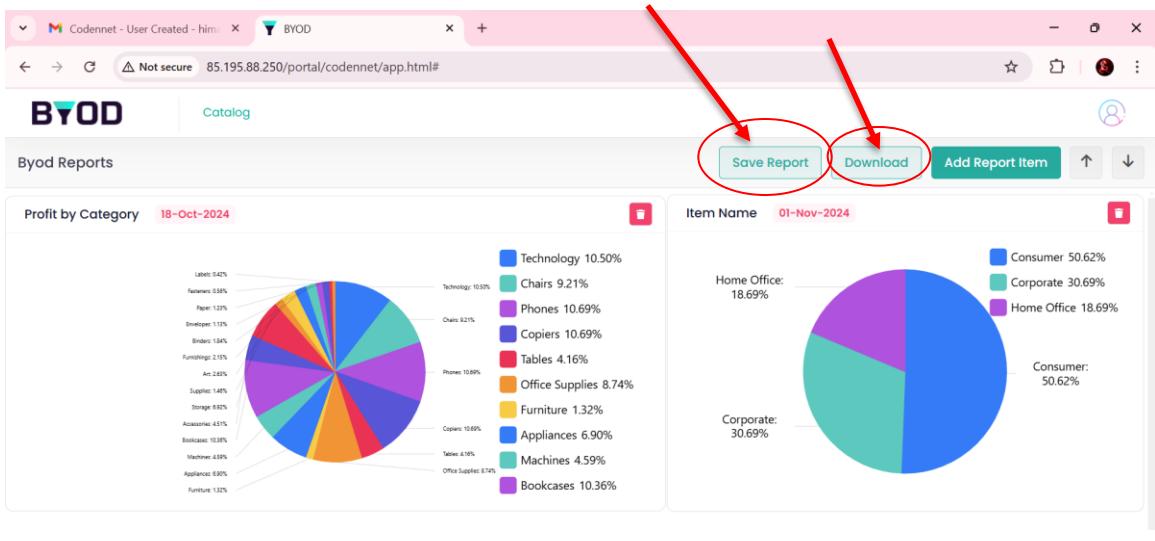
Home Office: 18.69%

Corporate: 30.69%

Consumer: 50.62%

A red arrow points from the 'Report Item Catalogue' section towards the 'Add Report Item' button.

Step 13: Once we have added all the charts in the report, click on Save Report. We can also download the report to our device by clicking on download. We have successfully created our dashboard using BYOD.



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## Results

The key findings from each BI tool are presented through the dashboards generated during the analysis. These visualizations offer insights into sales patterns, profit trends, and customer behaviour from the Superstore dataset.

**Tableau:** The Tableau dashboard effectively visualizes the sales and profit trends across different customer segments and countries. It highlights sales, profit margins, and customer segments through bar charts, pie charts, line charts and geographical maps.

### Superstore Sales Report

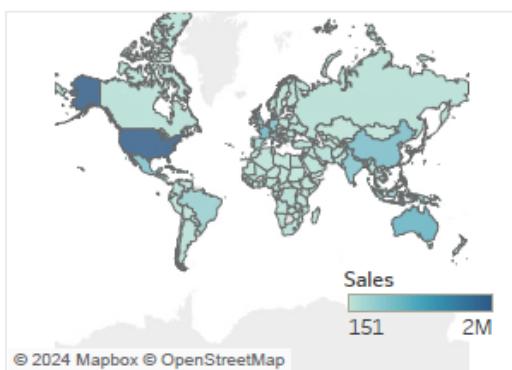
#### Sales by Segment



#### Monthly Trend of Sales and Profit



#### Country-wise Sales



#### Monthly Trend of Sales



Fig 1: Tableau Dashboard

**Qlik Sense:** The Qlik Sense dashboard features line charts for sales over years, region-wise sales and profit and the Key Performance Indicators like total sales, net profit and total quantity sold.

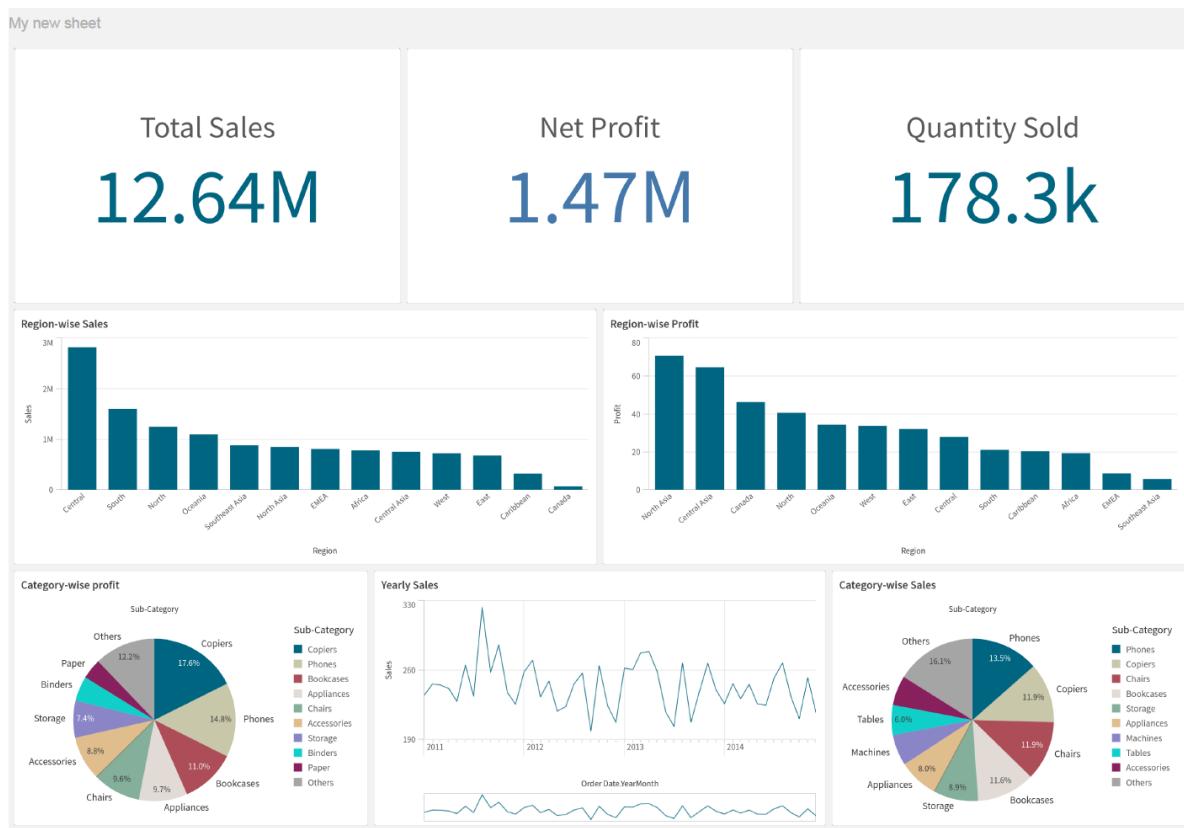


Fig 2: Qlik Sense Dashboard

**Zoho Analytics:** The Zoho Analytics dashboard focuses on simplified reporting of sales and profit trend across product category and customer segments. It presents basic charts such as line charts and bar graphs while highlighting the Key Performance Indicators (KPI) in the dashboard.

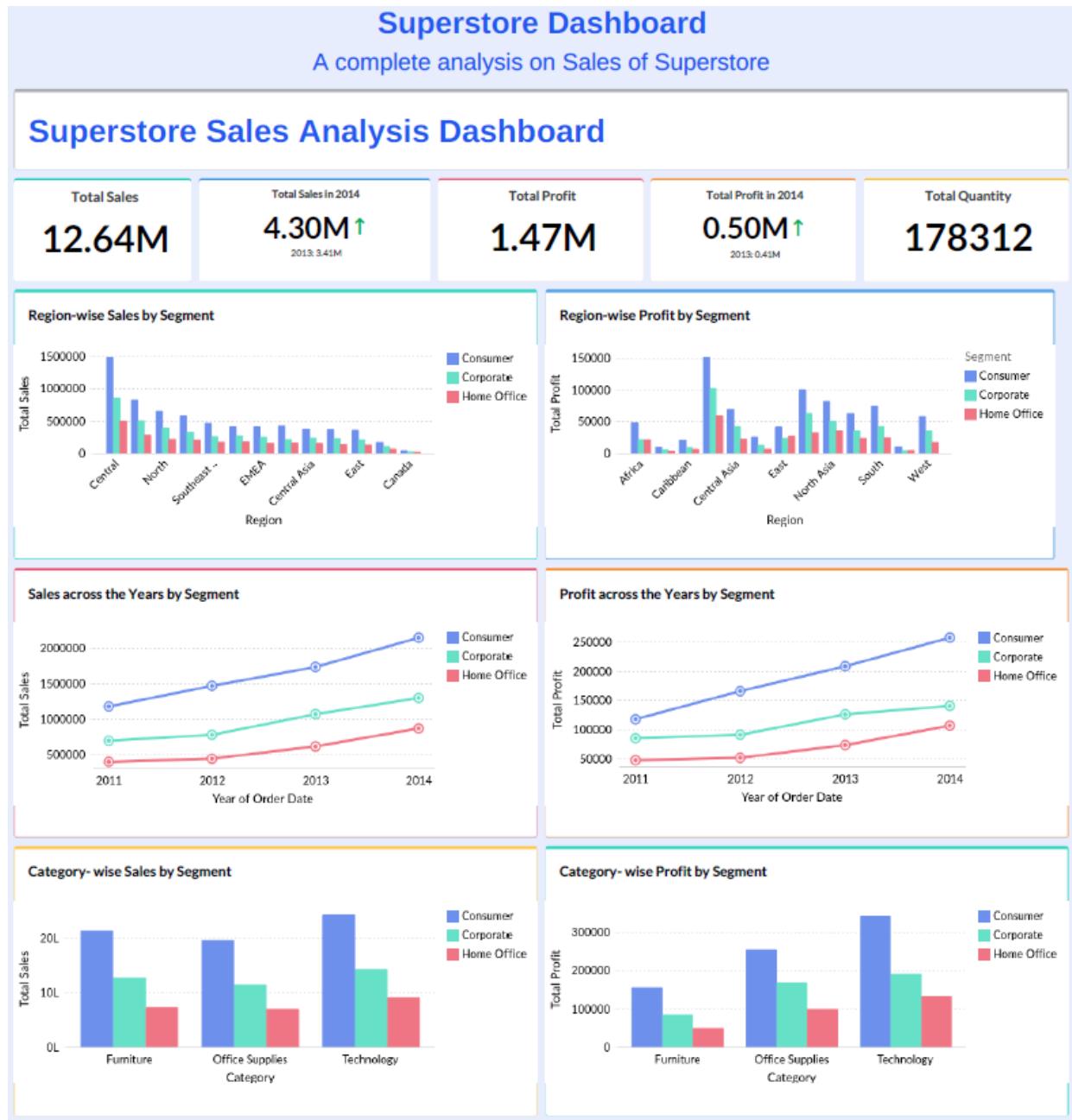


Fig 3: Zoho Analytics Dashboard

**BYOD Dashboard:** The BYOD platform provided flexibility in generating a range of charts, from basic bar and line charts to complex visualizations like bubble chart, radial histogram, geographical maps.

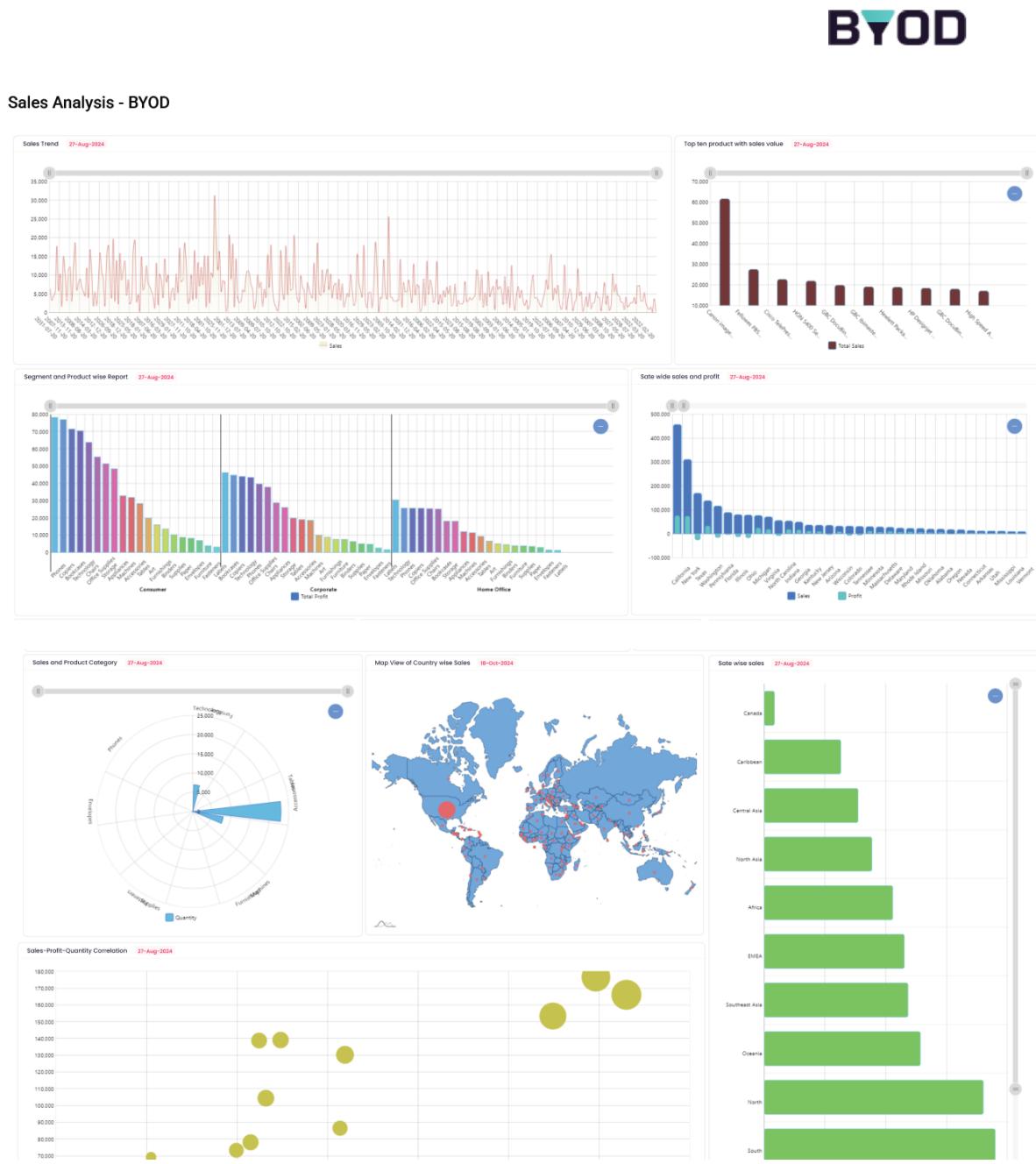


Fig 4: BYOD Dashboard

These visualizations not only reflect the analytical capabilities of each BI tool but also serve as benchmarks for businesses looking to select the right platform based on their specific needs for data visualization and analysis.

## Discussion

We dive into the comparative analysis of various Business Intelligence (BI) tools—Tableau, Qlik Sense, Zoho Analytics, and BYOD, focusing evaluating each tool's performance and suitability based on customizability, data handling, visualization capabilities, and overall user experience. By leveraging the Superstore dataset, each tool was tested on parameters like data integration, flexibility in calculations, and ability to produce meaningful insights through advanced visualizations. This analysis highlights the strengths and limitations of each platform, serving as a comprehensive guide for selecting the most appropriate tool for different business needs.

Criteria	Tableau	Qlik Sense	Zoho Analytics	BYOD
<b>1. Data integration</b>				
<b>a) Flat files/custom connectors</b>	Connects to a wide variety of data sources including flat files, databases, and custom connectors.	Supports data ingestion from flat files (CSV, Excel) and custom connectors.	Ingests data from flat files, cloud storage, and databases, providing predefined connectors.	Offers flexible integration, allowing for custom connectors and file uploads without specifying file type.
<b>b) Separate connectors for tenants</b>	Multi-tenant features available through custom connectors for specific data sources per tenant.	Supports multi-tenant architecture, enabling custom connectors per tenant.	Can use different connectors for different tenants but might require customization.	Offers customizable data collection layer to connect to source systems via various techniques like API connectivity, data scraping, etc.
<b>2. Data Curation</b>				
<b>a) Custom functions/calculations</b>	Supports calculated fields using its own formula syntax but doesn't support	Allows for custom expressions and calculations using its scripting	Provides a built-in feature for creating custom functions by writing functions using Python and using them in reports and dashboards.	Provides a built-in feature for creating custom functions by writing functions using Python and using them in reports and dashboards.

	creating new functions via code directly.	language, which can get complex, but does not typically allow users to write entirely new functions in code.	functions using JavaScript and using them in reports and dashboards.	
<b>3. Visualization</b>				
<b>a) Comparison, trend, correlation charts</b>	Offers robust visualization with various charts like trend, correlation, contribution, and comparison.	Provides standard charts like comparison, trend, correlation, and associative data models.	Supports a wide variety of chart types, including comparison, trend, and correlation charts.	Offers variety of charts for comparison, trend, contribution, correlation and map.
<b>b) Customizable charts</b>	Charts are fully customizable with advanced styling and formatting options.	Highly customizable charts with interactive features.	Provides customizable charts, with options for altering appearance and layout.	Provides various styling options for altering appearance, size and layout.
<b>c) Filtering with aggregated data</b>	Provides advanced filters on aggregated data.	Supports filtering with aggregated data values.	Aggregated data filters are supported.	Filters on aggregated values can be applied to refine analysis results.
<b>d) Widgets and advanced charts</b>	Supports advanced charts and widgets like Heatmaps, Flow-charts, and Maps.	Includes widgets and advanced visualizations like Heatmaps, Box plots, and Maps.	Provides a selection of widgets and charts, including advanced options like Maps and Heatmaps but Box plot is not supported.	Provides geographical map but Box plots and Heatmaps are not supported.
<b>e) Drill-down</b>	Provides easy-to-use drill-down options for deeper insights.	Strong drill-down capabilities for detailed analysis.	Drill-down options are available.	Offers drill-down/cross filtering in premium access.

<b>4. Collaboration &amp; Access Control</b>				
<b>a) Projects/Workspaces</b>	Provides a project-based workspace where multiple users can collaborate on analysis items.	Supports "Workspaces" for collaborative work.	Supports workspace collaboration with multiple users.	Collaboration supported through "Projects" with roles for each user.
<b>b) Roles (Owner, Viewer, Editor)</b>	Offers user roles like "Owner", "Editor", and "Viewer" with defined permissions.	Provides Owner, Viewer, Editor roles, allowing different access levels for users.	Users can be assigned specific roles, including Viewer, Editor, and Owner.	Provides roles like Viewer, Editor for managing user access to specific objects and reports.
<b>c) Shareable reports</b>	Allows report sharing within teams or the entire organization, with access control.	Reports and dashboards can be shared across the organization with specific permissions.	Reports are shareable, with detailed permission settings to manage access across the organization.	Projects and reports can be shared across the organization with specific permissions.
<b>5. Reporting</b>				
<b>a) Free-format/ad-hoc reporting</b>	Enables free-format reporting, allowing dynamic report creation and ad-hoc queries.	Ad-hoc reporting with free-format capabilities for dynamic analysis creation.	Enables free-format reporting, allowing dynamic report creation and ad-hoc queries.	Supports ad-hoc, free-format reporting, giving users flexibility to create and customize reports.
<b>b) Exportable reports</b>	Provides options to export reports in different formats.	Reports can be exported in various formats.	Reports can be exported in various formats.	Reports can be exported in pdf format.
<b>6. Self-service</b>				
<b>a) Easy-to-use UI</b>	Provides an intuitive UI for creating self-service dashboards and reports	User-friendly interface designed for self-service dashboard creation.	UI is designed for ease-of-use, making it simple for non-technical users to create	Self-service UI is easy to navigate, allowing users to create and customize dashboards without extensive technical knowledge.

	with drag-and-drop facility.		dashboards.	
<b>b) Natural language query</b>	Natural language queries are supported, enabling users to create dashboards by asking questions in plain language.	Supports natural language queries for creating dashboards with simple commands.	Offers natural language processing for querying data and creating dashboards.	Business users can generate analysis through <b>BYOD AI Engine</b> by natural language.
<b>7. Advanced Analytics</b>				
<b>a) Statistical/scientific data</b>	Supports advanced statistical analysis and visualization of scientific data.	Offers capabilities for statistical data analysis with strong visualization support.	Provides basic to advanced statistical analysis tools.	Capable of visualizing statistical data, with support for advanced scientific analysis depending on the customization applied.
<b>8. Performance</b>				
<b>a) Scalability with large user base</b>	High performance, even with large datasets and many users, due to its optimization algorithms.	Performs well with large datasets and user bases due to its in-memory processing capabilities. It uses its <b>QIX Engine</b> to compress and process data quickly, enabling users to work with large volumes without significant lag.	Can handle moderate datasets and user bases.	Can scale up to a large number of users by in-memory as well as in-browser data processing.
<b>9. Customizability</b>				
<b>a) Connectors, visualizations, calculations</b>	Highly customizable across connectors, visualizations,	Strong flexibility in custom connectors, visualizations,	Limited in terms of connectors and complex visualizations.	High flexibility, especially with custom database connections. Allows Python scripting for creating custom

	and calculations. Advanced visual options and integration with APIs. Complex formulas and calculated fields supported.	and scripting. In-memory calculations for better performance. Supports advanced chart types.	Basic calculated fields with minimal customization for advanced users.	functions. Lacks some advanced charts.
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## Conclusion

This project provided an in-depth comparative analysis of various BI tools—Tableau, Qlik Sense, Zoho Analytics, and BYOD—using the Superstore dataset to evaluate their performance and capabilities. The main findings highlighted that:

- **Tableau** excelled in ease of use, providing advanced visualizations like geographical maps and bar charts with extensive customization options.
- **Qlik Sense** showcased strong associative analysis and drill-down capabilities, making it effective for connecting multiple datasets and analyzing correlations.
- **Zoho Analytics**, while user-friendly, had limitations in terms of handling large dataset complex visualizations and customization of advanced charts such as box plots.
- **BYOD**, being a newer tool, demonstrated flexibility in database connectivity and offered Python-based scripting for creating custom functions, making it versatile for organizations with complex data environments.

Future work could focus on exploring deeper into performance testing with larger datasets to further analyze the scalability of each platform, investigating the evolution of emerging BI tools like BYOD to assess how their features mature over time and evaluating the effectiveness of natural language processing (NLP) capabilities in self-service BI tools for query generation.

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