

Competitive Analysis of BI Tools

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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, QlikSense, 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**, **QlikSense**, **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. QlikSense, 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, QlikSense, 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**, **QlikSense**, **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**, **QlikSense**, **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, QlikSense, 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.
- **QlikSense:** 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.
- **QlikSense:** QlikSense 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.
- **QlikSense** 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.

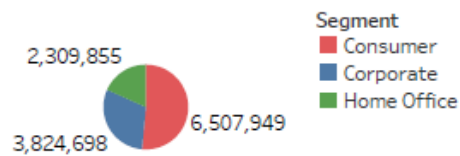
Results

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.

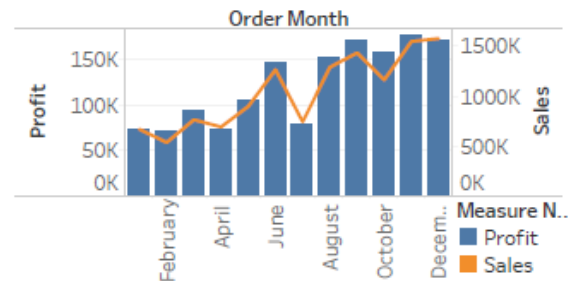
Tableau: The Tableau dashboard effectively visualizes the sales and profit trends across different customer segments and countries. It highlights sales, profit margins, and customer segments through bar charts, pie charts, line charts and geographical maps.

Superstore Sales Report

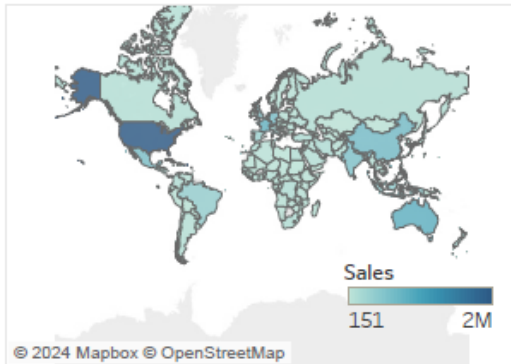
Sales by Segment



Monthly Trend of Sales and Profit



Country-wise Sales



Monthly Trend of Sales



Fig 1: Tableau Dashboard

QlikSense: The QlikSense 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.

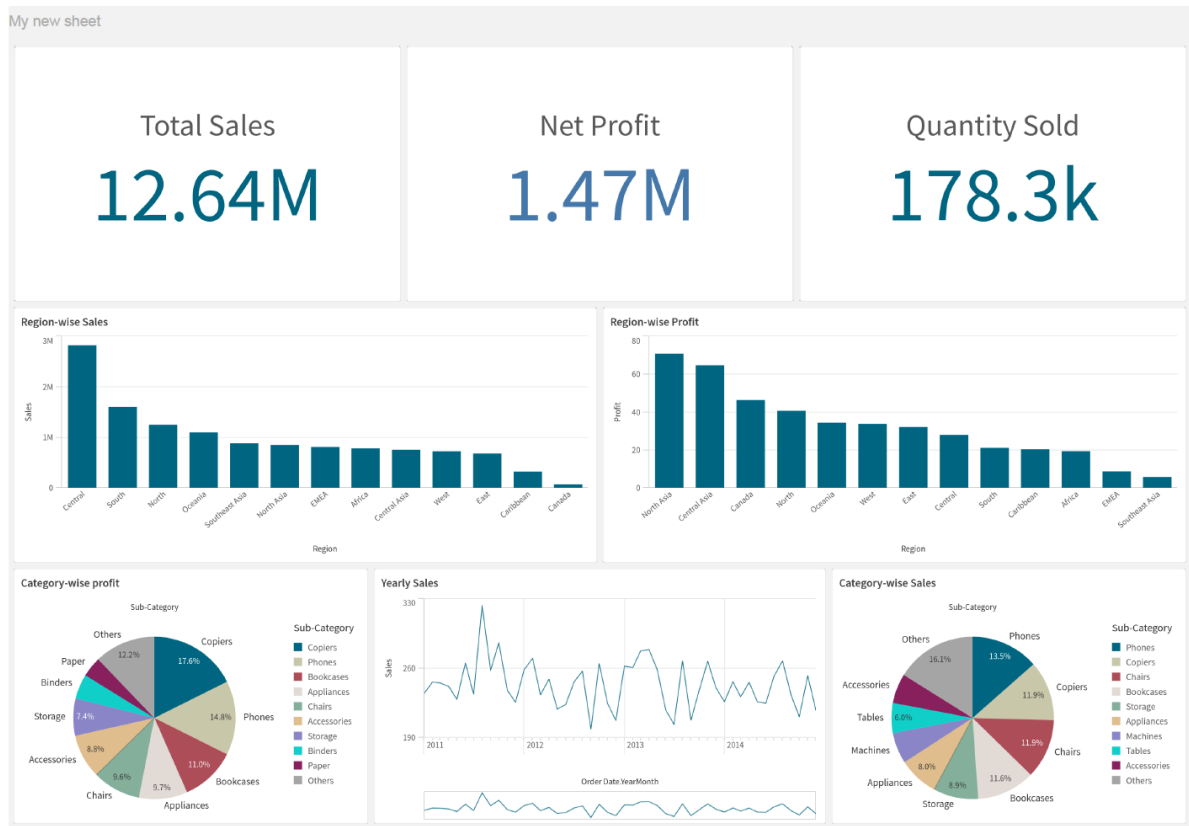


Fig 2: QlikSense Dashboard

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.

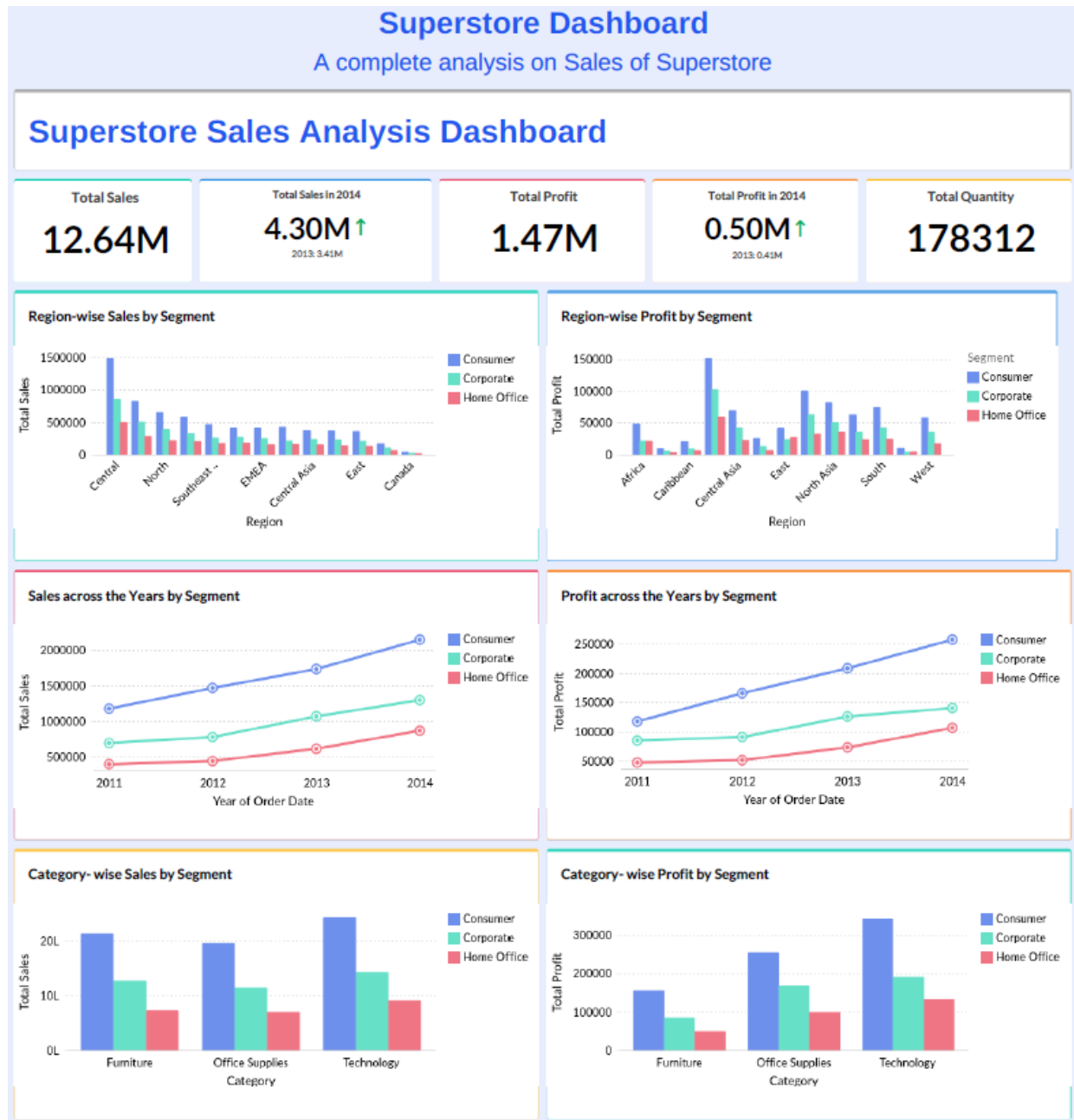


Fig 3: Zoho Analytics Dashboard

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.



Sales Analysis - BYOD

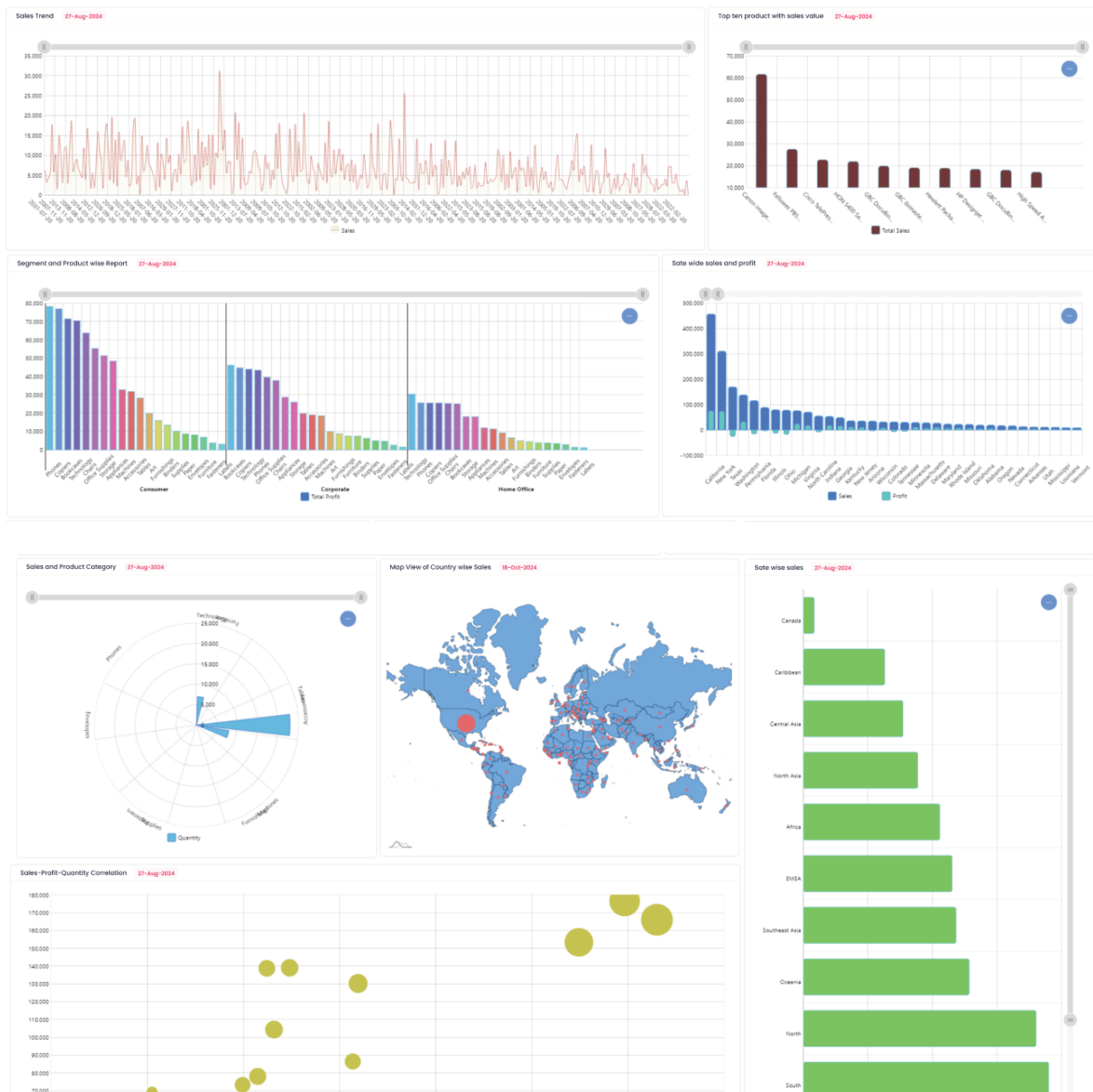


Fig 4: BYOD Dashboard

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, QlikSense, 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	QlikSense	Zoho Analytics	BYOD
1. Data integration				
a) Flat files/custom connectors	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) Separate connectors for tenants	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.
2. Data Curation				
a) Custom functions/calculations	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	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.	
3. Visualization				
a) Comparison, trend, correlation charts	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) Customizable charts	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.
c) Filtering with aggregated data	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.
d) Widgets and advanced charts	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.
e) Drill-down	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.

4. Collaboration & Access Control				
a) Projects/Workspaces	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) Roles (Owner, Viewer, Editor)	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.
c) Shareable reports	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.
5. Reporting				
a) Free-format/ad-hoc reporting	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) Exportable reports	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.
6. Self-service				
a) Easy-to-use UI	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) Natural language query	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 BYOD AI Engine by natural language.
7. Advanced Analytics				
a) Statistical/scientific data	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.
8. Performance				
a) Scalability with large user base	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 QIX Engine 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.
9. Customizability				
a) Connectors, visualizations, calculations	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, QlikSense, 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.
- **QlikSense** 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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