

Comparative Analysis of Data Visualization Tools: Power BI and Tableau

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Abstract - This research paper aims to provide a comprehensive comparative analysis of Power BI and Tableau, two popular tools used for business analytics and data visualization. The study highlights key differences in pricing structure, user interface, integration options, visualization capabilities, data modeling and ETL capabilities, collaboration features, and mobile app functionality. By examining these factors, the research aims to guide organizations in making informed decisions when choosing between Power BI and Tableau based on their specific needs and requirements.

Key Words: Data Visualization, Data Analytics, Power BI, Tableau.

1. INTRODUCTION

1.1 Background

In today's data-driven world, organizations heavily rely on analytics and data visualization tools to gain valuable insights, make informed decisions, and drive business growth. Power BI by Microsoft and Tableau are two leading tools in the market that enable businesses to analyze and visualize data effectively. This comparative analysis aims to explore the features and functionalities of these tools to assist organizations in selecting the most suitable tool for their business.

1.2 Research Objectives

The main objectives of this research are as follows:

- To provide an overview of Power BI and Tableau, including their key features, functionalities, and target audience.
- To compare the pricing structure of Power BI and Tableau, including the cost of licenses and additional features.
- To analyze the user interface and visual capabilities of both tools, including ease of use, customization options, and interactive features.

- To evaluate the integration options available for Power BI and Tableau with other applications and data sources.
- To assess the data modeling and ETL (Extract, Transform, Load) capabilities of both tools, including data preparation and transformation options.
- To examine the collaboration features offered by Power BI and Tableau, including sharing dashboards and real-time collaboration.
- To analyze the mobile app functionality of both tools, including the availability of mobile-friendly dashboards and offline access.

2. POWER BI AND TABLEAU OVERVIEW

2.1 Power BI

2.1.1 Business Analytics Service by Microsoft

Power BI is a business analytics service offered by Microsoft. It enables users to create interactive dashboards and reports to gain insights from their data. Power BI is widely used across industries due to its integration with other Microsoft products and its user-friendly interface.

2.1.2 Pricing Structure

Power BI offers various pricing options, including a free version with limited features, a Pro version for individual users, and a Premium version for enterprise-level usage. The pricing is based on a monthly or annual subscription model, with different costs for each version.

2.1.3 Interface and Visuals

Power BI provides a user-friendly interface with drag-and-drop functionalities, making it easy for users to create visualizations without coding. It offers a wide range of pre-built visuals and allows customization through its visualizations pane.

2.1.4 Data Modeling and ETL Capabilities

Power BI provides data modeling capabilities, allowing users to structure and transform their data

using Power Query and Power Pivot. It also supports ETL processes through its data flows feature, which enables users to extract, transform, and load data from multiple sources.

2.2 Tableau

2.2.1 Data Visualization and Business Intelligence Tool

Tableau is a leading data visualization and business intelligence tool that helps users analyze and communicate data effectively. It offers a wide range of features and functionalities to create interactive visualizations and reports.

2.2.2 Pricing Structure

Tableau offers different pricing options, including Tableau Desktop for individual users, Tableau Server for collaboration and sharing, and Tableau Online for cloud-based deployment. The pricing structure is based on a per-user or per-server basis, with additional costs for additional features and services.

2.2.3 Interface and Visuals

Tableau provides a user-friendly interface with drag-and-drop functionalities, making it easy for users to create visualizations. It offers a vast library of pre-built visualizations and allows customization using its extensive set of tools.

2.2.4 Data Modeling and ETL Capabilities

Tableau provides data modeling capabilities through its Tableau Prep tool. It allows users to perform data preparation tasks like cleansing, shaping, and blending data from different sources. Tableau also supports ETL processes through its integration with third-party ETL tools.

3. COMPARATIVE ANALYSIS

3.1 Pricing Structure

Power BI and Tableau have different pricing models. Power BI offers a free version, a Pro version with advanced features, and a Premium version for enterprise-level usage. Tableau offers a range of options, including Tableau Desktop, Tableau Server, and Tableau Online, with additional costs for add-ons and services.

3.2 Interface and Visuals

Both Power BI and Tableau provide user-friendly interfaces with drag-and-drop functionalities. Power

BI offers a wide range of pre-built visualizations, while Tableau offers a vast library of visualizations and customization options.

3.3 Integration Options

Power BI seamlessly integrates with other Microsoft products, such as Excel, SharePoint, and Azure. Tableau supports integration with various third-party applications, including popular CRM and ERP systems.

3.4 Data Modeling and ETL Capabilities

Both Power BI and Tableau offer data modeling capabilities, enabling users to structure and transform their data. Power BI provides data flows for ETL processes, while Tableau supports data preparation tasks through Tableau Prep and integration with third-party ETL tools.

Power BI and Tableau are two of the most powerful and popular business intelligence tools available in the market. Both of them have their own advantages and drawbacks however, there are other tools in the space that provide more flexibility and scalability to their users in a cost-effective way. One such tool is Sprinkle Data, a no-code data pipeline and analytics platform that provides its users with more than 100+ data connectors to unify their multiple data sources. The detailed comparison of the three tools is tabulated below:

4. Tableau vs Power BI - 15 Major Differences

Analytics tools are the lifeblood of any data-driven organization that enables companies to collect, analyze, and interpret vast amounts of data, helping them make informed decisions and derive better business development. In this article, we'll explore contrasts between the two most used BI tools in the market: Tableau vs Power BI, and discuss how they can help organizations gain insights from their data.

4.1 Tableau:

Tableau is a data visualization and business intelligence tool that helps people see and understand data. It provides an interactive and intuitive interface for creating powerful visualizations that are easy to understand and share. It is used by businesses and organizations of all sizes, from startups to Fortune 500 companies.

4.2 Power BI:

Power BI is a business analytics service provided by Microsoft that helps in creating interactive visualizations with self-service business intelligence capabilities, where end users can create reports and dashboards by themselves, without having to depend on any other technology. Power BI is used by hundreds of organizations around the world, including IBM, Visa, Microsoft, Netflix, Unilever, Salesforce, Adobe, Walmart, and Dell Technologies, among many others.

as it only provides access to the Tableau Server and Tableau Online.

The Viewer plan is very pocket-friendly, costing around \$15 per user per month.

- **Tableau Server:** The Server plan is designed for larger organizations that need to deploy Tableau across the enterprise. It provides access to the full Tableau product suite, including the Tableau Desktop, Tableau Server, Tableau Online, and Tableau Prep Builder.

The cost of the Server plan is based on the number of users and other factors as well, so to get the customized quote it is recommended to contact the Tableau support team.

Power BI, a business analytics solution provided by Microsoft offers flexible pricing plans, allowing users to choose the plan that best suits their needs. Pricing plans offered by Power BI are mentioned below:

- **Power BI Basic:** The basic Power BI plan is free, and it includes access to the Power BI desktop, data connection services, and content collaboration with others. This plan is suitable for basic data analysis and reporting, but it does not include any of the more advanced features.
- **Power BI Pro plan:** This plan includes all the features of the free plan, and also includes access to the Power BI service, content packs, data flows, and mobile app.

The cost of the Power BI Pro plan is \$9.99 per user per month.

- **Power BI Premium:** It is the most comprehensive plan, and is suitable for organizations that require large-scale deployments of Power BI. This plan includes all the features of the Pro plan, plus access to dedicated capacity, premium features, and support for extremely large data sets.

The cost of the Power BI Premium plan is \$4,995 per capacity per month and \$20 per user per month.

5. A Quick Glance Tableau vs Power BI: 15 Major Differences

5.1. Power bi vs Tableau : Cost

Tableau and Power BI are two of the most popular business intelligence (BI) tools available in the market. They both offer powerful visualization capabilities and many other features, but there are important differences when it comes to their cost.

Tableau offers four main pricing plans to accommodate the needs of different types and sizes of businesses. Let us discuss the pricing plans offered by tableau in detail.

- **Tableau Creator:** This plan is specially designed for the average business user, providing powerful analytics and visualization capabilities, along with access to the Tableau Desktop and Tableau Prep Builder tools.

The cost of the Creator plan is around \$70 per user per month.

- **Tableau Explorer:** The Explorer plan is designed for advanced business users who need access to extra features and capabilities. It provides access to the full Tableau product suite, including the Tableau Server, Tableau Online, and Tableau Prep Builder.

The cost of the Explorer plan is around \$42 per user per month.

- **Tableau Viewer:** The Viewer plan is ideal for those who need access to the Tableau Server but don't need to create or customize dashboards preferably used for the end users

- **Power BI Embedded:** It is a plan that allows developers to embed Power BI visuals into their applications. This plan includes all the features of the Pro plan, plus the ability to embed Power BI visuals into applications.

The cost of the Power BI Embedded plan is \$1 per hour depending on the virtual core and memory.

We can say that Tableau is typically more expensive than Power BI but choosing between the two depends on the use case as Tableau is a good choice for larger organizations whereas Power BI is a good choice for smaller organizations that require a cost-effective solution.

5.2. Power BI vs Tableau: Performance

Performance is one of the most important considerations when selecting a BI tool for an organization. Poor performance can lead to user frustration, missed deadlines, and costly errors that can lead to delays in decision-making and cause productivity to suffer. Fast and reliable performance is essential for a successful BI solution.

Tableau is renowned for its high performance, especially when compared to other BI tools. Some key features of tableau's performance are mentioned below:

- It is able to process and visualize large amounts of data quickly and efficiently, allowing users to quickly and easily extract insights from their data.
- It is optimized for speed, allowing for high-performance analytics and data exploration. It offers advanced features such as in-memory query processing, analytics acceleration, and query optimization which allows for faster data analysis.
- Its caching capabilities enable users to quickly load large datasets without waiting for them to be processed from scratch. This helps to speed up the data analysis process significantly.

Power BI is known for its robust performance capabilities, which allow users to analyze large amounts of data quickly and efficiently. Some factors affecting the performance are

- The performance of Power BI is highly dependent on the size and complexity of the data set. With large and complex data sets, the performance can be slow, particularly when users are trying to produce interactive visuals and reports. However, with smaller and simpler data sets, Power BI can be very fast and efficient.
- In addition, Power BI also offers a range of features that can help improve its performance. For example, users can optimize their data models to reduce the amount of data that needs to be processed and improve query performance.
- They can also take advantage of in-memory caching to improve query response times.

When it comes to performance both tools have their own capabilities and the best out of the two solely depends on the business, forecast data needs and the type of use case that needs to be achieved handling bulk data. For more complex and large volumes of datasets, Tableau should be preferred.

5.3. Power bi vs Tableau: Learning Curve

The Learning Curve is the amount of time and effort required to become proficient in using a BI tool, indeed an important factor to consider. A tool with a low learning curve is easier to learn and use, while a tool with a high learning curve requires more time and effort.

The learning curve of Tableau can vary depending on the user's experience level with data visualization and their familiarity with the user interface.

For those new to data visualization, the learning curve may be steep whereas those with experience in data visualization and analysis will find the learning curve to be less steep. Tableau also offers a collection of online tutorials, training materials, and help documentation, which can be useful for new users or those needing to brush up on particular features.

The Learning Curve of Power BI is a steep one, and it can take a while to become comfortable with the data visualization tool. The first step to understanding Power BI is to learn the basics of the platform. This includes understanding the different components of the platform. Once the basics are mastered, users can start to explore the more advanced features of Power

BI. These features include creating custom visuals and dashboards, using Power Query to transform and shape data, and using Power Automate to automate processes. With online resources and training videos available, anyone can get familiar with the platform easily.

Comparatively, Power BI is more complex than Tableau and requires more technical knowledge and understanding of programming languages such as DAX, M, and Python for creating complex dashboards, however selecting the tool out of the two can depend on your experience level with the field.

5.4. Power bi vs Tableau: User Interface

A well-designed user interface helps users interact with the tool in an intuitive manner and understand the data quickly. If a tool is too complicated or confusing, users may quickly become frustrated and may even abandon the tool. On the other hand, a simple, intuitive UI will make the tool easier to use and will encourage users to explore and engage with the data.

The user interface of Tableau makes it easier to access and analyze data from multiple sources. Some key benefits of Tableau UI are

- It provides a drag-and-drop interface, allowing users to quickly and easily create visualizations without the need for coding.
- Tableau also offers data blending, enabling users to combine datasets from different sources for a complete picture of their data.
- The intuitive user interface of Tableau makes it easy to understand and navigate to all analysis and visualization tools conveniently located in the toolbar.
- The visualization options are available in the form of several graph types, such as bar, line, scatter, pie, and tree maps which can be applied with just a click.

The user interface of Power BI is designed to be intuitive, enabling users to quickly access and interpret data without needing to be an expert in statistics or coding. Some of the features that make UI easy are mentioned below:

- The main window of Power BI consists of different tabs, including the Data tab,

Visualizations tab, and the Dashboard tab for easy navigation.

- The user interface also includes a variety of features such as drag-and-drop functionality, a range of color palettes and fonts, and a selection of templates to help users quickly create new visualizations.
- Power BI has a simple search bar that enables users to quickly find and access the data they need for their reports and dashboards.

When comparing the user interfaces of Power BI and Tableau, it's important to note that both software offers multiple features and capabilities. However, the Power BI interface is generally seen as having a simpler user interface and workflow than Tableau.

5.5. Power bi vs Tableau: Community Support

The success of any tool is heavily dependent on the support of the community. Community support is critical for the development and advancement of tools, providing a platform for users to provide feedback and suggestions for improvement, as well as helping to build a sense of trust and credibility among users.

Tableau is an incredibly popular data visualization platform, and it has a thriving community of passionate users and supporters. Some of the stats include:

- It has over 3 million users, including over 60,000 organizations worldwide.
- The Tableau Community Forum is one of the largest and most active online data visualization forums, with over 100,000 members and over a million posts.

5.5.1 Power BI has been embraced by the tech community with tremendous enthusiasm, the stats are mentioned below:

- Power BI has grown to over 10 million monthly active users, making it one of the most popular analytics and business intelligence tools in the market. It has been adopted by large companies such as Microsoft, Walmart, and Bank of America and by small businesses and individuals.
- Power BI also has a vibrant online community of users and developers, with over 1.2 million

members on the Power BI Community Forum.

In summary, while Power BI and Tableau both have active user communities, Power BI has a larger community than Tableau according to the numbers.

5.6. Power bi vs Tableau: Data Sources

Without data sources, analytics tools would be useless as data sources provide the raw material for data analysts using an analytics tool to analyze, making it possible for seasoned data analysts using the tool to provide useful insights and recommendations to its users.

Tableau connects to a wide variety of data sources including relational databases, flat files, cloud-based sources, and cubes. Some of tableau's most commonly used data sources include:

- Relational Databases: Tableau can connect to relational databases such as Oracle, Microsoft SQL Server, PostgreSQL, and MySQL.
- Cloud-Based Sources: Tableau can connect to several cloud-based sources, such as Amazon Redshift, Google BigQuery, and Salesforce.
- Flat Files
- Cubes: Tableau can connect to cubes, such as SAP BW, Microsoft Analysis Services, and Oracle Essbase, and some additional data connectors like Hadoop, Spark, and ODBC are also present.
- Tableau also supports custom data connectors, which can connect to nonstandard data sources.

Power BI offers a wide range of data sources that can be used to create powerful data visualizations and reports. The data sources include

- Files
- Database: Power BI can connect to multiple database types, such as Microsoft SQL Server, Oracle, and MySQL.
- Online Services: Power BI can connect to many online services, such as Salesforce, Google Analytics, and Twitter.
- Web: Power BI can connect to web-based data sources such as HTML, XML, and OData.

- Azure: Power BI can connect to Azure cloud services such as Azure SQL Database, Azure Data Lake, and Azure Stream Analytics.
- Big Data: Power BI can connect to Big Data sources such as Hadoop and Azure HD Insight.

There is no exact number of supported data sources in Tableau and Power BI as new data sources are regularly added. But both Power BI and Tableau support almost equal numbers of data sources.

5.7. Power bi vs Tableau: Data Visualization Options

Visualizations are an important component of analytics tools that enable users to quickly and easily understand insights from large amounts of data making it more engaging.

Tableau is a powerful data visualization tool that enables users to quickly and easily create complex, interactive visualizations from their data. It offers a wide range of chart types to choose from including bar charts, line charts, area charts, pie charts, scatter plots, heat maps, tree maps, box and whisker plots. Some more advanced chart types like Gantt charts, histograms, bullet graphs, donut charts, waterfall charts, funnel charts, motion charts, word clouds, and Pareto charts are also supported.

Power BI offers a variety of visualization options to help you gain insights from your data ranging from basic charts to complex dashboards and reports: The basic visualization options available in Power BI include column charts, line charts, area charts, etc that allow users to explore and compare data points quickly and easily.

Power BI also offers more advanced visualizations such as maps, filled maps, ArcGIS Maps, tree maps, sunburst, funnel charts, network graphs, and Sankey diagrams that allow users to gain deeper insights into their data.

Tableau and Power BI are excellent data visualization tools both, each with their own strengths and weaknesses but Tableau is better for data exploration and storytelling, while Power BI is better for data analysis and reporting.

5.8. Power bi vs Tableau: Security

The use of a secure data analytics tool is essential for businesses today as it will provide protection against data manipulation and breaches, and help to protect sensitive information. By using a secure data analytics tool, businesses can be confident that their business data analysis used is safe and secure.

Tableau and Power BI provides a wide range of security features to help protect customers' data and ensure that only authorized users have access to their information. Some common features provided by both of the BI tools include

- **Data Encryption:** Industry-standard encryption algorithms are used to protect customer data in transit and at rest.
- **Password Policies:** Customers are required to create strong passwords that meet the latest security standards.
- **Role-Based Access Control:** Customers are allowed to set up user roles and assign them specific permissions and only the users with the right authorization level can access the data they need.
- **Multi-factor Authentication:** Multi-factor authentication is also supported for added security.
- **Granular Permissions:** Customers are asked to set up granular permissions, so users only can access the data they need. This helps to ensure the security of confidential data.
- **Data Masking:** Sensitive data can be masked so that users only see what they need to see which helps to protect against unauthorized access.
- **Auditing:** Customers are allowed to audit user activity and detect suspicious behavior.

Along with the above-mentioned features Power BI also provides a comprehensive set of threat detection capabilities to protect against malicious attacks.

Overall, both Power BI and Tableau provide strong security features to help protect data and both of them have their own range of security. Ultimately, the best tool for an organization will depend on its individual security needs and features.

5.9. Power bi vs Tableau: Sharing

Sharing of dashboards and reports to the end users is an important part of any data analytics tool.

- **Tableau** is more complex when it comes to sharing its resources. It has built-in features allowing users to publish or share their data easily. However, this feature is less robust than Power BI. In Tableau, users cannot embed reports into webpages or apps. It is limited in its data sharing capabilities, as workbooks and dashboards must be published to Tableau Server, Tableau Online, or Tableau Public before they can be shared.
- **Power BI** makes it very easy to share data with others. With Power BI, users can easily create and share reports within seconds. It allows users to publish reports to the cloud securely and enables them to embed reports into web pages or apps with ease.

Overall, both Power BI and Tableau offer powerful sharing and collaboration capabilities. However, Power BI is more flexible and offers more features for data sharing than Tableau.

5.10. Power bi vs Tableau: Customization

Customization is a key feature of any data analytics tool as it allows businesses to modify the tools to their specific needs and objectives. Enhanced Customization capabilities in the tools can help businesses to gain a better understanding of their customers, identify trends and patterns in their data, and improve their overall efficiency.

Tableau provides several customization capabilities listed below:

- **Custom Views:** Users can easily create custom views of their data and can also save them for easy access.
- **Filters:** Using tableau users can easily create custom filters to dynamically adjust the data in their visualizations.
- **Parameters & Calculations:** Custom parameters & Calculations to adjust data dynamically can be created.
- **Color Palettes, Legends & Shapes:** Custom color palettes, legends, and Shapes for your visualizations can be created to make them look more visually appealing.

- Annotations: Annotations to the visualizations can be created to provide additional context for better user understanding.
- Tool-tips: Custom tool tips to provide additional information when hovering over data points can also be created.
- Drill Down: Custom drill-down paths to quickly explore data points in more detail can also be created.

Power BI has a variety of custom visuals, including pie charts, bar charts, and line graphs, as well as custom formatting options for each visual. Some of them are mentioned below:

- Data Visualization: Custom visuals, slicers, charts, etc can be created.
- Data Exploration: Drill-down, filter, and drill-through capabilities can be created to cater to specific user needs.
- Dashboards: Interactive and visual dashboards with a variety of customizable widgets can be created.

Overall, Power BI and Tableau offer powerful customization to meet user needs. However, Power BI may be better suited to those who need to quickly and easily create visuals and reports and Tableau may be better suited to those who need more detailed and complex customization.

5.11. Power bi vs Tableau Machine learning

Machine learning capabilities within analytics tools are becoming increasingly important as it allows for faster and more accurate analysis of data, which can give organizations valuable insights into customer behavior, market trends, and operational performance.

Tableau is a popular choice among data scientists and business analysts who need to identify trends and patterns in their data quickly. Tableau can use machine learning algorithms to create predictive models and forecasts. Tableau's machine learning capabilities are powered by the Tableau Machine Learning Platform, built on top of the Python programming language.

It includes a variety of supervised and unsupervised algorithms. Examples of supervised algorithms

include random forests, decision trees, k-nearest neighbors, and support vector machines. Unsupervised algorithms include clustering algorithms such as k-means and hierarchical clustering.

Power BI enables data professionals, scientists, and analysts to perform predictive analysis, create sophisticated visualizations, and develop AI-powered solutions. Using Power BI, data science professionals can create machine learning models based on data from multiple sources. In power BI, a user can use decision trees, linear regression, and other algorithms to create a machine learning model, the model can then be used to predict future events or trends.

5.12. Power bi vs Tableau Certifications

Tableau offers a variety of certifications to help individuals demonstrate their knowledge and skills in the Tableau platform. These certifications are recognized by employers, organizations, and institutions globally to showcase that the users are capable of using the Tableau software for analytical solutions. Some of the certifications provided by Tableau are mentioned below:

- Tableau Desktop Specialist certification
- Tableau Server Administrator certification
- Tableau Server Qualified Associate certification
- Tableau Desktop Qualified Associate certification
- Tableau Prep Builder Qualified Associate certification
- Tableau Server Certified Professional certification

The certifications offered by Power BI range from the Microsoft Certified Solutions Associate (MCSA) to the Microsoft Certified Solutions Expert (MCSE) and the Microsoft Certified Professional (MCP). The details for each certification are mentioned below:

- The MCSA certification is the most basic certification and is designed for individuals who are just starting out in the field of data analysis and visualization.
- The MCSE certification is the highest level certification and is designed for experienced professionals who want to be certified in the use of Power BI.

- The MCP certification is more focused on the technical aspects of Power BI, such as data modeling, data mining, and developing Power BI solutions.

5.13. Programming Language Support

Tableau is available in multiple programming languages, allowing users to access and manipulate data visualization tableau in a variety of ways. Some programming languages supported by Tableau are Python, R, C++, and C, and also supports a variety of other languages, such as MATLAB, SAS, and SQL. With these languages, users can access and manipulate numerous data points in their Tableau dashboards to create powerful visualizations and dashboards.

Power BI supports a variety of popular programming languages such as R, Python, and DAX, allowing users to create powerful and visually interactive reports. C#, and SQL are also used when creating a calculated field or metric. These languages can be used to create custom visuals in Power BI reports, allowing users to take their data analysis to the next level.

5.14. Ease of Integration

Tableau is an industry-leading data visualization platform that makes it easy to integrate data from various sources. Tableau's integration capabilities make it easy for users to access and visualize data from a variety of sources. It offers a REST API, allowing users to easily embed Tableau visualizations in their web applications. This makes it easy to integrate Tableau into existing applications, allowing users to create powerful visualizations without the need to write any code. Tableau's powerful integration capabilities make it easy for users to quickly and easily connect to their numerous data sources and create meaningful visualizations. This helps users gain deeper insights into their data and make more informed decisions.

Power BI integrates with other Microsoft applications like SharePoint, Teams, Outlook, etc with ease. This means users can easily link and combine data from these other applications to create powerful insights in Power BI.

Overall, the ease of integration with Microsoft in Power BI makes it a great choice for businesses that are completely working with Microsoft Services

5.15. Supported Machines

Tableau is supported in various machines, including Windows, Mac, and Linux. For Windows, Tableau Desktop and Tableau Server are supported till Windows' latest version and Tableau Online is supported on Chrome, Firefox, Internet Explorer, Edge, and Safari.

Power BI is supported on Windows but the application is not compatible with Mac OS. This can be a hassle for organizations where apple machines are being used.

6. Advantages of Power BI and Tableau

6.1 Following are the benefits of Tableau and Power BI:

6.1.1 Power BI Advantages

6.1.2 Price:

- Power BI offers various features and services at a rate of \$10 per user per month. Power BI Pro provides access to the full suite of Power BI features, as well as integration with Microsoft Services such as Cortana, enabling voice-based queries.

MSFT integration:

Power BI is compatible with all Microsoft products, such as Azure and Office 365, providing users with seamless operation.

Ease of use:

- Power BI is user-friendly for novices, thanks to an interface resembling Microsoft Excel. Additionally, it incorporates the DAX query language, allowing users to type queries in plain English and execute them on datasets.
- ETL/Discovery suite:
- Power BI offers a powerful set of tools for ETL compared to Tableau. Data preparation takes up 90% of a reporting project, and Power BI can build reporting data marts without the need of outside software.

7.1 Tableau Advantages

7.1.1 High performance:

- Tableau offers exceptional visualization and data transformation, plus rapid advanced analytics on big datasets. This advanced performance gives it an advantage over other Data Analytics tools.
Multiple data source connections:
- Tableau links to Hadoop, DB tech, SAP and BigQuery to facilitate better data analysis and reporting. This ensures more accurate information, enabling better decision-making. Tableau also utilizes Python and R for complex table calculations, avoiding any drops in performance.

6.1.3 Thriving community and forum:

- Tableau fans collaborate and share insights and resources on the community forum, helping new users learn data parsing and reporting. Experienced users provide valuable assistance, helping anyone with Tableau-related issues.

6.1.4 Mobile-friendliness:

Tableau offers both Android and iOS mobile apps, offering users convenient access to their statistical data. All the features available on Tableau Desktop are also supported on the mobile apps.

Disadvantages of Power BI and Tableau

Let's now shift the focus to the drawbacks of these tools.

7.1.Power BI Disadvantages

Table relationships: Power BI often struggles when dealing with data containing intricate connections to other tables. To ensure data models are built correctly, unique fields must be implemented specifically for joining tables.

User interface: Power BI's interface is dense; its many icon options can impede the visibility of reports and dashboards. Additionally, Tool-tip lacks robust features.

- **Compatibility with iOS:** Power BI is not available for Mac desktop users. To access Power BI on an iOS device, it must be installed on a virtual machine.

- **Limited Excel integration:** Power BI offers great Excel integration, but data downloads are capped at 150,000 rows, which can be restricting.

Power BI is a great tool for data analysis and its data visualization capabilities, with more benefits than drawbacks.

7.1.2 Tableau Disadvantages

- **High cost:** Tableau has a lower price point than BI giants such as IBM and Oracle, however its license is more costly than its competitors, such as Power BI. This can be relatively affordable for large organizations, but may prove to be too expensive for smaller companies for whom budget is a key consideration.

Tableau requires substantial investment in implementation, maintenance, and staff training in order to yield effective analysis. Therefore, it is well-suited for organizations capable of covering the licensing cost.

- **Steep learning curve:** Tableau requires advanced data analysis skills, as well as proficiency in R and Python programming. Additionally, data extraction, transformation, data modeling, and visualization are manually intensive, resulting in potential data incompetency when connecting data sources to Tableau.

With Power BI, once we are familiar with the interface, we can write queries in our desired language using Power Query or add data columns to visuals via drag-and-drop.

Time- and resource-intensive staff training: Tableau is user-friendly for many operations, but complex procedures require an in-depth training program, which can be expensive and time-consuming. This is especially detrimental for smaller businesses.

- **Hard to integrate with Microsoft BI solutions:** Microsoft's BI solutions and cloud-based services are used by multiple organizations. Power BI integrates effortlessly with them to provide greater efficiency through features like Power Q&A and Power

BI Service. On the other hand, Tableau's integration with products such as Dynamics 365, Microsoft Flow, and Office 365 can be time consuming due to the single sign-on process.

8. CONCLUSION

This research paper has provided a comprehensive comparative analysis of two leading data visualization tools, Power BI and Tableau. The decision between these tools should be based on the specific needs and circumstances of an organization. While Power BI offers strong integration with the Microsoft ecosystem and a variety of pricing options, Tableau excels in ease of use and extensive data exploration capabilities. Organizations should carefully evaluate their requirements and budget before selecting the most suitable tool for their data visualization and analytics needs.

The evolving landscape of data visualization tools ensures that organizations have a range of options to choose from. As the field continues to develop, it is essential to stay informed and adapt to the changing demands of data analysis and visualization.

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