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Comparative Study of BI Tools for Real-Time Analytics

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ABSTRACT

In achieved from compare the three most widely used Business Intelligence tool Tableau, Microsoft Power BI and Qlik Sense based on their real-time analytical features. The tools are assessed on their performance, interface integration capabilities, visualization modes, and expansions capabilities. Tableau got praise for superior data visualization and receptive dashboards and for the opposite course, Power BI is somewhat cheaper and tightly united with Microsoft ecosystem. Qlik Sense stands out using the associative engine for the free navigation of the data. Finally, the study summarizes the findings of the tools, strengths, and limitations to aid the various businesses to select suitable solutions.

Keywords: BI, RTA, Tableau, Power BI

INTRODUCTION

BI tools are used to help organizations settle for decisions from data in the real world, and help them decipher what that means. Today there are many kinds of BI tools but the most well-known and leading tools are Tableau, Microsoft Power BI and Qlik Sense. Both tools provide distinct functionalities for real-time analysis, making the business to obtain insights from their data in real-time. The purpose of this comparative work is to compare and assess these three tools in terms of capacity, usability, interoperability, and adaptability to different business contexts.

LITERATURE REVIEW

A review of literature on real-time Business Intelligence (BI) tools and applications presents an emerging area of concern, a need to incorporate BI to aid real-time decision-making needs of businesses in different fields. Barely, real-time analytics means analysing data as soon as possible when it is generated, which helps organizations make instantaneous decisions for strategic purposes. With advancing data storage and types, companies are seeking more rapid and efficient methods of data analysis in the present moment (Bharadiya, 2023). This change has affected BI tools in ways that has shifted BI from tools that predominantly used batch processing to more real-timing tools.

Traditionally, BI tools were used to address the problem of processing and analysing large amounts of data and presented reports on an occasional basis. These tools helped decision makers to begin to obtain brief aggregate historical information, however, decision making based on them was possible only through history, and not through vision. However, use of cloud computing, big data, and Internet of Things (IoT) make it possible to process data in streams as is, increasing demands for real/ near real-time BI solutions.

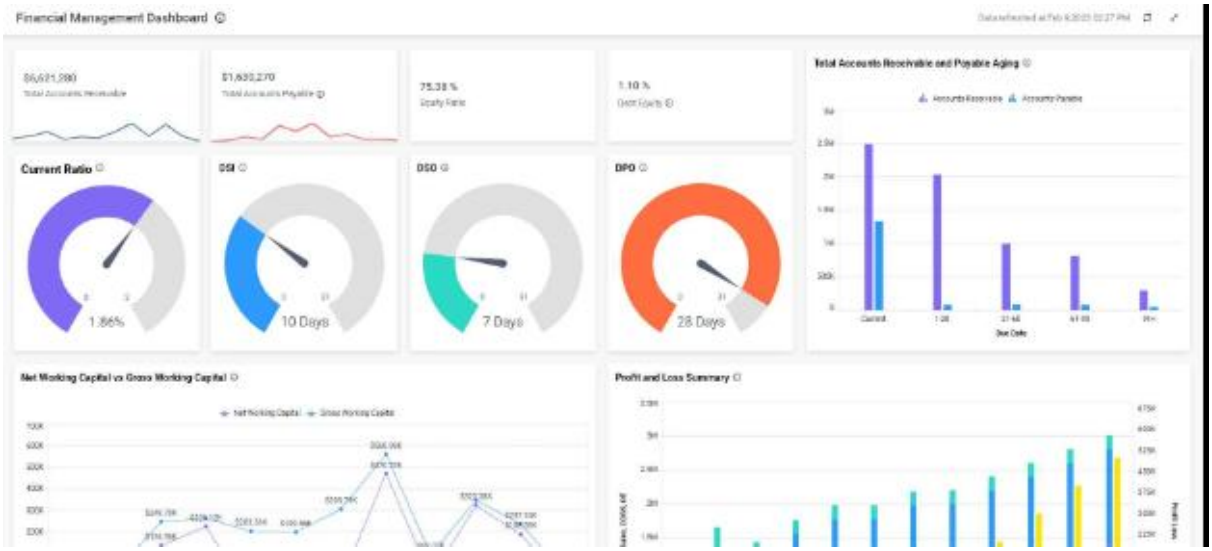

Figure 1 Real-Time Analytics (Bold BI, 2023)

Real-time analytics is adopted because of the rising demand for competitive operations among businesses operating in volatile environments. For instance, in financial services such as banking and insurance, technology such as; real time data analytics can make business processes easier, customers relations better and operations more efficient in sectors such as; healthcare and e- commerce. In finance especially banking, real-time analytics is applied in fraud detection, market analysis and risk management. In general, real-time information is critical in the provision of healthcare services and patient care, timely updates on the availability of products, the dynamic pricing of products, and sends relevant content and services to target clients.

Real-time analytics brings the issues of the volume, velocity and variety of the data received. Being able to process vast versions of data in real time is also a prerequisite for BI tools due to the huge influx of data from various sources including social media, transactional databases or IoT devices. Frequently, it becomes critical as the statistic information to analyse flows with a petabyte scale without any delays (Majid et al., 2024). Therefore, current BI tools distinguish the ability to process such data flows, using Apache Kafka and other technologies, Apache Spark, and real-time databases designed for receiving continuous data.

Hyping up adoption of BI has been made easier by integrating artificial intelligence or machine learning in accepting and analyzing actual-time information. The opportunities include the employment of the mentioned technologies that can help to analyze the patterns and trends of the data and provide proactive decision-making alternatives. Probabilistic algorithms included in BI software can process massive amounts of data in real time for fast forecasts and recommendations and issue alerts to the deciders. This is especially useful where issues such as identification of a shift in the market or responding to operational oddities requires quick decision making.

Figure 2 Amazing Real Time Power BI Project (Youtube, 2023)

A characteristic of a number of new-generation tools used in real-time business intelligence is the fact that they are capable of generating visualizations that reflect changes in data. The legacy BI solutions mostly involved installation of reports and key performance indicators and real time analytics requires a solution that changes as soon as there is new data coming in. This entails such features as the ability to query data in forms of dynamic visualizations like an interface that enables users to manipulate data in a number of ways and view details of specific elements on a click (Nwosu, 2024). Since data is viewed and interrogated in real-time the current state information is what the decision makers are working with which is powerful in high velocity environments.

Another important factor they bear in mind is how these tools can be connected with the other systems of the business. For instance, tools for real time data analytics must be fully integrated with the Customer Relationship Management (CRM), Enterprise Resource Planning (ERP) and other data applications of the organization. This integration helps to ensure that the analytic results gained through real time actualization are useful and can be implemented without delay. Nonetheless, the use of real-time analytics tools to work collaboratively with traditional enterprise systems poses the

problem. These systems may not have incorporated to deal with the high speed and the high volumes of data for real-time analysis hence subject to upgrade or outright replacement.

A third relevant factor towards the implementation of BI tools for real-time analysis is cost. Some of the problems that many organizations, especially those of a more modest size, encounter when attempting to adopt real-time analytics include the fact that these tools are expensive to buy and implement and therefore require a substantial initial outlay to obtain. But there are undoubtedly many advantages in having such means of real time analytics as enhanced decision making, business performance, and consumer satisfaction which tips the balance when considering the costs. Latest trends in BI technologies include cloud-based BI solutions due to noncentralized requirements for a large infrastructure investment and the possibility to expand usage of BI technologies following corporate needs. Real-time analytics tools are becoming more popular due to cloud platforms and are available in Microsoft Power BI, Tableau and Google Data Studio, among others.

However, there are also some problems of using real-time analytics which are described below. The issue of data quality is especially important, since real time data typically originates from various sources, making it challenging to maintain data integrity. Some of these include data cleansing and transformation that are so vital in data quality and should therefore form part of the real-time analytics flow (Tavera Romero et al., 2021). Also, real time analytics should be able to accommodate bursts of data intake meaning that, at certain times the stream of data is higher than others but tool should handle this without deteriorating its performance or reliability of insights produced.

Several trends about the future of BI tools for real-time analytics can be reported based on the literature as follows. Among recent trends one can mention the growing popularity of owning and using cloud solutions as well as SaaS offerings. On the same note, the use of cloud-based BI tools means that organizations can get real-time analytics, and without having to spend significant resources in physical infrastructure. Just as we have seen in other advanced areas, there is the growing application of AI technology and its subset ML in real-time analytics for insightful decision-making. Moreover, the progression of IoT devices as connected entities over a more extensive range of applications will incrementally spur the need for real-time analytics with growing dependence on intelligent things as creators of data that must be analyzed in real time.

Real time analytics is now a pivotal factor in numerous strategies across companies today. With today's organizations citing the need to adopt an analytical environment for decision making, there has been a growing call for BI tools capable of processing real time data (Tsiu et al., 2024). Based on the literature, such tools change frequently reflecting that AI and cloud computing started to integrate into these tools to give faster and better results. There is no doubt that real time analytics comes with a number of challenges concerning data quality, system integration and cost hence why it should be considered as a key capability for business that wish to survive in the current highly technological world.

Overview of BI Tools Selected for Comparison

In this comparative study, we focus on three widely used Business Intelligence (BI) tools: The other popular tools were Tableau software, Microsoft Power BI, and Qlik Sense. These tools have been chosen based on the popularity of these tools in the industry, as these provide real-time analyses of the varied business demands.

Tableau is celebrated for its functionality in data visualization, enabling the creation of stunning dashboards from raw information earning the software a place among the most sought-after business intelligence tools. It lets the users develop live dashboards and reports that they can use to make faster decisions in the company. Due to its characteristics to process great amounts of data and offer nice graphics and friendly interface, Tableau is used in finance, healthcare, and retail businesses.

Additionally, Microsoft Power BI interacting with the Microsoft ecosystem is a rather powerful tool for data analytics and real-time reporting. It also allows for data consolidation from different sources such as cloud storage, databases and on-premise application (Torres et al., 2021). The major advantage of Power BI is its relatively low price and open access, which will be attractive to both small businesses and large enterprises that already work with Microsoft Office tools, including Excel and Azure. This also gives real-time or current status on the reports and has an option of setting the reports to address business needs.

Qlik Sense belongs to BI tool solutions which makes a heavy emphasis on self-service and associative data modeling. Its span is the initiative associative engine where the user can look at the data from different perspectives and find some hidden connections, being able to make decisions based on the numbers in no time. Despite of performing real-time data analysis, Qlik Sense has advanced data visualization capabilities and would be suitable for business organizations who are interested in combining intensive data analytics with ease of use. To this effect, its tight coupling with cloud platforms and other enterprise systems is also a plus.

Each of these three BI tools presents specific features that target a certain area of interest within organizations to serve as the foundation for evaluating the tools' real-time performance.

Comparative Analysis of BI Tools for Real-Time Analytics

When considering the options of real-time analytics namely Tableau, Microsoft Power BI, and Qlik Sense, many features must be considered which include; speed, integration, user interface, scalability and cost. These tools vary by how they work with and present data streaming to them in real-time, to be useful for different purposes in the organization.

Tableau is designed with unmatched ability to operationalize data. It is a tool for creating appealing and engaging scheduled and real-time updating dashboards (Hosen et al., 2024). The connectivity feature which allows the software to access data from cloud as well as the local database supports the real-time data transfer necessitated for dynamic analysis. Tableau is great for using big volumes of data and creating intricate graphics; however, the problem arises when it has to work with very vast data volumes in real-time contexts. With high levels of system resources to perform to their optimum, they might not be very helpful to small businesses without good computational power. Tableau also has a feature of live data that has real-time analysis, but they may be a little complex, or rather require technical knowledge to set up.

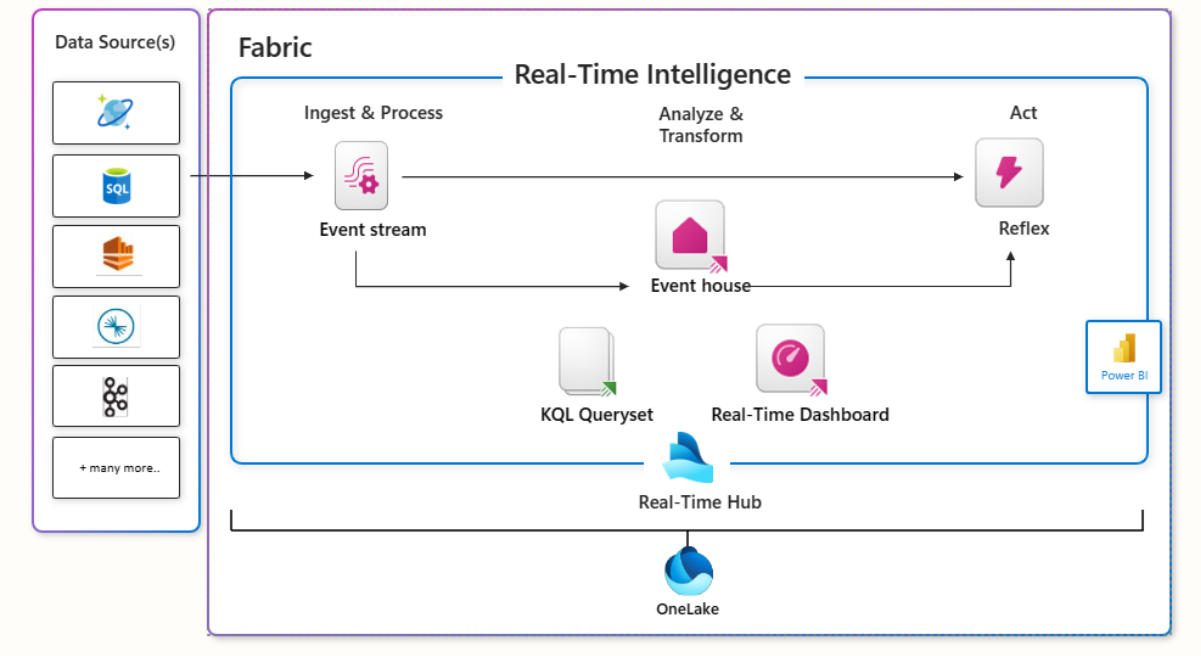

Figure 3 What is Real-Time Intelligence (Microsoft Learn, 2023)

Microsoft Power BI, in contrast, offers smoother entry for businesses and especially if the business already using Microsoft products and tools. It also works well with Azure, Office 365, SharePoint, among other applications which makes the tool suitable for companies that use them often. In Power BI, the update of data sources in a dashboard is made easy by the application's connectivity to many data sources such as Excel, cloud services, and databases. It can stream data with the help of which users can come up with the real-time reports with the help of which original reports can be updated every time it is necessary (Gupta & Jiwani, 2021). Regarding the pricing, Power BI is cheaper than Tableau, this apps is suitable for SMB companies. Although it provides strong real-time analysing capability, data representation and the ability to add personal touch to the program is not as strong as it is in Tableau.

The various features make Qlik Sense have a unique selling proposition with the associative engine that offers detailed insights about related information during analysis. The tool enables fast and versatile analysis and querying of the data and also enables one to view the insights from as many angles as possible although data is ever being updated. Qlik Sense does support databases that are both on-premises and cloud based thus its perfect for enterprises due to the flexibility in scaling up. Its data processing is quite live with the feature of live data connectors allowing display of current real-time data in the dashboards. However, it can make more difficulties for getting used by the users who are not familiar with associative model of Qlik Sense and its UI seems to be not very stylish compared with Tableau that may influence the willingness of using the tool among the groups that are not very technological.

When it concerns scalability, there are often more significant enterprise-level products like Tableau and Qlik Sense that initial handled with large datasets and multiple user connections. As mentioned above, Power BI is an inherently scalable tool, but its performance declines as the amount of data increases, making it more appropriate for

organizations ranges from small to the mid-level. Last but not least, the price Scotsman compared the prices of these tools with each other, and stated that Power BI was the most economical and justified the cost of its distribution for small businesses and those with a limited budget (Gajera, 2023). However as compared to Tableau and Qlik Sense, while encompassing higher levels of features and scalability, have a slightly higher license cost and therefore may not be that practical to be implemented in mid and small sized businesses.

Both Tableau, Power BI, and Qlik Sense have excellent real-time analytics; any of them will work depending on the business requirements of an organization. Tableau has a brilliant data visualization feature and effective in dealing with BIG data but may be costly. Power BI is cost-effective and rather easy to use when you are using Microsoft solutions, but it may seem not so rich in features and functionality as Tableau. In this recommendations, Qlik Sense has the associative engine and free data discovery that differentiates fro the competitors, can serve as better for businesses looking for more analysis in the data; nonetheless, the user navigator and the natural complexity of absorbing the product can pose opportunity.

DISCUSSION

Real-time analytics comparative assessment of Tableau, Microsoft Power BI, and Qlik Sense demonstrate opportunities and constraints based on application preferences (Colmenares-Quintero et al., 2021). Some of the tools provide different features thereby having different capacities on handling real time data processing, visualization and integration. These tools should therefore be evaluated regarding the data requirements, technological capability, cost, and growth capacity of an organization.

Tableau, for example, specializes in superior data visualization and extent of interactivity and visually appealing dashboard. Hive is particularly popular with users that would like to use more advanced graphical visualization, like in marketing and finance where it is necessary to visually analyze the source data to make a decision. Nevertheless, the effectiveness of the application may be questionable in cases of usage with large data sets or real-time streaming data. The platform demands significant system permits and could need further parameters to handle actual-time data conveniently. Overall, organizations having expertise and infrastructure to cope with Tableau resource needs it continues to be an adequate tool for real-time analysis especially where high level data display is needed.

Whereas to the contrary Microsoft Power BI is a tool which is more affordable and within the reach of mid-size organization (Pattyam, 2021). Microsoft Excel integration, Azure compatibility, allows for direct data connection, it is perfect for businesses that are already a part of Microsoft environment. One of the biggest advantages of Power BI is that it enables the real time update of the dashboard data as new data is produced by a business. Although it does provide somewhat reliable real-time data access and – to some extent – the ability to visualize the data, it's significantly weaker in terms of customization capabilities of Tableau. Furthermore, it is reported that relative to systems such as Tableau or Qlik Sense, Power BI might not perform well operations with large data volumes; this aspect can be a concern to an organization, especially one that requires high frequency data analysis.

Qlik Sense has a particular analytic engine that enables users to navigate through the data sources in a more linear manner than their counterparts' enabling organizations that are in search of higher value from their data to consider it. This engine helps to explore data as fast as possible and make real time as natural as possible for the user which may not have background knowledge about the query-based systems. Nonetheless, Qlik Sense does not have a polished user interface as Tableau does; this may be inconveniences for some teams since the application's appearance is essential. Also, while working with real-time data and cloud/on-premise integrated users to Qlik Sense, one can find numerous benefits, its usage can be somewhat challenging for those who have no deep understanding of IT.

Tableau, Power BI, and Qlik Sense share generic functionality while specific differences make the choice depends only on the opportunity of the concrete business. Tableau is well suited for people who want to get even more advanced and well-scalable visualizations but it would be more appropriate for people who know how to work with much more technical tools. For the small businesses or the ones already in Microsoft ecosystem it is much more cost effective and easy to use than Tableau (Lennerholt et al., 2021). Qlik Sense offers exceptional data discovery and dynamic analytics and can be complex in terms of user adoption because of its engine and design. These aspects that have to be consider in order to select the adequate tool to support the strategic goals of an organization.

CONCLUSION

These three; Tableau, Power BI and Qlik Sense offer very critical tools on real-time business analytics with strengths suitable for the respective business environments. Tableau is ideal for data visualization especially for big data but it comes with a heavy consumption of resources. Power BI is an even cheaper and easier to use software, which is suitable for companies, already utilizing Microsoft solutions, but still, it does not possess all the functions of Tableau.

Qlik Sense further allows high level, dimensional analysis due to its associative engine but has a higher entry level complexity. Therefore, based on the technical competency of the firm, needs of the firm for data analysis, and cost factor, the tool has to be selected.

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