Optimizing Tableau for data visualization management by data analyst at Kapanlagi Youniverse

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Abstract

Backgroud: KapanLagi Youniverse (KLY) is an information institution and online media company that manages ten types of media with diverse segmentation. In this context, information management becomes crucial, especially considering that KLY has millions of users every day. One of the primary data sources is information about pageviews obtained through Google Analytics from all the websites managed. With pageviews reaching trillions, the management and distribution of data to stakeholders is essential.
Purpose: This article aims to ensure that the data team managers at KLY can make informed decisions and provide valuable insights based on the available and accurate data for their users. To facilitate the management of large and complex data, the implementation of business intelligence is critical, with Tableau Server being used as a visualization tool for pageview data. This article discusses how optimizing the use of Tableau Server can enhance the effectiveness of data management and visualization at KapanLagi Youniverse, as well as its impact on better decision-making.
Methods: This research employs a mixed approach that combines qualitative and quantitative methods to evaluate the use of Tableau Server in managing the visualization of pageview data.
Results: The findings indicate that Tableau has proven effective in conducting in-depth data analysis, allowing for interactive exploration and the identification of patterns that are difficult to uncover through traditional methods, thereby supporting more informed and timely decision-making strategies.

INTRODUCTION

KapanLagi Youniverse (KLY) is an information institution and online media company formed through the merger of PT Kreatif Media Karya (KMK) and PT KapanLagi Networks (KLN). As a media platform and information provider, KLY is integrated with its television network and digital assets, and actively engages with online media users. KLY not only delivers news but also offers services for producing creative content and articles, which are distributed through its various affiliated digital networks. According to Harizi & Trebicka (2023) a systematic review highlights that social media platforms facilitate real-time interaction, which can significantly enhance communication effectiveness and consumer perception.

KapanLagi Youniverse serves a diverse range of audience segments, generating tens of thousands of user data points daily from visitors accessing its various websites. In addition to user data, KLY also collects information on the number of articles published and the total number of views received. According to the KLY website, since 2021, the platform has averaged 113 million monthly visitors, with approximately 50,000 new content items published each month. This data is obtained through Google Analytics, which has been in use since before the KLY merger and continues to be utilized today (*KLY Statistics*, 2025). Although Google Analytics offers a wide array of features, a lack of in-depth understanding of the data can hinder managers and data teams from delivering meaningful insights to stakeholders for decision-making purposes. Mulla (2024)

argues that a structured approach to data analysis, including business intelligence and predictive analytics, can significantly enhance the decision-making process.

Many organizations still rely on manual reporting methods, which can lead to delays in decision-making and reduce responsiveness to market changes (Tirupati et al., 2024). By adopting Business Intelligence (BI) solutions such as Tableau Server, KLY can accelerate data management processes and improve reporting accuracy, thereby supporting faster and data-driven decision-making. Tools like Power BI offer customizable dashboards that allow users to explore data dynamically (Tirupati et al., 2024)

In the context of data management, BI encompasses data collection, integration, storage, processing, and presentation. Its objectives include analyzing historical data, facilitating reporting, enhancing data analysis capabilities, and providing user—friendly visualizations—such as dashboards—to support decision-making processes (Andriyati et al., 2021). Furthermore, PupuWeb (2021) adds that the use of BI tools can reduce reliance on intuition in decision-making, which is often inconsistent.

Effective BI implementation can improve the quality of decision-making and provide deeper insights into available data (Abdul-Azeez et al., 2024). This is particularly relevant for platforms like Tableau Server at KapanLagi Youniverse, where effective data visualization can accelerate information comprehension. Additionally, Abdul-Azeez et al. (2024) argue that integrating BI with visualization tools such as Tableau can help organizations

present complex data in a more accessible manner, thereby enhancing cross-team collaboration in strategic decision-making.

Effective data visualization tools facilitate improved decision-making processes by enabling users to interpret data more easily (Lousa et al., 2019). Dashboards provide visual representations of data, making it easier to identify trends and patterns that may not be immediately apparent in raw datasets. This visual aspect enhances the interpretability of complex data sets, allowing stakeholders to comprehend insights more effectively (Bai, et al., 2024).

Tableau Server is a Business Intelligence (BI) application that enables efficient and rapid data management and visualization. By using Tableau, stakeholders can easily analyze large volumes of data—reaching millions of entries. According to Zhang (2024), Tableau's ability to present data in interactive visual formats allows users to identify trends and patterns that may be obscured in raw data. Additionally, the data team at KLY utilizes Tableau Workbooks, which enable them to independently create dashboards through desktop applications licensed to each user. This provides the team with the flexibility to conduct analyses without relying on third parties.

Few (2020) explains that effective data visualization can reduce users' cognitive load and accelerate information comprehension. Tools like Tableau allow users to detect patterns and trends that may not be visible in unprocessed data, thereby supporting faster and more accurate decision-making. A study by Maaitah (2023) found that the use of BI tools such as Tableau enhances interdepartmental

collaboration. By providing a shared platform for data visualization, teams can exchange insights and make joint decisions more effectively. The use of Tableau Server enables real-time data access and improved collaboration among distributed team members. This is particularly critical in dynamic business environments where decisions must be made quickly based on the most current data (Zhang, 2024).

The use of Tableau in KLY's decision-making context is also supported by other expert opinions. Singh & Kumar Shukla (2023) state that BI tools like Tableau not only improve data processing efficiency but also foster better collaboration among teams by presenting information visually. As a result, decisions become more informed and data-driven. Furthermore, Lee et al., (2021) emphasize the importance of training and a solid understanding of the tool, as effective use of Tableau can enhance visual analysis capabilities and support more accurate decision-making. Therefore, the implementation of Tableau Server at KapanLagi Youniverse is highly relevant for improving the quality and speed of data-driven decision-making.

The research problem addressed in this study concerns the challenges faced by KapanLagi Youniverse (KLY) in leveraging user data and the analytics generated by Google Analytics. Despite having access to tens of thousands of user data points and hundreds of thousands of content items, limited understanding of this data can hinder timely and accurate decision-making. This study aims to explore how the implementation of Business Intelligence (BI) tools such as Tableau Server can enhance the quality of data analysis,

accelerate decision-making processes, and support team collaboration in responding to dynamic market conditions.

Accordingly, the objective of this research is to optimize the use of Tableau Server to improve the effectiveness of data management and visualization at KLY. Based on the aforementioned background, the central research question is: How can the use of Tableau Server be optimized to enhance the effectiveness of data management and visualization at KLY? This study seeks to analyze the effectiveness of Tableau Server as a Business Intelligence tool in accelerating and simplifying data-driven decision-making at KLY.

RESEARCH METHODS

This study employs a mixed methods approach, combining both qualitative and quantitative research techniques. The mixed methods design integrates narrative-based qualitative insights with numerical and statistical quantitative data to provide a more comprehensive understanding of the phenomenon under investigation (Dalei, 2023). The analysis utilizes qualitative techniques, and data validation is conducted through triangulation. This approach allows for the integration of data analysis, consideration of conceptual frameworks, and addressing validity challenges in research design. It enables researchers to gain both depth and breadth in understanding the research topic. The objective of this study is to evaluate the use of Tableau Server in managing data visualization for pageviews at KapanLagi Youniverse (KLY).

The research process consists of these

stages: 1) Literature review: conducting a review of relevant literature to understand best practices and conceptual frameworks related to Tableau Server and data visualization management. 2) In-Depth interviews: conducting semi-structured interviews with managers and associate managers from KLY's data team to explore their experiences, challenges, and strategies in using Tableau. 3) Data collection: gathering quantitative data related to pageviews and other relevant metrics from KLY's internal systems. 4) Data cleaning: performing data cleaning to ensure the accuracy and consistency of the information used in the analysis. 5) Implementation in Tableau: applying the cleaned data in Tableau to develop informative and interactive visualizations. 6) Dashboard maintenance: conducting routine maintenance of the developed dashboards to ensure that the displayed data remains current and relevant.

This study emphasizes the critical importance of the data cleaning phase in the analytical process, as it ensures the integrity of the information before it is visualized. By eliminating errors and inconsistencies, researchers can achieve more accurate and reliable analyses. The implementation phase in Tableau enables the KLY team to create interactive dashboards that are not only easily accessible but also support data-driven decision-making.

Through the mixed methods approach, this research aims to provide both practical recommendations for KLY and theoretical contributions to the development of BI research methodologies in the media industry. The approach is expected to yield a more comprehensive understanding

Table 1. Informant Sources for the Study

No	Name	Position	Interview Date	Initial in Article
1	IR	Data Analyst KLY	Februari 22, 2025	Informant 4
2	ABS	Head of Data Analyst KLY	Februari 23, 2025	Informant 3
3	DNa	Assosiate Manager of Data Analyst KLY	Februari 23, 2025	Informant 5
4	WAP	Assosiate Manager of Data Analyst KLY	Februari 22, 2025	Informant 1
5	DNu	Manager of Data Analyst KLY	Februari 23, 2025	Informant 2

Source: Research Data, 2025

of the effectiveness of Tableau Server in enhancing data visualization management at KapanLagi Youniverse.

The interview process involved all informants working in the Data Analyst division at KapanLagi Youniverse. The details of the informants are presented in Table 1.

RESULTS AND DISCUSSION

This section presents the findings and analysis of the study. The analysis includes interviews with data analysts at KapanLagi Youniverse (KLY) and the processing of data obtained through Google Analytics, which produced visualizations of article pageview counts since 2021. KapanLagi Youniverse utilizes two primary tools for data visualization: Tableau and Google Looker Studio. This aligns with Few's (2020) assertion that selecting the appropriate visualization tool can enhance data comprehension and facilitate better decision-making. Similarly, Knaflic (2015), emphasizes that effective visualizations help convey complex information in a more intuitive and engaging manner for the audience.

Tableau is a powerful data analysis and visualization software designed to help users transform raw data into comprehensible insights. With its intuitive interface, Tableau enables users to create various types of interactive visualizations—such as charts, graphs, and maps—that clarify patterns and trends within the data. Through its simple drag-and-drop functionality, users can easily explore their data and generate informative reports. Moreover, Tableau supports integration with a wide range of data sources, facilitating comprehensive analysis across platforms. Its ability to present data in visually appealing and easily interpretable formats makes Tableau a valuable tool for professionals across industries, aiding in more informed decision-making based on in-depth data analysis (Enterprise, 2024).

Few (2021) highlights that Tableau's strength lies in its ability to convert raw data into understandable insights. By applying appropriate visualization techniques, users can identify patterns and trends that may not be visible in unprocessed data, thereby enhancing understanding and decision-making. Ritchie dan Hariyanto (2023) Indonesia also underscore the importance of Tableau's integration capabilities with various data sources. This integration enables more comprehensive analysis and provides a fuller picture of the available data, supporting more effective decision-making.

Additionally, Panghal (2024) notes that the use of visualization tools like Tableau can improve the quality of organizational decision-making. By presenting data in an engaging and accessible format, Tableau helps professionals across sectors make better decisions based on deep analytical insights.

Knaflic (2019) states that effective data visualization can help users better understand complex information. Tableau, with its ability to create interactive visualizations, allows users to view data from multiple perspectives, thereby facilitating evidence-based decision-making. Gharakhani dan Khosravi (2022) demonstrate that Tableau's intuitive interface enables non-technical users to access and analyze data without requiring advanced programming skills. This increases the adoption of BI tools across organizations. Furthermore, Tableau's ability to integrate with diverse data sources—including databases, spreadsheets, and cloud platforms—enables more comprehensive analysis. This flexibility allows users to combine data from various origins, which is crucial in complex decision-making contexts (Huang, 2023).

Data analysts at KapanLagi Youniverse (KLY) acknowledged Tableau's significant contribution to data visualization:

> "Tableau contributes by simplifying the creation of data visualizations from various data sources into informative, interactive products that are accessible to users across the organization." (Informant 1, interview, February 22, 2025).

The use of Tableau in data analysis offers numerous significant benefits, as highlighted by experts. One of the primary advantages is its ability to present data through intuitive visualizations, which facilitates the understanding of complex information. According to Howson (2008), Tableau enables users to create interactive dashboards that are not only visually appealing but also informative, allowing users to quickly identify trends and patterns in the data. Furthermore, Tableau supports team collaboration by providing easy and real-time access to data. As Magnuson (2021), explains, the ability to share and collaborate on data analysis enhances decision-making efficiency. Thus, Tableau not only improves data comprehension but also strengthens teamwork in achieving business objectives.

Tableau is particularly helpful in managing and presenting data in a more interactive and comprehensible manner. With its drag-and-drop features, flexible parameters, and integration with various data sources, Tableau enables rapid analysis without the need for complex coding:

> "Tableau is very helpful, especially with its drag-and-drop features and flexible parameters. It allows us to analyze data quickly without needing complex coding." (Informant 2, interview, Februari 23, 2025).

As Khan et al. (2024), note, interactivity in data visualization is crucial for enhancing user understanding. Tableau's ability to present data interactively allows users to explore information dynamically, making it easier to identify patterns and relationships. Lousa et al (2019) add that the flexibility of Tableau's parameters enables users to conduct more focused and in-depth analyses, helping tailor visualizations to

specific analytical needs.

The Head of Product Data at KLY emphasized the value of Tableau in facilitating data visualization and decision-making:

> "As a lead data analyst in the media industry, one of the main challenges is increasing organic traffic by optimizing content based on data from Google Search Console, Google Analytics, Google Trends, and internal content systems. During the data integration phase, we use ETL tools to consolidate this data into the BigQuery Data Warehouse, which is directly connected to Tableau. We then use Tableau for routine performance monitoring and visualization, producing interactive dashboards that are easy for stakeholders—such as editorial, SEO, and social media teams—to use." (Informant 3, interview, Februari 23, 2025).

Zhang dan Chen (2024) state that interactive dashboards generated by tools like Tableau can provide rapid and accurate insights for decision-making. With clear visualizations, stakeholders can easily understand performance metrics and make strategic decisions based on available data. Goh (2023) also highlights that Tableau enables users to create interactive dashboards that facilitate performance monitoring. These dashboards not only enhance data comprehension but also promote better collaboration among different teams, such as editorial and SEO.

Selecting the appropriate type of visualization is essential for effectively conveying information. According to Knaflic (2019), the choice of visualization should be based on the analytical objective and the characteristics of the data. For example, bar or pie charts are suitable for categorical data comparisons, while line charts are more appropriate for time-series data. Audience considerations are also crucial, as their familiarity with the data influences how information should be presented. Therefore, careful analysis of data types and audience needs is vital in determining the most effective visualization approach:

> "The goal of data visualization is to facilitate communication, save time in reading and understanding data, and ease the process of drawing conclusions. There are many techniques for selecting appropriate visualizations, such as temporal visualizations for time-series data, cartographic visualizations for geographic data, and others." (Informant 4, interview, February 22, 2025)

The Manager of Data Analysts at KLY further emphasized that visualization choices depend on the analytical objective:

> "For example: line charts for time trends, bar charts for category comparisons, histograms or boxplots for data distribution, pie charts or treemaps for proportions, and scatter plots for variable relationships. Visualization should also be user-friendly to ensure stakeholders can easily understand the data." (Informant 2, interview, February 23, 2025)

The Manager of Data Analysts at KLY also shared a case study involving the use of Tableau for reporting article performance across various channels, sections, or other breakdown types such as content type, traffic source, and more. "With interactive dashboards, the team can quickly identify which articles have high engagement and the contributing factors, allowing content strategies to be adjusted promptly." (Informant 2, interview, Februari 23, 2025).

The Head of Data Analysts at KLY added:

> "as a data analytics team handling diverse data types from various business lines, Tableau has been extremely helpful in transforming large and complex datasets into easily understandable visualizations. In particular, the drag-and-drop feature significantly accelerates the creation of interactive dashboards without the need for coding, thereby enabling the generation of actionable insights." (Informant 3, interview, 23 Februari 2025).

Tableau performs efficiently when handling medium to large datasets, especially when the data has been optimized within a database. However, performance may decline if there are too many complex calculations or if data is pulled directly from external sources without pre-processing (Informant 2, interview, Februari 23, 2025). According to Cottam (2021), Tableau's ability to integrate various data sources and present them in a unified view enables more comprehensive analysis, which is crucial for data-driven decision-making. As such, Tableau supports KLY in evaluating monthly performance, planning marketing strategies, and setting more realistic growth targets for the upcoming year.

> "The use of Tableau is quite efficient because it can condense data presentation that would otherwise require two to three pages in other tools into a single page. However, in terms of speed, it is relative—it depends on the volume of data and the complexity of the required visualizations." (Informant 5, interview, Februari 23, 2025).

The Head of Data Analysts at KLY emphasized that the media and entertainment industry is increasingly relying on data-driven decision-making to understand audiences, optimize content, and enhance engagement. Non-technical stakeholders, such as editorial teams in the media industry, now use Tableau to monitor content performance in real time through live dashboards, enabling them to track metrics like views and engagement immediately after content is published (Informant 3, interview, Februari 23, 2025). Davenport (2007) also noted that the media industry is shifting toward data-informed decisions to better understand audiences and optimize content. The use of data analytics enables organizations to respond more quickly and effectively to changing audience preferences, thereby increasing the relevance of the content delivered.

Tableau is widely recognized as a highly effective tool for data analysis due to its ability to present information in a visual and interactive format. According to Knaflic (2019), Tableau's effectiveness lies in its ability to transform complex data into easily understandable visualizations, thereby facilitating decision-making. With its intuitive drag-and-drop interface, users can quickly create informative dashboards without requiring advanced technical skills.

In addition, Tableau supports cross-team collaboration by enabling real-time dashboard sharing. Heller (2021), noted that the ability to share and collaborate on data analysis improves organizational efficiency and speeds up decision-making. Thus, Tableau's effectiveness lies not only in its analytical capabilities but also in its ability to enhance communication and collaboration among stakeholders.

The data collection process in data analysis involves systematically gathering

relevant information, ensuring data accuracy, and applying appropriate sampling techniques. The quality of the collected data significantly influences the robustness of subsequent analysis and the insights derived from it (Sharma, 2024). Data processed from Google Analytics for the KLY website produced outputs in the form of graphs showing the number of article pageviews since 2021. The data was obtained from Google Analytics, a tool used to store all information from the KLY website. It was downloaded in Excel format and then imported into Google Sheets, where it was formatted as needed for dashboard creation in Tableau. A snapshot of the user pageview data imported into Google Sheets is shown in Figure 1.

Data cleaning is a critical initial stage in data analysis, ensuring that datasets are free from errors. This process involves a variety of procedures—both manual and automated—to prepare data for effective analysis and to enhance the performance of machine learning models (Lee et al., 2021). Data cleaning occurs during the analysis phase by identifying and reconciling errors within the dataset. This vigilance ensures high data quality, which is essential for maintaining the validity, reliability, and representativeness of research findings throughout the analytical process (Cunningham & Muir, 2023).

According to Enterprise (2024), data cleaning—or data cleansing—involves the removal or correction of invalid or inconsistent values to ensure data validity. In the development of the pageview dashboard at KapanLagi Youniverse (KLY), the data cleaning process includes detecting, correcting, and removing corrupted or inaccurate datasets, tables,
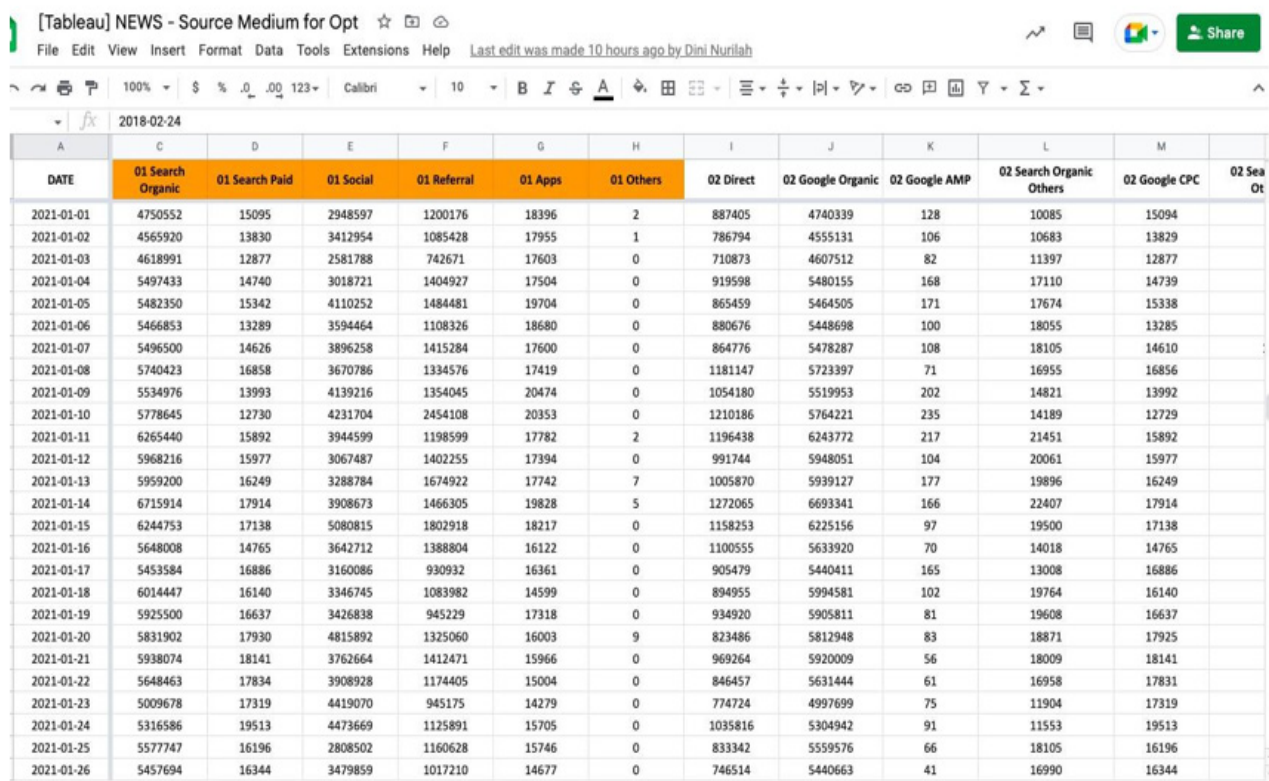

Figure 1. Pageviews by Source Medium at KLY

Source: Personal Documentation, 2022

and databases, as well as addressing data duplication. This process is essential for effective data management.

As emphasized by Adolph (2016), poor data quality can lead to flawed decisions that may harm the organization. Therefore, data cleaning involves eliminating or correcting invalid or inconsistent values to enhance data validity. In the context of building the pageview dashboard at KLY, this process is carried out by identifying and resolving issues in datasets, tables, and databases, including the removal of duplicates and corrupted records.

The data cleaning process is not solely focused on removing errors or inconsistencies; it also involves evaluating the structure and format of the data to ensure optimal alignment. For example, in the context of developing the pageview dashboard at KapanLagi Youniverse (KLY), greater attention to date formatting, consistency in measurement units, and uniformity in category labeling can significantly strengthen the integrity of the analysis. When data is organized consistently, it not only facilitates further processing but also enhances the team's ability to deliver clear and comprehensive reports. Thus, data cleaning serves as a critical initial step in the analytical process, directly influencing the accuracy of the results obtained.

Moreover, a comprehensive data cleaning procedure contributes to reducing the risk of making decisions based on flawed information. In the fast-paced media industry—where speed and accuracy of information are vital—having clean and reliable data is essential. Given the increasing complexity of data

collected by KapanLagi Youniverse, the implementation of systematic data cleaning methods enables the team to be more responsive to shifts in audience behavior and market dynamics. With high-quality data, the resulting analysis becomes more accurate and relevant, thereby supporting better decision-making and more effective strategies in content management and user engagement. Therefore, data cleaning is not merely a technical process but a foundational element for successful and sustainable analysis.

Following the data cleaning process, the dashboard was developed through implementation in Tableau. In the initial stage, the data was input via the data source interface in the Tableau application, as illustrated in Figure 2.

After the data input process was successfully completed in Tableau, the next stage involved the development of the pageview dashboard for KapanLagi Youniverse. At this stage, the processed data was further refined to produce visualizations that are both informative and easy to interpret. By leveraging various features available in Tableau, the data team was able to assemble relevant visual elements—such as charts and tables—to clearly display patterns and trends in pageviews. This process aims to provide deeper insights into user behavior and to enhance strategic decision-making.

The data visualizations created by the data team at KapanLagi Youniverse are presented in the form of informative dashboards, which can be accessed and analyzed by stakeholders within the organization. These dashboards are designed to facilitate the understanding and
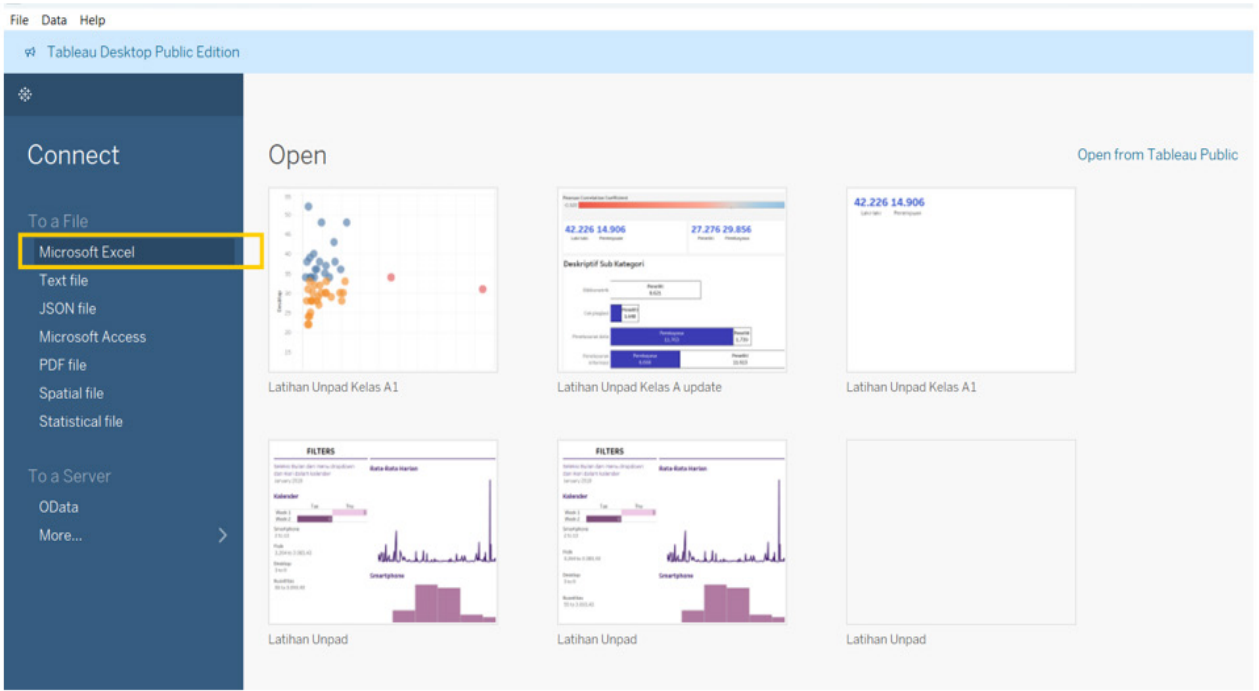
Figure 2. Data Input Display in the Data Source Table
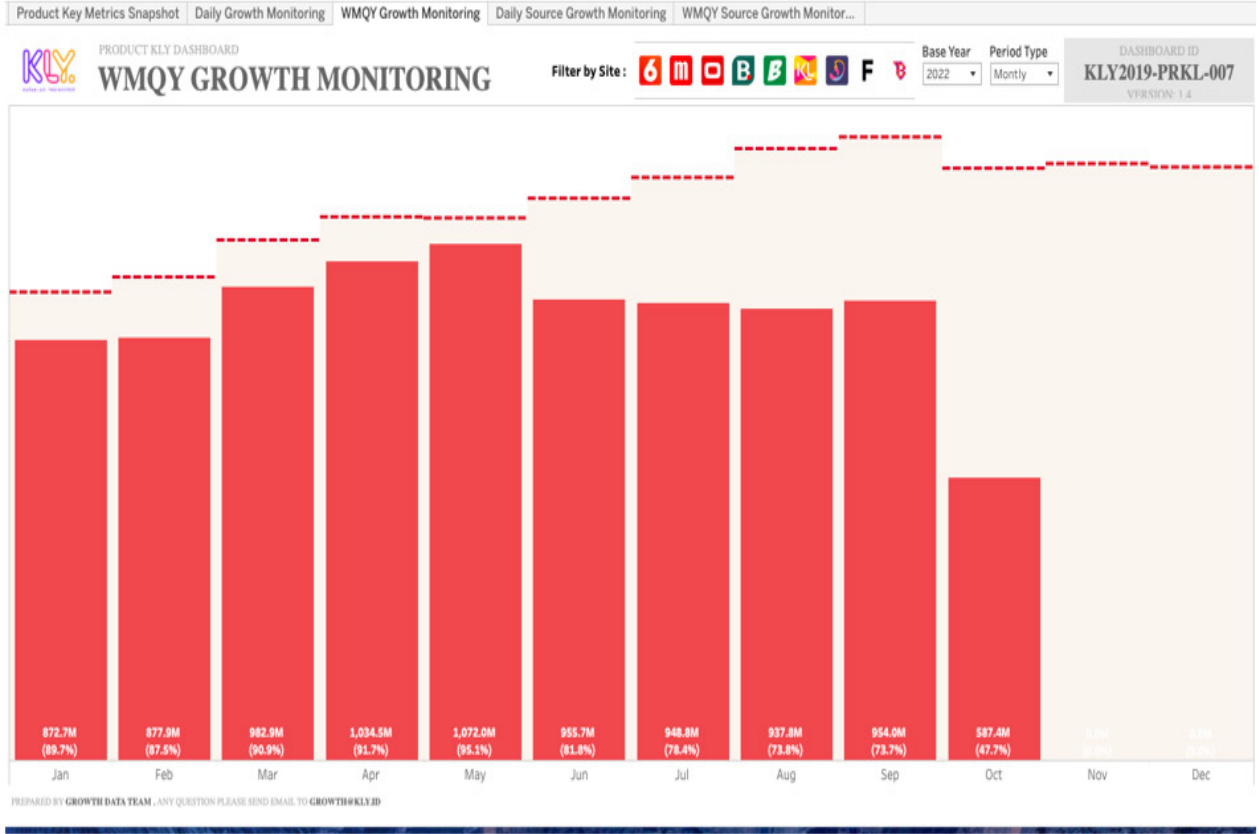
Source: Personal documentation, 2022

Figure 3. KLY pageview dashboard display since early 2022

Source: Documentation tb.emtek.co.id, 2022

interpretation of the available information, enabling users to quickly identify patterns and trends. Figure 3 illustrates this data visualization, providing a clear graphical representation of pageviews throughout 2022, and supporting more effective and efficient data-driven decision-making.

Figure 3 illustrates the progression of total pageviews across all KLY websites since January 2022. Overall, May 2022 marked the highest achievement for KLY during the year, with total pageviews reaching 1.07 trillion, although this figure still fell short of the organization's target. Fluctuations were observed throughout the year, with a significant decline in October (587.4 million). This data supports KLY in evaluating monthly performance, planning marketing strategies, and adjusting growth targets to be more realistic for the following year.

In this study, Tableau was utilized as a Business Intelligence application to generate insights and graphical representations aligned with the required data. The use of Tableau at KLY greatly facilitated the data team in performing their tasks and delivering the necessary insights. This aligns with Cao (2020) who stated that effective data visualization can enhance data-driven decision-making.

After the creation of dozens of dashboards on the Tableau Server at KapanLagi Youniverse (KLY), the next step is to maintain these dashboards to ensure they continue to deliver up-to-date data. This maintenance is essential to ensure that the information presented remains accurate and relevant. According to Few (2021) effective dashboard maintenance involves not only updating data but also periodically

evaluating the dashboard's relevance and usefulness. This helps organizations remain responsive to changing user needs.

Dashboards must be updated regularly to reflect the latest data and ensure that users have access to accurate information for decision-making (Goh, 2023). Implementing validation checks—such as manual reviews or automated data quality assessments—can help maintain the integrity of the data presented in dashboards (Wang et al., 2023). Additionally, attention should be given to the frequency of updates and the methods used in dashboard maintenance to ensure continued relevance and accuracy. By implementing an effective monitoring system, the KLY team can conduct regular audits of the displayed data. This includes routine data audits and the use of automated tools to detect anomalies or inconsistencies. These steps not only enhance the reliability of the information but also build user confidence that decisions based on the data are accurate and well-founded.

KLY data management involves handling millions of data points daily through continuous monitoring and maintenance of dashboards. This process is expected to deliver the information users need effectively. Adolph (2016) stated, efficient and systematic data management is key to generating insights that are valuable to users. Furthermore, according to the Data-Driven Decision Making theory (DDDM) proposed by Provost dan Fawcett (2013), decisions based on data analysis can improve decision quality and reduce uncertainty in business processes. This approach encourages organizations to treat data as a strategic asset in decision-making.

By adopting this approach, KLY can ensure that the data presented is not only accurate but also relevant and reliable for decision-making. Additionally, the Big Data Analytics theory described by Provost dan Fawcett (2013) emphasizes the importance of analyzing large-scale data to identify patterns and trends that can yield valuable insights. By applying these principles, KLY can enhance the effectiveness of its data management and support better decision-making.

CONCLUSION

This study demonstrates that the use of Tableau Server as a Business Intelligence tool at KapanLagi Youniverse (KLY) is highly effective in accelerating and simplifying the development of data-driven decision-making processes. With its capabilities to integrate various data sources, create interactive dashboards, and provide intuitive visualizations, Tableau Server facilitates more efficient data analysis and cross-team collaboration. This enables KLY to quickly identify patterns and uncover new insights, allowing for more accurate and consistent strategic decisions. However, it is important to note that this study focuses on a single organization, and therefore, the findings may not be generalizable to other contexts. For future research, it is recommended to explore the use of other Business Intelligence tools and assess their effectiveness across different industries or organizational settings.

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