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Application of Business Intelligence Using Tableau in Visualizing New Student data

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Abstract

Business Intelligence (BI) has become part of an institution's strategy in formulating, deciding and implementing policies. Of course this is because Business Intelligence (BI) makes it easier to analyze existing data, including in universities such as UHAMKA. This research aims to apply Business Intelligence (BI) using Tableau in visualizing new student data of Universitas Muhammadiyah Prof. Dr. Hamka (UHAMKA) in 2023. This research methodology includes several main stages, data collection from UHAMKA's academic information system, data preparation through cleaning and transformation, using Tableau to create interactive visualizations, and analysis of visualization results. The results show that the use of Tableau is able to produce informative and easy-to-understand visualizations, which help in identifying study program preferences, enrollment trends, and demographic profiles of new students. The distribution of new students shows that the S1 Psychology, S1 PGSD, and S1 Management study programs are the top choices, while the D3 Accounting study program has a very low number of applicants. This research concludes that the implementation of BI using Tableau provides significant benefits in the management and analysis of academic data, supports better decision-making, and improves operational efficiency and effectiveness at UHAMKA.

Keywords: *Business Intelligence, Tableau Software, New Students, UHAMKA*

1. Introduction

In the ever-evolving digital age, data has become one of the most important assets for organisations in various sectors, including education [1], [2], [3]. Data generated by educational institutions, such as new student data, academic data, and other operational data, has great potential to support strategic decision making [4], [5], [6]. However, a major challenge facing many institutions is how to effectively manage and utilize such data to generate useful information. Prof. Dr. Hamka Muhammadiyah University (UHAMKA) is one of the Muhammadiyah universities that already has a solid information system architecture characterized by the implementation of Cloud Computing-based IT Architecture [7]. Prof. Dr. Hamka Muhammadiyah University (UHAMKA) is one of the universities in Indonesia that is committed to continuously improving the quality of education and services provided to students. Every year, UHAMKA admits hundreds to thousands of new students from various backgrounds. Data regarding these new students includes demographic information, school of origin, chosen study program, and more. Good data management not only helps in administration and operations, but also in strategic planning and education quality improvement.

Historically, student admission and academic management processes have often been based on the experience and intuition of decision-makers. However, this approach is often sub-optimal as it is not supported by solid data and in-depth analysis. With the development of BI, educational institutions now have access to sophisticated tools that allow them to collect data from various sources, including online enrollment, academic management systems, and student satisfaction surveys. This data can be processed and analyzed to identify trends, such as the most in-demand courses, demographic characteristics of prospective students, and factors that influence enrollment decisions [8],

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[9]. Business Intelligence (BI) is a technology solution designed to help organizations collect, store, and analyze data to support decision making [10], [11]. One of the popular Business Intelligence tools is Tableau, Tableau is known for its ability to visualize data interactively and intuitively. With Tableau, complex data can be turned into easy-to-understand visualizations, such as graphs, charts, and interactive dashboards [12], [13], [14]. This allows decision makers at UHAMKA to gain deeper insights and make better decisions based on available data.

The application of BI using Tableau in visualizing new student data at UHAMKA in 2023 is expected to provide various benefits. With clear and informative data visualizations, universities can identify patterns and trends in new student data, such as distribution by study program, school of origin, and enrollment trends from year to year. This information is crucial in capacity planning, curriculum development, and marketing strategies. In addition, the application of Tableau is also expected to increase efficiency and effectiveness in data management. With the ability to integrate data from multiple sources and update data in real-time, Tableau can help UHAMKA to always have accurate and up-to-date data. This is especially important in the dynamic and ever-changing educational environment.

Overall, this research aims to apply Business Intelligence using Tableau in visualizing UHAMKA's new student data in 2023. Thus, UHAMKA can optimally utilize existing data to support better decision making and improve the quality of educational services provided to students.

2. Research Methodology

This research methodology describes the steps taken to implement Business Intelligence (BI) using Tableau in visualizing UHAMKA's new student data in 2023. The research stages include data collection, use of Tableau, and analysis of visualization results [15]. Research flowchart can be seen in Figure 1.

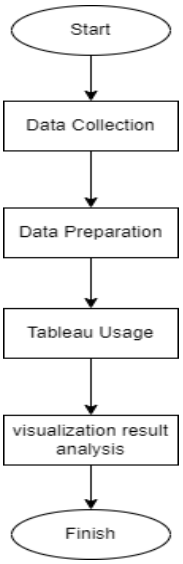

Figure 1. Flowchart of Research Stages

Based on the research flow chart, start this stage marks the start of the research process. At this stage, the objectives and scope of the research are determined, and initial preparations are made to ensure the smooth conduct of the research. Data Collection in the data collection stage, data on UHAMKA's new students in 2023 was collected from available sources, such as UHAMKA's academic information system. The data collected includes study program, gender, age, and other relevant information. Data Preparation the

data preparation stage involves several steps to ensure the data collected is ready for analysis. These steps include, data cleaning, checking the data to find and correct any errors or inconsistencies, such as duplicates, missing data, or invalid values. Tableau Usage at this stage, the prepared data is imported into Tableau to create visualizations. These steps include, importing Data: Importing the prepared dataset into Tableau. Visualization Creation, creating various data visualizations, such as bar graphs, interactive maps, line graphs, and pie graphs to present new student data. Data Analysis, using visualizations to analyze data, identify patterns, trends, and anomalies. Visualization Result Analysis the visualization result analysis stage involves evaluating the visualizations that have been created and interpreting the information obtained. These steps include, Visualization Evaluation, assess the quality and effectiveness of the visualization in conveying information. Evaluation criteria include clarity, accuracy, and ease of interpretation. Data Interpretation, using visualizations to identify patterns, trends, and important insights that can be used to support strategic decision-making at UHAMKA. Finish the final stage marks the completion of the research process. At this stage, conclusions and recommendations are drawn based on the results of the visualization analysis. This research is expected to provide valuable insights and support better decision-making at UHAMKA. This research is also expected to be a reference for other educational institutions that want to apply Business Intelligence in managing their academic data.

3. Results and Discussion

In this section, we will describe the results of UHAMKA's 2023 freshmen data visualization created using Tableau and discuss the key findings of the analysis. The resulting visualization will help in understanding the profile of new students and support better decision-making at UHAMKA. The dashboard design process begins with determining the purpose and needs of the dashboard to be created. In this case, the goal is to develop a dashboard that displays new student admissions.

3.1. Entering Data into Tableau

After finding the appropriate dataset, the next step is to download the data from UHAMKA academic information system and import it into Tableau. Tableau supports various data formats, so the author ensures that the downloaded data is in a format that is acceptable to Tableau, such as CSV or Excel. The data was then cleaned and prepared for further analysis in Tableau. The main page of the tableau application can be seen in Figure 2.

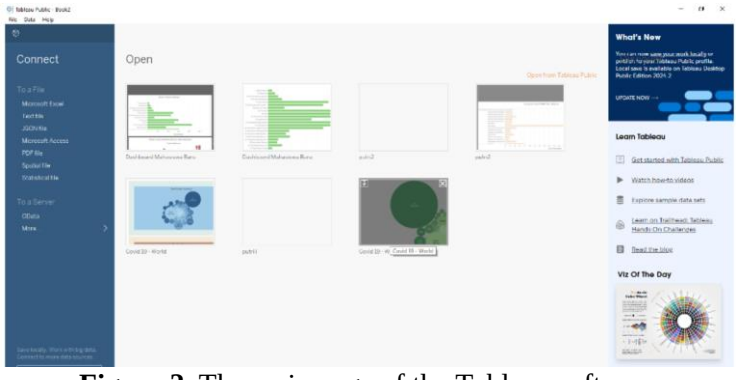

Figure 2. The main page of the Tableau software

3.2. Create Sheet

With the data imported, the author started creating sheets in Tableau. Sheets are where individual visualizations are created. The author created various sheets that display different visualizations such as maps, bar graphs, line graphs, and tables. Each sheet was

designed to display a specific aspect of the data, such as the number of applicants per university, the demographic distribution of students, and enrollment trends. The view of creating a sheet can be seen in Figure 3.

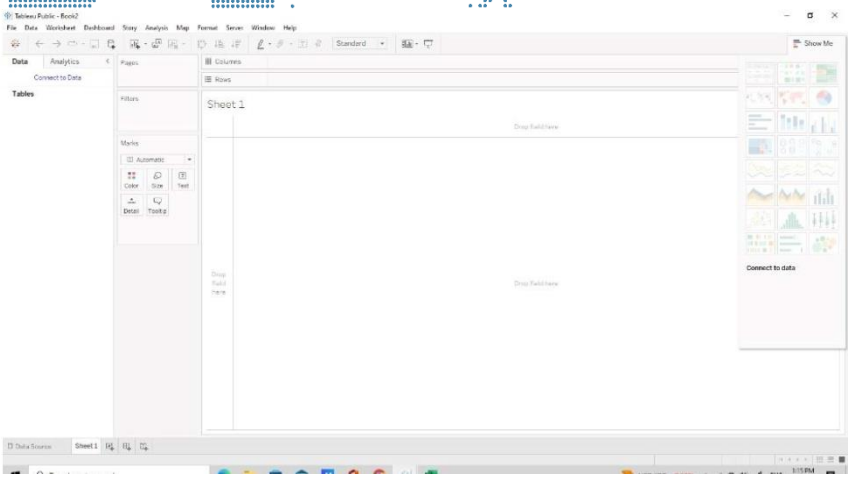

Figure 3. creating a sheet on Tableau

3.3. Distribution of New Students by Study Program

One of the visualizations created is a bar graph showing the distribution of new students based on study programs. This graph helps to see the number of students who enroll in each study program.

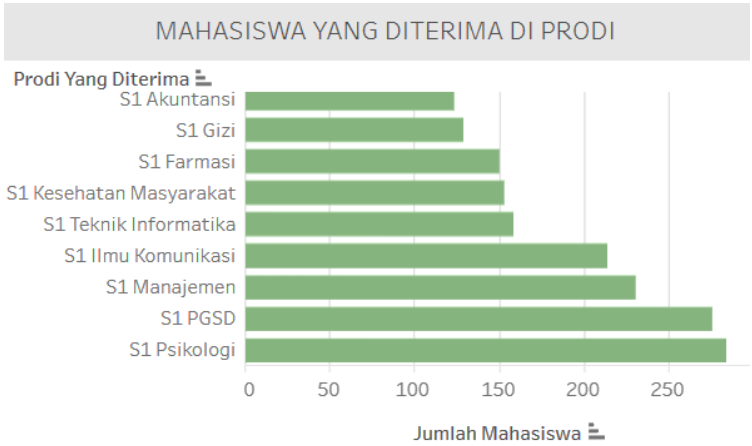

Figure 4. Display of students admitted to the study program

This visualization displays the number of new students admitted to various study programs at UHAMKA in 2023. The horizontal bar graph shows the distribution of students in each study program, with the length of the bar representing the number of students admitted. Based on the visualization, it can be seen that the S1 Psychology study program is the study program with the most student admissions compared to other study programs.

3.4. Distribution of New Students by Cost, and the number of students in the Study Program

In Figure 5 shows a visualization of the tuition fees in the study program and also the number of students in the study program, it can be concluded that the highest tuition fees are in the S1 Medicine study program and the study program that has the highest number of students is the S1 Psychology study program.

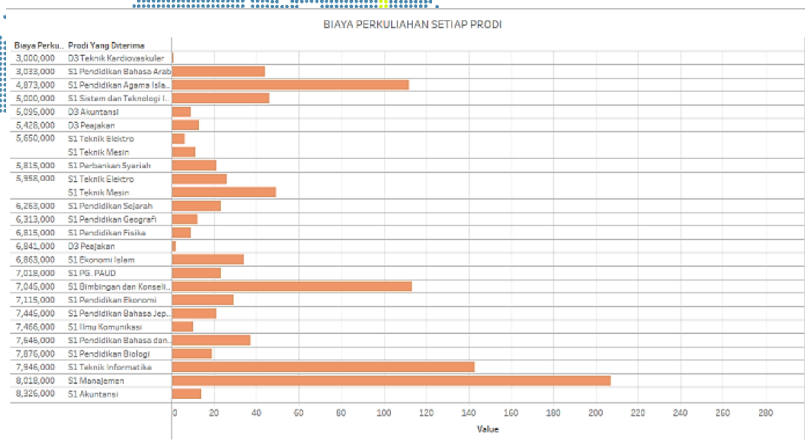

Figure 5. Visualization of costs, and the number of students in the study program

3.5. Distribution of New Students by Study Program and Gender

Figure 6 shows the visualization of the study program chosen by new students and also their gender, namely male. In this visualization using a rectangular beam model with the vertical showing the number of males and the horizontal showing the selected study program.

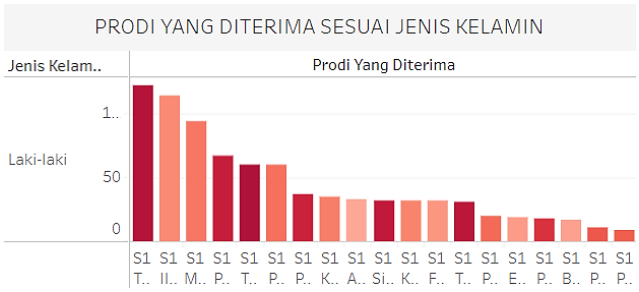

Figure 6. Distribution of New Students by study program and gender male

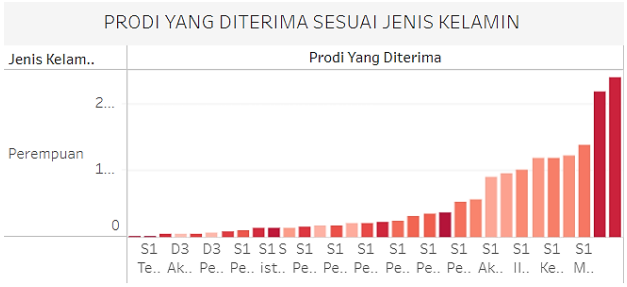

Figure 7. Distribution of New Students by study program and gender female

Figure 7 shows the visualization of the study program chosen by new students and also their gender, namely female. In this visualization using a rectangular beam model with the vertical showing the number of males and the horizontal showing the selected study program.

3.6. Distribution of New Students in Study Programs with the highest number of applicants

This graph shows the study programs with the highest number of student admissions. This may give an indication of the popularity of certain study programs among new students. The data may also indicate that study programs with the most admissions have better attractiveness or career prospects in the eyes of prospective students.

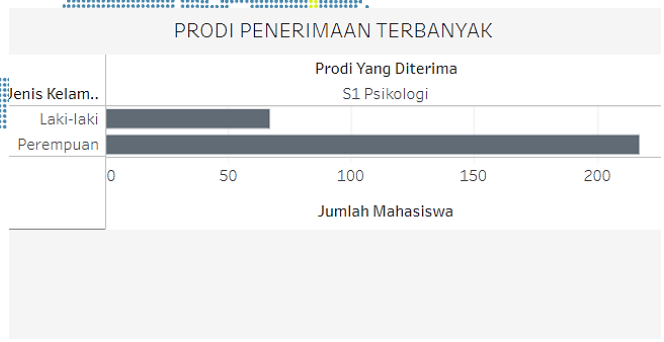

Figure 8. Visualization of study programs with the highest demand

3.8. Creating a Dashboard

After creating several sheets, the next step is to combine the sheets into one dashboard. A dashboard is a collection of visualizations that provide a comprehensive view of the data. Here, the author organizes the sheets that have been created in a layout that is intuitive and easy to understand. For the Dashboard display can be seen in Figure 9.

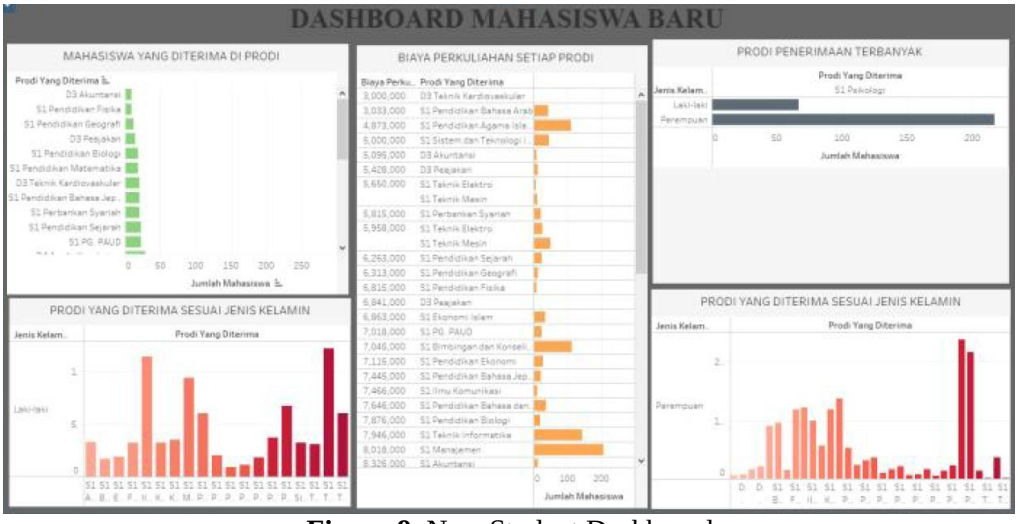

Figure 9. New Student Dashboard

In Figure 9, it can be seen that the final result of Business Intelligence using Tableau is the visualization of student data to make it easier to read and understand as a whole. The dashboard has four sections on the left there is a visualization of students in each study program, on the top left is a visualization of the number of students in each study program from this graph, we can see which study program has the most new students. at the bottom is a visualization of study programs based on male gender provides a more detailed visualization of how new student admissions are distributed among study programs by gender, in the middle is a visualization of tuition fees in each study program and also the number of students, study programs shown on the vertical axis are sorted by tuition fees on the horizontal axis. This gives an idea of the variation in tuition fees between different programs, with some programs having higher or lower fees, in the upper right is the most popular program this graph shows the study programs with the highest number of student admissions. This may give an indication of the popularity of certain study programs among new students. The data may also indicate that study programs with the most admissions have better attractiveness or career prospects in the eyes of prospective students and the lower right is a visualization of study programs based on female gender.

4. Conclusion

Overall, this research shows that the application of Business Intelligence using Tableau in the visualization of UHAMKA's new student data in 2023 provides significant benefits in the management and analysis of academic data. With interactive and informative data visualization, UHAMKA can make better and strategic decisions, and improve the quality of educational services provided to students. This research can be a reference for other educational institutions that want to apply Business Intelligence in managing their academic data.

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