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Implementation of Business Intelligence to Analyze Opportunities to Enter the Most Popular Majors at SMKN1 Tanjung Pura

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ABSTRACT

The use of information technology in education continues to evolve, including in the analysis of vocational school department selection. This study aims to apply Business Intelligence (BI) to analyze admission opportunities in the most popular departments at SMK Negeri 1 Tanjung Pura. The data used is secondary data from SMK applicants between 2020 and 2024, processed using Tableau software for data visualization. The results indicate that the Motorcycle Engineering and Business department is the most favored choice, while the Accounting department has the fewest applicants. BI implementation enables more accurate and informative data presentation, aiding schools in student admission strategies and providing clearer information for prospective students in choosing a department.

Keyword : Business Intelligence; **Department Selection; Tableau ; Data Visualization**

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1. INTRODUCTION

The use of information technology in the world of education continues to grow rapidly, which can be seen from the increasingly widespread digitalization in schools. This digitalization provides various benefits, such as ease of accessing information and increased efficiency in data management. One solution to improve the quality of information is to apply business intelligence, which utilizes data, information and knowledge owned by an organization.

Vocational education or secondary education (SMK) has an important role in creating human resources who are ready to compete in the industrial world. Vocational education is also known as vocational education. SMK Negeri 1 Tanjung Pura as a vocational education or vocational education institution must be able to adapt to the needs of the job market and students' interests in choosing majors that suit their talents and potential. Therefore, an effective analytical method is needed to determine the opportunities for entering the majors that are most in demand by prospective students.

One approach that can be used is Business Intelligence (BI), which allows systematic data processing to produce relevant information and support data-based decision making. Business Intelligence (BI) can describe past data and predict future data. Business Intelligence (BI) has several advantages, namely being able to create reports quickly and accurately, being able to process large amounts of data, the processed data is of higher quality, being able to identify trends that are being observed and for making precise and accurate decisions **(Rachmawati & Hasan, 2023)**. The concept of using images or graphs to understand data has been around for centuries, whereas in recent years, technology has brought to the fore the art and science of data visualization and this is having an impact on companies. Tableau public is an easy-to-use Business Intelligence software. In particular, Tableau public will help in data visualization or graphics, data analysis and reporting. Tableau public is very easy because it only uses a drag and drop system **(Yusuf et al., 2024)**. Data sources that can be applied to Tableau public are from various data sources, such as spread sheets, databases, cloud data, big data and others to be used as one program in the analysis process. The advantages of Tableau public are that it is visual, easy to learn because it does not require a programming language, easy to understand because it only uses a drag and drop system, can create dashboards, is user friendly and completely free **(Bahar et al., 2023)**.

By applying Business Intelligence, schools can analyze trends in major selection, factors that influence student interest, and estimate the likelihood of a student being accepted into a major based on historical data.

Based on this, this research aims to analyze the implementation of Business Intelligence in evaluating opportunities for admission to the most popular majors at SMKN 1 Tanjung Pura, identify factors that influence the level of student acceptance in various majors, and present information that can be used by schools in designing more effective student admission strategies. It is hoped that the results of this research can provide data-based insight for schools in making decisions regarding student admission strategies, provide an overview for prospective students regarding opportunities to enter the desired major, and become a reference for other researchers in the fields of education and information technology.

By applying Business Intelligence in the analysis of major selection, it is hoped that it can increase the effectiveness and efficiency of the selection process and provide more accurate recommendations for prospective students in determining their educational choices.

2. RESEARCH METHOD

A. Research Stages

This stage uses a dataset method, namely secondary data obtained through Vocational High Schools, namely SMK Negeri 1 Tanjung Pura, which is located in Tanjung Pura District, Langkat Regency, then the data obtained is processed using the Business Intelligence (BI) platform, namely Tableau. So that the data can be visualized to become a consideration process in decision making. Below is Figure 1 of the research flow in the form of a flowchart.

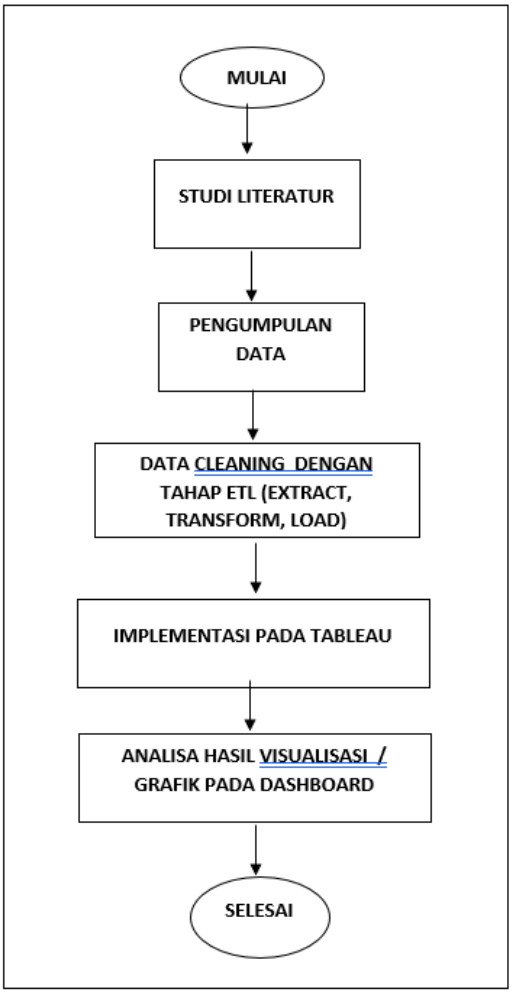

Fig 1. Flowchart

B. Initial Stage

This initial stage is to collect literature studies related to the research to be conducted. The aim is to obtain a problem to be studied. The benefit of this literature study is to find sources of information related to the research to be studied and then compare it with previous studies. At this initial stage, an investigation can be carried out to determine the problems to be taken and the solution strategies to be applied. This is very important because it helps ensure the success of the research being conducted.

C. Data Collection Stages or Data Preparation

This data collection stage uses data, namely secondary data. Secondary data is data obtained from second-hand data in the form of a dataset. A dataset is an object that represents data and relationships between data stored in memory or files. The Dataset structure is similar to the data contained in a database **(Tumini Tumini & Endang Sri Subekti, 2023).** In addition, researchers use literature studies in the form of scientific journals, scientific articles, and books to find previous studies as a reference for conducting information and visualization or graphics in a visualization dashboard. Researchers use datasets sourced from Vocational High Schools, namely SMK Negeri 1 Tanjung Pura, which is located in Tanjung Pura District, Langkat Regency, based on 2020 to 2024.

D. Data Cleaning Stages (Data Cleaning) With ETL Stages (Extract, Transform, Load)

At this stage, after collecting data in the form of a dataset, there are several stages in carrying out Data Cleaning, namely the process of identifying, correcting, deleting errors, and inaccuracies, or inconsistencies in data to improve data quality and reliability. The purpose of Data Cleaning is to produce clean, complete, and consistent data that can be relied on for accurate analysis and decision making. Data Cleaning uses the ETL (Extract, Transform, and Load) stages. In ETL (Extract, Transform, Load) processing, it is a process of taking data from various information (Extract), cleaning, formatting, changing, and repairing data (Transform), and loading the processed data into a destination system (Load) so that the data can be used for analysis, reporting, and decision making purposes. At this stage, the data is processed to prevent errors that will occur so as not to hinder research. The data obtained is then corrected from data that will not be used and then cleaned. This process is important to ensure that the data used in Business Intelligence (BI) is truly reliable and can be used for perfect decision making so that there is no error process and mess or error in doing it on the tableau public platform **(Santhi, 2023)**.

E. Implementation Stages and Visualization of Dashboard in Tableau

After carrying out the ETL (Extract, Transform, and Load) stages, the last stage is that the data obtained from SMK Negeri 1 Tanjung Pura is valid and then implemented into the Business Intelligence (BI) platform, namely Tableau. The implementation process includes the process of importing data into Tableau, followed by the data execution stage to be continued into a new worksheet. The data obtained can be visualized into the Tableau Public dashboard. Dashboard refers to a visual user interface that displays information in an easy-to-understand manner, which is used to monitor and support decision-making based on data related to data on opportunities to enter the most popular majors at SMK Negeri 1 Tanjung Pura. Dashboard can be considered as a tool consisting of information and data visualization, which functions as a measure and indicator in monitoring and decision-making in the context of Business Intelligence (BI) **(Triyanto et al., 2023**).

3. RESULTS AND DISCUSSION

A. Data Processing Steps

In this study, the data that will be processed in the system are in the form of majors, years, quotas received, and the number of interested applicants. In this system, the data processed is in the form of data on the total number of junior high school and MTS students who registered at SMK Negeri 1 Tanjung Pura from 2020 to 2024 through five admission channels, namely the achievement channel, zoning channel, affirmation channel, transfer channel and achievement channel from competition results.

B. Data Execution Process

In Business Intelligence to see the results of data visualization, namely by using the Tableau application or software, the execution process of data using Tableau Public is:

1. Input or enter data to be processed into Tableau, by dragging the data file to the Tableau software, the data that has been dragged previously will become the data source for later processing. The data source to be processed can be seen in Figure 2 below, the data before being processed into Tableau is in the form of Excel data which can be seen in Figure 3 below.

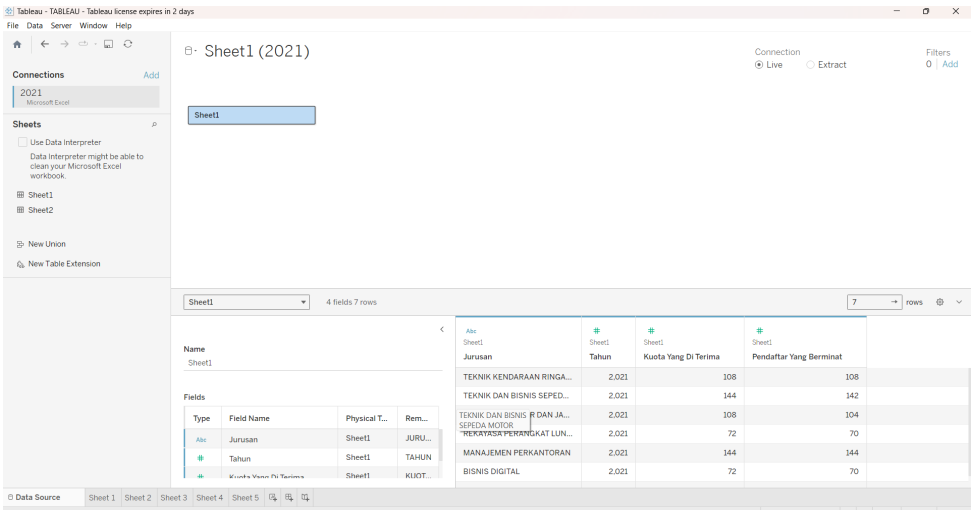

Fig 2. Data Source

	JURUSAN	TAHUN	KUOTA YANG DI TERIMA	PENDAFTAR YANG BERMINAT
5	TEKNIK KENDARAAN RINGAN OTOMOTIF	2020	108	102
6	TEKNIK DAN BISNIS SEPEDA MOTOR	2020	108	108
7	TEKNIK KOMPUTER DAN JARINGAN	2020	108	105
8	REKAYASA PERANGKAT LUNAK	2020	72	72
9	MANAJEMEN PERKANTORAN	2020	144	140
10	BISNIS DIGITAL	2020	72	69
11	AKUNTANSI	2020	72	68
12	TEKNIK KENDARAAN RINGAN OTOMOTIF	2021	108	108
13	TEKNIK DAN BISNIS SEPEDA MOTOR	2021	144	142
14	TEKNIK KOMPUTER DAN JARINGAN	2021	108	104
15	REKAYASA PERANGKAT LUNAK	2021	72	70
16	MANAJEMEN PERKANTORAN	2021	144	144
17	BISNIS DIGITAL	2021	72	70
18	AKUNTANSI	2021	72	72
19	TEKNIK KENDARAAN RINGAN OTOMOTIF	2022	144	143
20	TEKNIK DAN BISNIS SEPEDA MOTOR	2022	144	150
21	TEKNIK KOMPUTER DAN JARINGAN	2022	108	110
22	REKAYASA PERANGKAT LUNAK	2022	72	75
23	MANAJEMEN PERKANTORAN	2022	144	146
24	BISNIS DIGITAL	2022	72	75
25	AKUNTANSI	2022	72	72
26	TEKNIK KENDARAAN RINGAN OTOMOTIF	2023	144	150
27	TEKNIK DAN BISNIS SEPEDA MOTOR	2023	144	180
28	TEKNIK KOMPUTER DAN JARINGAN	2023	144	160
29	REKAYASA PERANGKAT LUNAK	2023	72	80
30	MANAJEMEN PERKANTORAN	2023	144	155

Fig 3. Data Excel

2. To start the data processing process, click New WorkSheet to create a data visualization, then drag the data field to be processed, which can be seen in Figure 4 below.

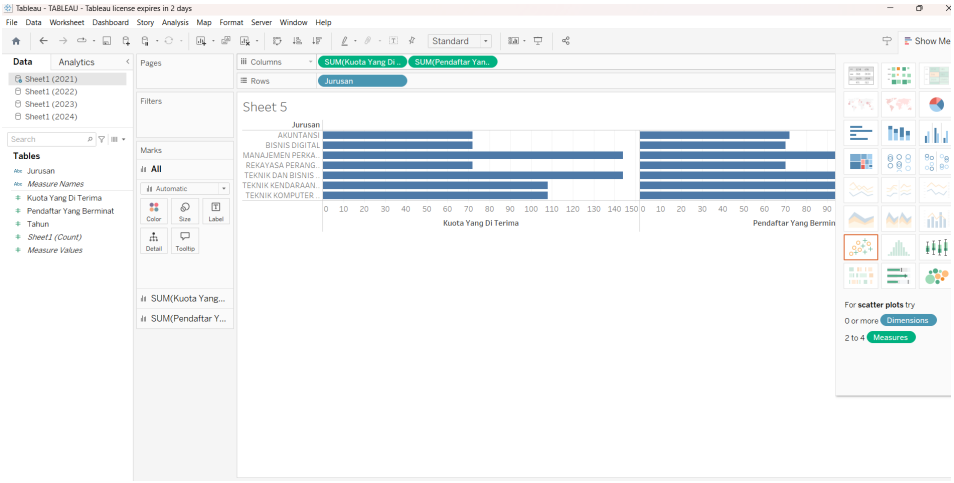

Fig 4. Visualization data

C. Data Processing Results

The results of this data processing will be in the form of data visualization, namely graphs, from the graphs we can see a comparison of the number of interested applicants from junior high school and MTS students and the number of quotas accepted by SMK Negeri 1 Tanjung Pura.

1. Summary or combined graph for a comparison of the number of quotas accepted and interested applicants based on majors at SMK Negeri 1 Tanjung Pura from 2020 to 2024, which can be seen in Figure 5 below.

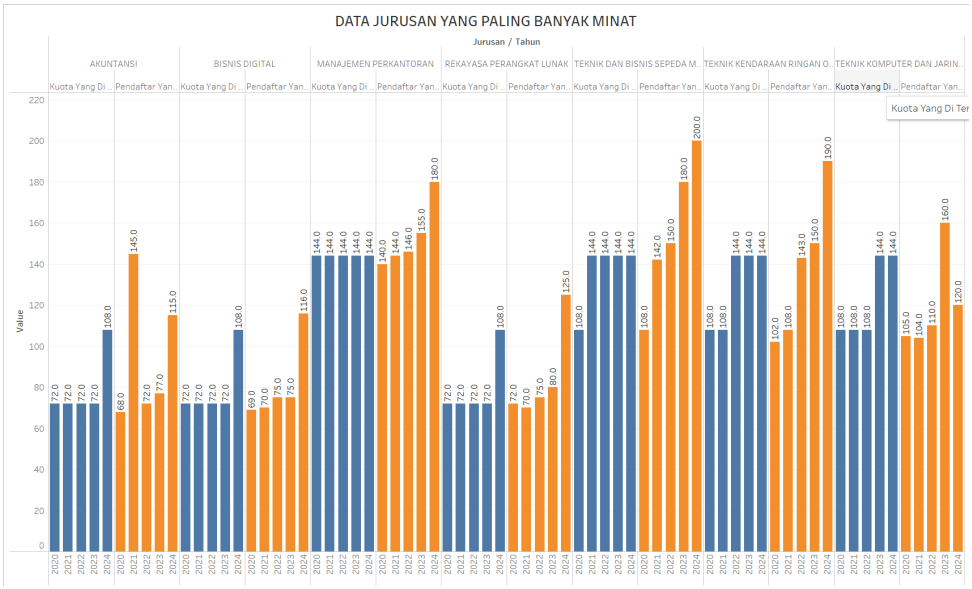

Fig 5. Comparison Summary Chart by Major From 2020-2024

2. Comparison chart of the number of quotas accepted and interested applicants based on the majors at SMK Negeri 1 Tanjung Pura can also be seen based on the Year. Figure 6 below shows the data on the majors at SMK Negeri 1 Tanjung Pura in 2020.

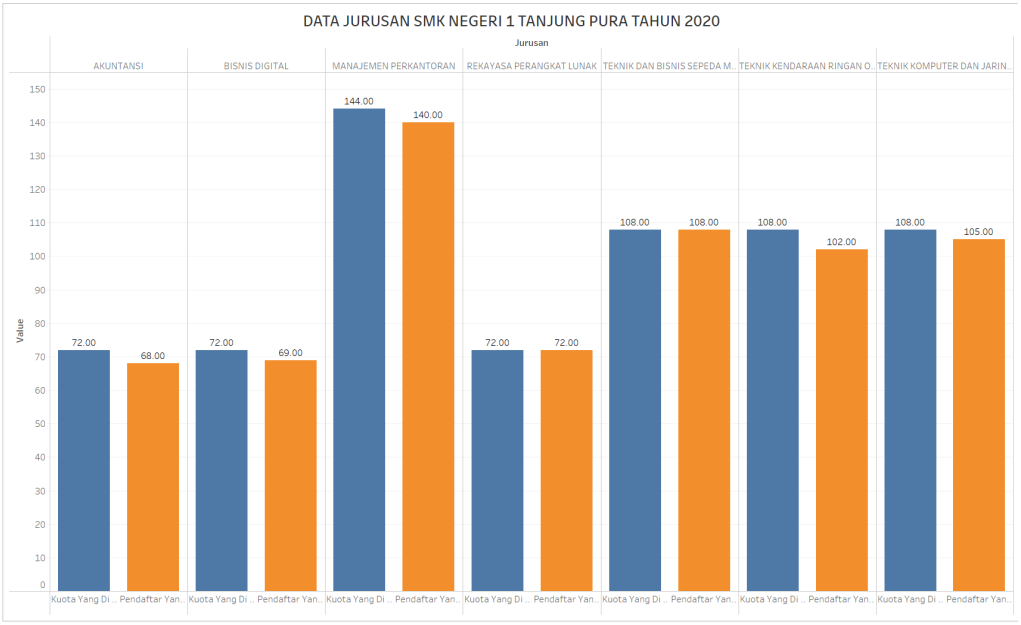

Fig 6. Comparison Chart By Major From 2020

3. Comparison chart of the number of quotas accepted and interested applicants based on the majors at SMK Negeri 1 Tanjung Pura in 2021 which can be seen in Figure 7 below.

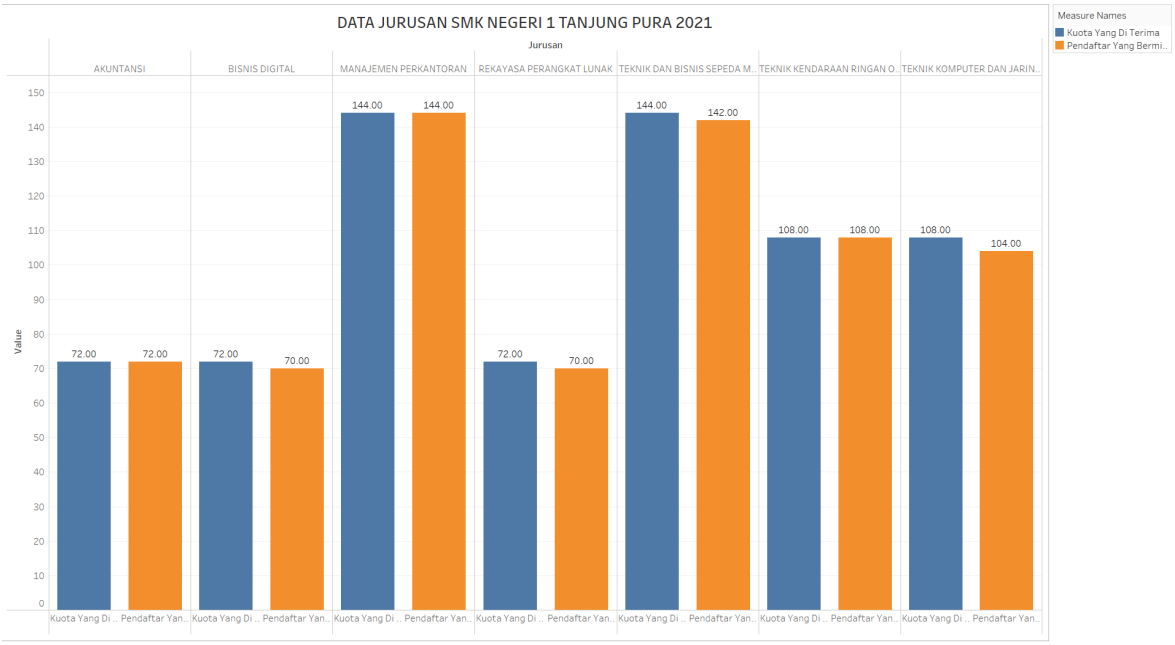

Fig 7. Comparison Chart By Major From 2021

4. A comparison graph of the number of quotas received and interested applicants based on majors at SMK Negeri 1 Tanjung Pura in 2022 can be seen in Figure 8 below.

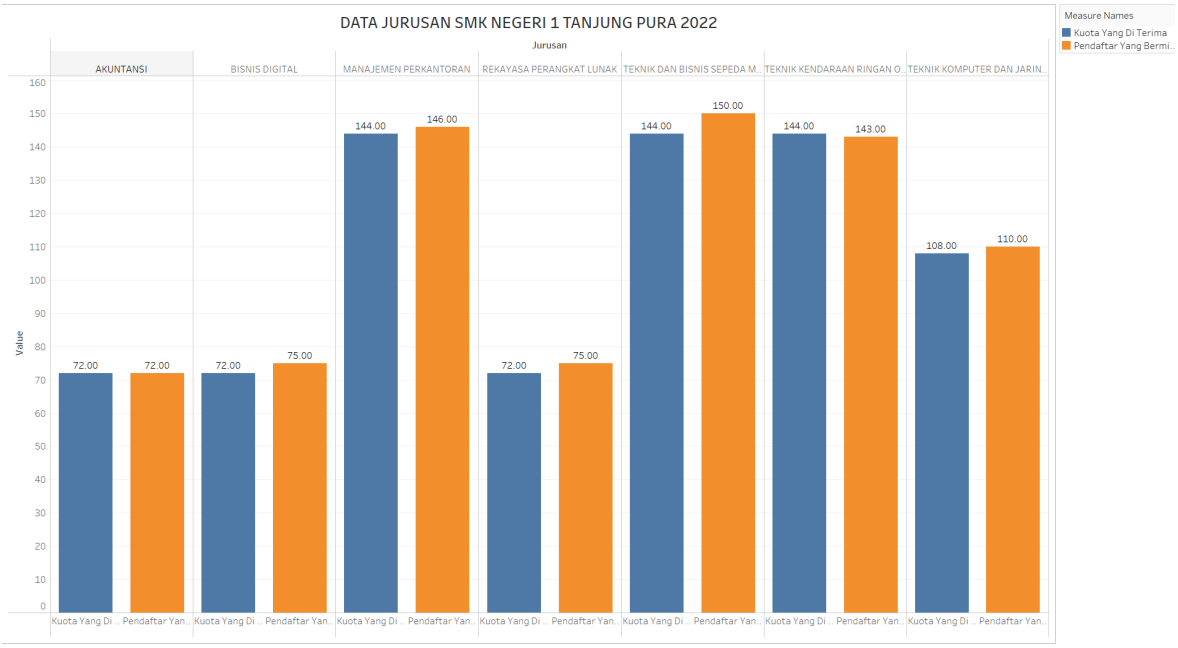

Fig 8. Comparison Chart By Major From 2022

5. Comparison chart of the number of quotas accepted and interested applicants based on the majors at SMK Negeri 1 Tanjung Pura in 2023 which can be seen in Figure 9 below.

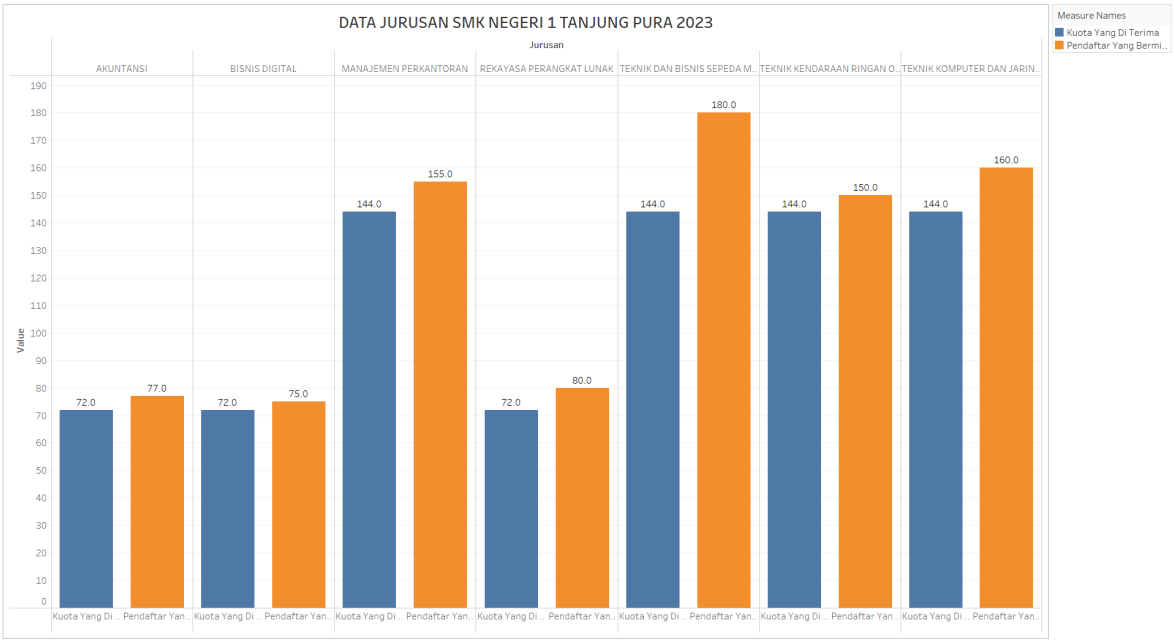

Fig 9. Comparison Chart By Major From 2023

6. A comparison graph of the number of quotas received and interested applicants based on majors at SMK Negeri 1 Tanjung Pura in 2024 can be seen in Figure 10 below.

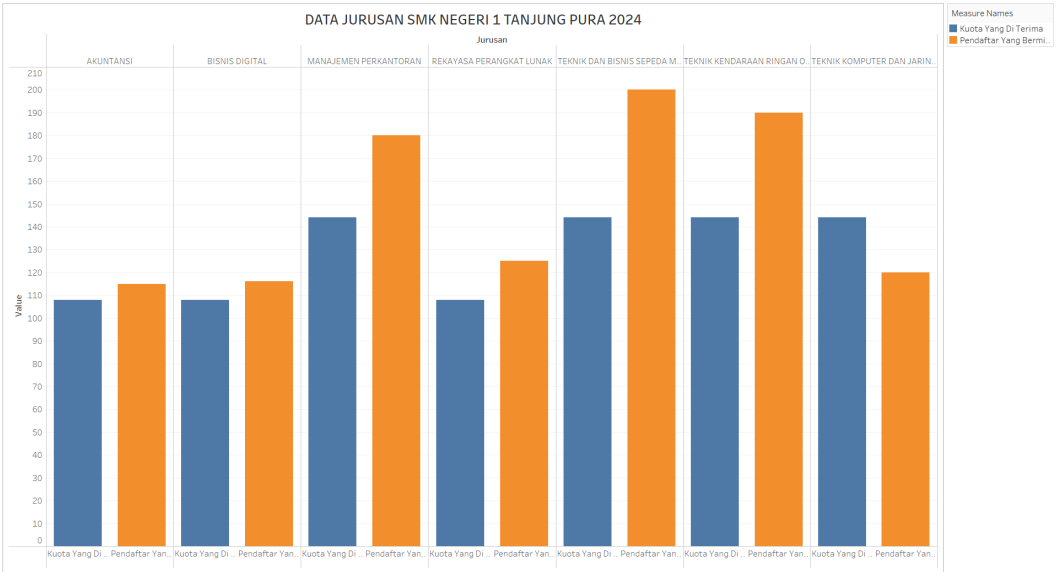

Fig 10. Comparison Chart By Major From 2024

D. Discussion

After carrying out all stages of the research method, it can be seen that all data and functions on the dashboard run according to the design that has been made. This study displays the results of data visualization or graphs that use attributes including department data, quotas received and applicants who are interested in 2020 to 2024. Based on the overall results of Data Visualization or Graphs that have been carried out using the Tableau application, it can be concluded that the most popular department data at SMK Negeri 1 Tanjung Pura is in the Motorcycle Engineering and Business department because the graph in the study that has been carried out from 2020 to 2024 has experienced a continuous increase, while the least interested is in the Accounting department, although from 2020 to 2024 it has increased, but of all the Accounting departments it has the lowest interest.

With these results, it can be said that the purpose of this study has been achieved, namely implementing Business Intelligence to analyze the opportunities to enter the most popular department at SMK Negeri 1 Tanjung Pura. However, in this study there is still a possibility of data updates that will be displayed, so the monitoring process is very necessary for data updates on the dashboard system. The results of the visualization dashboard or graph will look like the image below.

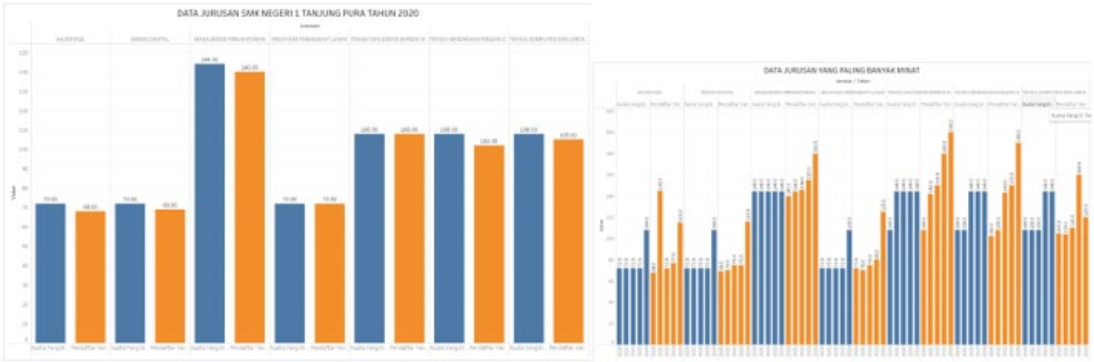

Fig 11. Comparison Chart Dashboard By Major

4. CONCLUSION

Based on the overall results of the research that has been done, it was concluded that the process of determining the most popular direction at SMK Negeri 1 Tanjung Pura was carried out by executing data

on the number of junior high school and MTS students who registered in each department, namely with the strictness that has been determined by SMK Negeri 1 Tanjung Pura as a comparison of the number of applicants with the number accepted, then the data execution process to display graphs or data visualization can be done by creating a New WorkSheet, and dragging the desired fields, so that SMK Negeri 1 Tanjung Pura can find out which head is the most popular. Based on the results of the Visualization or Graphs that have been carried out using the Tableau application from the dashboard results above, it can be concluded that the data on the most popular majors at SMK Negeri 1 Tanjung Pura are in the Motorcycle Engineering and Business majors because the graph in the research that has been carried out from 2020 to 2024 has experienced a continuous increase, so that the quota accepted is less than the previous SMP and MTS students, while the least interested is the Accounting major, although in 2020 to 2024 there was an increase, but of all the Accounting majors it has the lowest number of interested students. Therefore, SMK Negeri 1 Tanjung Pura must broadcast promotional strategies and the appeal of the Accounting major, such as improving the quality of teaching, adjusting the curriculum to industry needs, introducing clearer career opportunities, or holding more intensive socialization to the list of SMP and MTS so that student interest increases, and provide admission policies and student quotas for each major to be more in line with the interests of the pen, therefore the most in-demand data and opportunities to enter SMK Negeri 1 Tanjung Pura must always be monitored, using Business Intelligence, namely with data visualization or graphs so that SMK Negeri 1 Tanjung Pura is easier to monitor in data updates, so that every year there are no majors that are few in demand and for SMP and MTS students can see the magnitude of the competition that occurred in the previous year, so that it can be a reference in choosing the major to be chosen at SMK Negeri 1 Tanjung Pura.

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