Implementation and Visualization of Business Intelligence Based Budget in Ngawi District Financial Agency 2021-2023

Elsa Pudyaningrat*
Putri Nugrahaningsih

Diploma 3 in Accounting, Vocational School, Universitas Sebelas Maret, Madiun, Indonesia
*Corresponding Author: elsapudya21@student.uns.ac.id

ABSTRACT

This research aims to determine the s of budget implementation and visualization from 2021 to 2023 in the Financial Agency of Ngawi Regency which uses Business Intelligence Power BI as a basis for decision-making. This is quantitative research which used a descriptive-quantitative approach method. To collect the data, the researchers used a literature study and documentation of the summary of APBD data in the Financial Agency of Ngawi Regency from 2021 to 2023. The results indicate that there are fluctuations in the Regional Income, Regional Expenditures, and Regional Financing when implementing and visualizing budget data (APBD) using Business Intelligence Power BI. Cumulatively, the total APBD is Rp13,732,224,315,602.00, with a total growth of 210.3%. The next result is the Financial Agency of Ngawi Regency can use Business Intelligence Power BI to analyse and visualize the APBD budget data for decision-making purposes. It shows that this system can be used for decision-making by this agency because it is user-friendly, fast, accurate, and informative.
Keywords: budgets; business intelligence; decision making

INTRODUCTION

The Ngawi Regency Government, as part of an organization involved in the public sector, aims to provide the highest quality public service. To accomplish this goal, the government must adhere to the principles outlined in a discipline known as public sector accounting. Over time, public sector accounting has evolved rapidly and has become a significant focus for government agencies and institutions, particularly at the regional level. According to Mardiasmo (2021), government agencies, state-owned and regional companies, and other public organizations give considerable attention to accounting in their daily operations. It is essential for local governments in Indonesia, such as the Ngawi Regency Government, to provide various reports, especially in the financial sector, to the public (Utomo & Suharto, 2018). This requirement is stated in Government Regulation Number 8 of 2006 on Financial Reporting and Performance of Government Agencies, and Regulation of the Minister of Home Affairs Number 13 of 2006 on Guidelines for Regional Financial Management. These regulations mandate that every regional government must produce financial reports on economic resources and reporting entity obligations on the reporting date, as well as the flow of economic resources during the current period. The financial report serves as an evaluation tool for making decisions related to resource allocation, as outlined in Regulation of the Minister of Finance (Indonesian: *Peraturan Menteri Keuangan*, abbreviated PMK) number 22/PMK.05/2022 on Central Government Accounting Policies.

In accordance with Government Regulation Number 12 of 2019 regarding Regional Financial Management, regional financial management must be conducted in an orderly, efficient, economical, agile, transparent, and responsible manner. This should be done while considering justice and benefits for the community and adhering to the provisions of the law. In accordance with these regulations, it is essential to demonstrate that the performance of regional governments in managing regional finances, both in terms of planning and realization, serves as an indicator of regional competence in carrying out their governance (Rizal, *et al.,* 2019).

The Ngawi Regency Government, through the Regional Finance Agency, which has a role in regional financial management, has effectively carried out its duties. This conclusion is based on a study conducted by Rahayu et al. (2019). The economic performance concerning the regional budget and expenditure of the Ngawi Regency regional government from 2014 to 2018 can be generally considered good. However, the level of independence ratio is very low, the efficiency ratio falls into the inefficient category, and the growth ratio is classified as very low.

The Ngawi Regency Finance Agency, as an institution related to regional finance, plays a role in planning and budgeting regional income and expenditure as per the Ngawi Regency Regional Revenue and Expenditure Budget (Indonesian*: Anggaran Pendapataan dan Belanja Daerah*, abbreviated APBD). According to Pandensolang (2022), the main focus of regional expenditure projections is the analysis report, which determines the amount of budget needed for operational expenditures. This is crucial because operational expenditures are mandatory and essential for guaranteeing the performance process of an agency (Zamaro, 2018). These operational expenditures include employee expenses and other operational costs.

Every year, the Ngawi Regency Finance Agency submits financial reports, including APBD data, to the central government. This data is essential for the local government to make informed policy decisions and forecasts for the upcoming year's budget (Camila, et al., 2018). However, according to the Head of Planning, there have been instances of budget data not being synchronized, which has hindered decision-making. The lack of synchronization has been attributed to human errors.

Research with similar themes has been widely conducted by previous researchers, such as a study by Pandensolang et al. (2022) on budget realization at the National Narcotics Agency (Indonesian: *Badan Narkotika Nasional Provinsi*, abbreviated BNNP) of North Sulawesi from 2019 to 2020. The results of the research showed that the implementation of Business Intelligence on the planning and

realization data of the APBN budget at the BNNP of North Sulawesi revealed a consistent trend. It was observed that as the year progressed, there was an increase in budget absorption, indicating an accumulation of activities towards the end of the year.

In a study conducted by Akbar, et al. (2018), the use of Business Intelligence in the form of the Tableau application was demonstrated. The study used regional APBD data from West Sumatra, which revealed discrepancies in government budget allocations. Notably, the largest budget was directed towards Padang City, the capital of West Sumatra Province. The study's findings can serve as a foundation for decision-making and policy development regarding regional budget allocations. It's worth mentioning that both studies utilized Tableau as their business intelligence tool, whereas the current study relies on Power BI. Furthermore, while previous studies used regional APBD data for West Sumatra and the APBN data at the National Narcotics Agency (BNNP), while the current study focuses on the APBD data for Ngawi Regency from 2021 to 2023.

In light of the background described above, it is essential to implement Business Intelligence (BI) on the Ngawi Regency's APBD data. In this case, the researcher is utilizing Power BI, a BI tool connected to Artificial Intelligence (AI), to analyse the 2021-2023 APBD data. This study aims to provide insights into the data's development and demonstrate how Power BI can be used as a decision-making tool and to mitigate human errors leading to data inconsistencies.

RESEARCH METHOD

This research utilized a qualitative descriptive method with both primary and secondary data sources. The secondary data was collected from the Ngawi Regency APBD records available on the ngawikab.go.id website for the years 2021 to 2023. Primary data was gathered through interviews with the Regional Budget Planning Section, as they play a significant role in the Ngawi Regency APBD. Information regarding the APBD planning process was obtained from this section. It is essential to conduct research using Business Intelligence to analyse and visualize the budget or APBD, considering the suboptimal management of APBD data for decision-making within the Ngawi Regency Finance Agency.

After obtaining the information as described above, the next step is data processing. To process the data, the researchers do several stages. Firstly, the researchers collected the data at the Ngawi Regency Finance Agency Office. The data is the archive of financial reports containing information related to the 2021-2023 Regional Budget, Revenue, and Expenditure. Secondly, the researchers select the data, which is a summary of the APBD data from 2021-2023. According to Widaningsih (2022), it is a process of selecting data or data sets containing financial report information in the form of a summary of the APBD for a certain period. Thirdly, the researchers did the cleansing process. According to Zai (2022), this is the stage where researchers delete duplicate data or also delete unused data. Fourthly, the researchers did the data transformation. It is a process that is carried out in the form of organizing or formatting data so that it can be classified (Nasution & Camidah, 2019). Fifthly, the researchers did data mining. This process needs to be carried out to obtain important information from fairly large data. The range of budget years required by the researchers is the data from 2021 to 2022. And the last is interpretation. In the interpretation stage, researchers must make the data used understandable by the Ngawi Regency Finance Agency. It means the data must be clear and it does not contradict the existing facts, so there is not any error in the information processed and obtained from the data used.

RESULTS AND DISCUSSION
Regional Income

The following is a breakdown of the data on the Regional Revenue and Expenditure Budget of Ngawi Regency for 2021-2023. The table below shows the nominal amount of the budget carried out by the Ngawi Regency Government:

Table 1. Summary of regional income of Ngawi Regency 2021-2023

No.	Years	Budget
1.	2021	Rp2,127,457,886,476.00
2.	2022	Rp2,122,604,133,831.00
3.	2023	Rp2,389,604,229,617.00

Source: Documentation of accounting and reporting sector of Ngawi Regency financial agency

The table above is data on Regional Income in Ngawi Regency in 2021-2022 which always fluctuates. The data in the table is then visualized into a dashboard containing various types of visualizations such as charts, bars, diagrams, and others. The APBD data is visualized using Business Intelligence tools called Power BI. Power BI is a product from Microsoft Office that allows users to combine data, visualize data, and analyze data to be then presented in a structured and interactive manner (Maziyyah, 2022). Power BI is known to have more complete features such as being able to be displayed online via desktop, web, and mobile, having complete visualizations, and users can access data directly, and in real-time with data sources because it uses Data Connectivity Gateways (Gowthami & Kumar, 2017). The following is the visualization result of the 2021-2023 regional revenue budget data for the Ngawi Regency Regional Government:
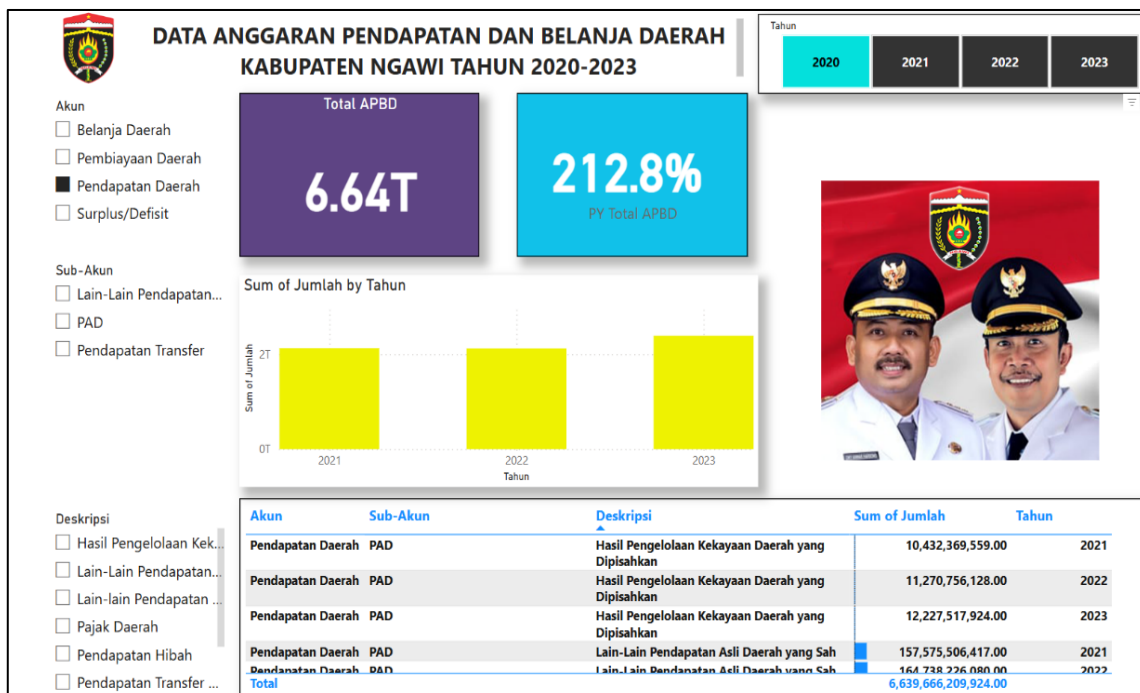

Figure 1. Visualization of regional income data for Ngawi Regency 2021-2023
Source: Personal documentation

Based on the data visualization above, it shows that the overall Regional Revenue Budget from 2021-2023 is Rp6,639,666,209,924.00 with a growth percentage during 2021-2023 of 212.8%. The regional Revenue Budget from 2021-2023 is known to be included as Regional Original Revenue (Indonesian: *Pendapatan Asli Daerah*, abbreviated PAD) of Rp766,853,561,604.00, with a percentage increase of 206.9%. The next regional income comes from Other Legitimate Regional Revenue of Rp176,739,613,000.00, with total growth reaching 101.4%, and Transfer Revenue, based on the visualization conducted by the researcher, was obtained information that Transfer Income replaces Balancing Funds as regulated in PP Number 12 of 2019. Transfer Income includes Central Government Transfer Income and Inter-Regional Transfer Income (Sulaeman & Silvia, 2019). Total Transfer Income for three years is Rp5,696,073,035,320.00. The largest regional revenue budget is in 2023 amounting to Rp2,389,604,229,617.00 with the largest source of income from the Central Government Transfer Fund of Rp1,916,637,377,000.00 in 2023.

Regional Expenditure

In contrast to the definition of regional income, Regional Expenditure is an obligation of the regional government that is recognized as a reduction in regional government assets in the current budget year.

Table 2. Summary of regional expenditure of Ngawi Regency 2021-2023

No.	Years	Budget
1.	2021	Rp2,270,417,650,068.00
2.	2022	Rp2,287,317,676,477.00
3.	2023	Rp2,497,822,779,133.00

Source: Documentation of accounting and reporting sector of Ngawi Regency financial agency

In the 2021-2023 budget period, the total Regional Expenditure of Ngawi Regency is Rp7,055,558,105,678 with a growth percentage of 208.5%. This percentage is obtained from the total accumulation of the 2021-2023 budget which is calculated automatically by Power BI. The following is a visualization of the Regional Expenditure data for Ngawi Regency in 2021-2023:
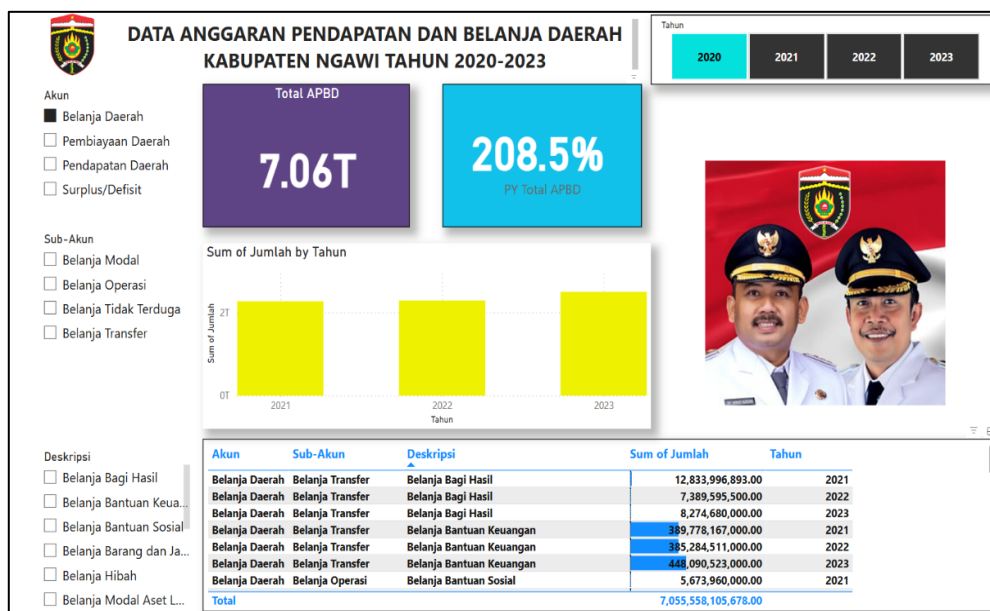

Figure 2. Visualization of regional budget data for Ngawi Regency 2021-2023
Source: Personal documentation

The researcher conducted visualization and obtained information that in 2021, Ngawi Regency Regional Expenditure decreased by 2.5%, which was Rp2,270,417,650,068.00. Different from the previous year, starting in 2021, changes to the APBD structure were implemented based on PP No. 12 of 2019 as was the case with the Regional Revenue Budget explained above. In 2021, Regional Expenditure includes Operational Expenditure, Capital Expenditure, Unexpected Expenditure, Transfer Expenditure. In Operational Expenditure, there are budget elements in the form of Employee Expenditure of Rp1,053,168,086,515.00, Goods and Services Expenditure of Rp427,010,758,591.00, Grant Expenditure of Rp42,356,359,041.00, Social Assistance Expenditure of Rp5,673,960,000.00, so that the total Regional Expenditure of Ngawi Regency in 2021 is Rp1,528,209,164,147.00.
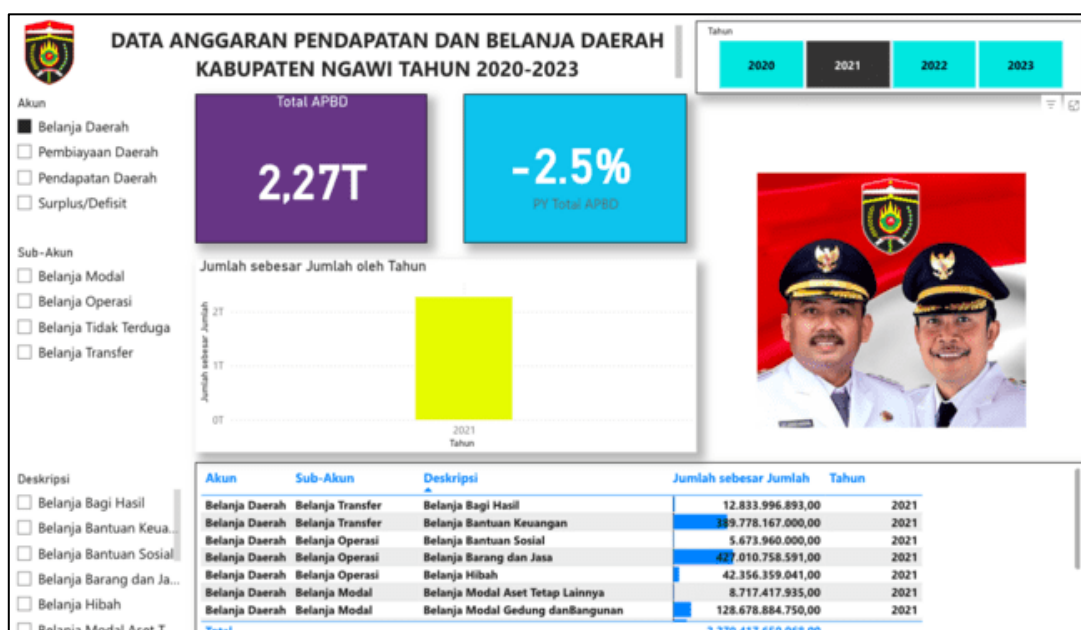

Figure 3. Visualization of regional budget data for Ngawi Regency 2021
Source: Personal documentation

Next is Capital Expenditure, which includes budget elements such as Land Capital Expenditure of Rp9,641,025,000.00, Equipment and Machinery Capital Expenditure of Rp81,871,961,343.00, Building and Structure Capital Expenditure of Rp128,678,884,750.00, Road, Network, and Irrigation Capital Expenditure of Rp99,275,403,000.00, Other Fixed Asset Capital Expenditure of Rp8,717,417,935.00. Total Capital Expenditure in 2021 is Rp328,184,692,028.00. Next, Unexpected Expenditures worth Rp11,411,630,000.00, and Transfer Expenditures worth Rp402,612,163,893.00, consisting of Revenue Sharing Expenditures and Financial Assistance Expenditures of Rp12,833,996,893.00 and Rp389,778,167,000.00.

Next is 2022, which obtained information that in that year the Ngawi Regency Regional Expenditure budget was Rp2,287,317,317,676,477.00. The amount of the budget is known to have grown by 0.7% from a similar budget in the previous period. Similar to the previous year, the Ngawi Regency Regional Expenditure in 2022 consists of several types of budgets such as Operational Expenditure of Rp1,624,469,096,737.00 which comes from Employee Expenditure of Rp1,031,050,223,932.00, Goods and Services Expenditure of Rp526,978,631,805.00, Grant Expenditure of Rp57,556,417,000.00, Social Assistance Expenditure of Rp8,883,824,000.00.
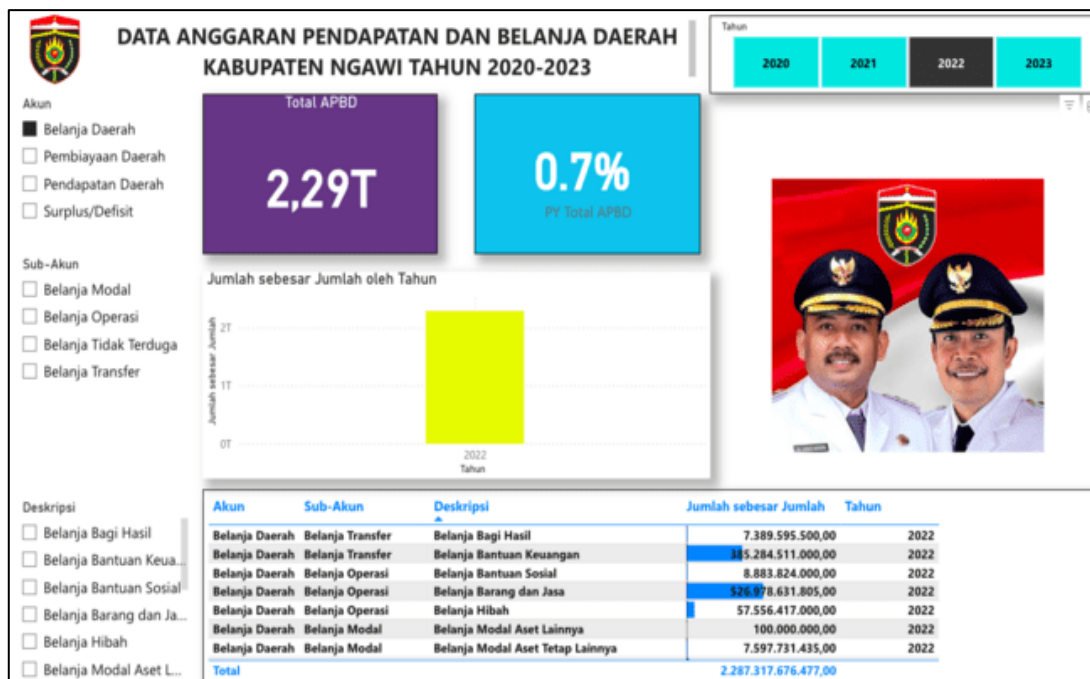
Figure 4. Visualization of regional budget data for Ngawi Regency 2022
Source: Personal documentation

Capital Expenditure has a budget of Rp257,562,843,240.00, which includes Land Capital Expenditure worth Rp1,030,000,000.00, Equipment and Machinery Capital Expenditure of Rp83,720,979,161.00, Building and Structure Capital Expenditure of Rp22,004,040,000.00, Road, Network, and Irrigation Capital Expenditure of Rp143,110,092,644.00, Other Fixed Asset Capital Expenditure of Rp7,597,731,435.00, then the last one is Other Asset Expenditure of Rp100,000,000.00. Next, in the Unexpected Expenditure budget type of Rp12,611,630,000.00 and Transfer Expenditure, the total is Rp392,674,106,500.00, with details of Revenue Sharing Expenditure and Financial Assistance Expenditure of Rp7,389,595,500.00 and Rp385,284,511,000.00.

The next Regional Expenditure Visualization is the 2023 APBD. This year, Regional Expenditure is the same as that structured in the previous year. Includes Operational Expenditure, Capital Expenditure, Unexpected Expenditure, and Transfer Expenditure (Sugiri, 2019). The total Regional Expenditure budget for Ngawi Regency is Rp2,497,822,779,133.00. This amount increased by 9.2% compared to 2022.

Ngawi Regency Regional Expenditure in 2023 consists of several types of budgets such as Operational Expenditure of IDR1,648,899,074,646 which comes from Employee Expenditure of Rp1,009,617,951,503.00, Goods and Services Expenditure of Rp552,052,346,143.00, Grant Expenditure of Rp84,153,537,000.00, Social Assistance Expenditure of Rp3,075,240,000.00.
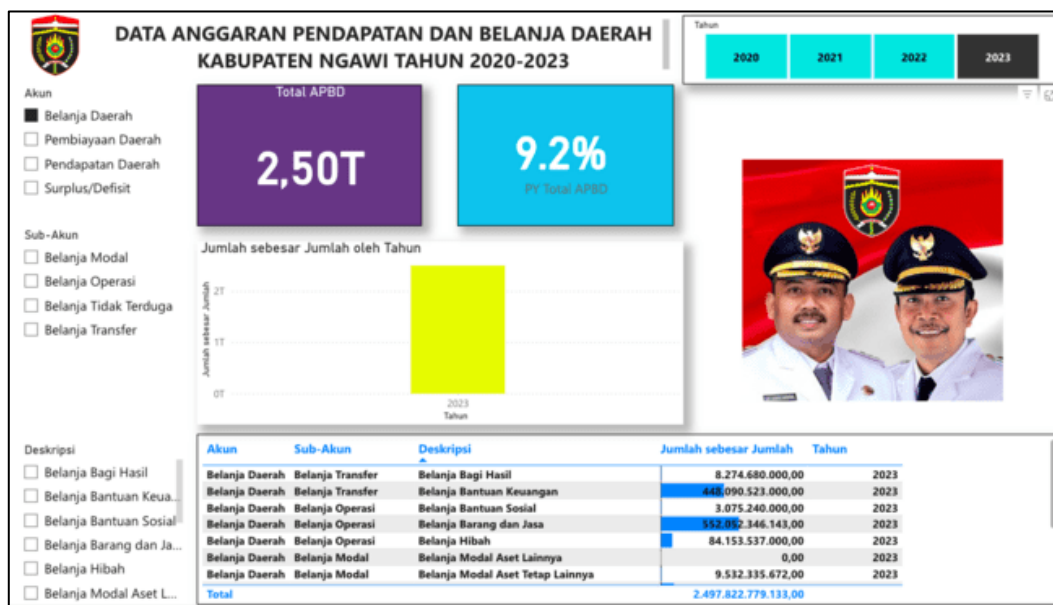
Figure 5. Visualization of regional budget data for Ngawi Regency 2023
Source: Personal documentation

Capital Expenditure has a budget of Rp385,724,253,817.00, which includes Land Capital Expenditure worth Rp10,569,989,295.00, Equipment and Machinery Capital Expenditure Rp72,016,568,350, Building and Structure Capital Expenditure Rp95,599,607,000.00, Road, Network, and Irrigation Capital Expenditure Rp198,005,753,500.00, Other Fixed Asset Capital Expenditure Rp9,532,335,672.00, then the last one is Other Asset Expenditure Rp0. Next, in the Unexpected Expenditure budget type Rp6,834,247,670.00 and Transfer Expenditure totaling Rp456,365,203,000.00, with details of Revenue Sharing Expenditure and Financial Assistance Expenditure Rp8,274,680,000.00 and Rp448,090,532,000.00.

Decision making based on APBD data

After knowing the description of the Ngawi Regency budget in 2021-2023 which was visualized and visualized using Power BI, there is a lot of information obtained by researchers and the Ngawi Regency Finance Agency. In this case, it is the Budget Planning Section along with the Ngawi Regency APBD Information and Data processing officers who are also part of the Planning and Budgeting Section at the Ngawi Regency Finance Agency as the results of interviews conducted by researchers with informants namely the Head of Budget Planning Section, show that the use of Power BI Business Intelligence as a media for visualizing budget data is considered appropriate and can be used in decision making (Rudiawan, 2021).

This is the statement made by the Head of the Budget Planning Section, Mrs. Palupi, in an interview conducted on March 5, 2024:

"Yes, I think it is necessary to use this Power BI application, because I have tried it directly and I know that there are accurate calculations, there are percentages, and it is very detailed, so it will be very easy to use to make decisions related to the APBD budget" (Palupi, 2024).

"Iya, menurut saya perlu menggunakan aplikasi Pwer BI ini, karena saya sudah mencoba langsung dan saya mengetahui ada perhitungan yang akurat, ada presentasenya, dan sangat rinci, sehingga akan sagat mudah digunakan untuk mengambil keputusan terkait anggaran APBD" (Palupi, 2024).

The basis for this statement is that Power BI-based Business Intelligence is easy to use by laypeople and is also practical because just by scanning the barcode that the researcher has created, the desired APBD data will appear, then it can be accessed using a smartphone, laptop, PC, or other similar devices that are connected to the internet, besides this media is also considered very fast and precise so that it greatly supports the success of the APBD budget decision making by the Ngawi Regency Finance Agency. The decision-making factor at the Ngawi Regency Finance Agency using Power BI is the aim of preventing human error which causes data asynchrony and accuracy of analysis in Power BI.

The choice of Power BI as a decision-making medium is due to several things, including:

a. The information and data contained in this Power BI-based visualization can be used as a medium for non-formal budget reporting (not written in an official letter by the department) in internal meetings.

b. In preparing the five-year Strategic Plan (Renstra) for the coming period, this dashboard will be used as a reference because it is easy to access without having to search for files buried on the computer.

c. This budget data visualization dashboard will be used in determining the budget amount related to Capital Expenditures because in preparing it you need to look at and adjust the previous budget considering that Capital Expenditures are related to market prices.

d. This media will enable it to be used to increase the openness of Ngawi Regency budget data and information to the public so that it is more transparent.

e. This Business Intelligence system is used in making decisions regarding speed and timeliness in accessing budget data and reducing reporting errors due to human error (Tumini & Subekti, *et al.,* 2023).

CONCLUSION

The implementation and visualization of Regional Revenue and Expenditure Budget using Business Intelligence Power have provided valuable insights. This study shows that using Power BI can help resolve issues related to the synchronization of Ngawi Regency's APBD budget data from previous years. Analysis using Power BI also revealed fluctuations in the APBD budget over the four-year period from 2021 to 2023, with a cumulative total of Rp13,732,224,315,602.00 and a total growth of 210.3%. These findings demonstrate that the Power BI system can support decision-making processes within agencies, including strategic planning (Indonesian: *Rencana Strategis*, abbreviated Renstra), budget transparency, determination of Capital Expenditure, financial reporting during internal meetings, and various other decisions related to the APBD.

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