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BUSINESS INTELLIGENCE DASHBOARD FOR FINANCIAL PERFORMANCE ANALYSIS OF PUBLIC SERVICE AGENCY USING MICROSOFT POWER BI

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Abstract: This research discusses the use of business intelligence dashboard for financial performance analysis at the BRIN Technology Service Center Public Service Agency, focusing on the decrease of BLU cash balance. The factors that affect the ups and downs of the BLU cash balance are the total revenue realization and the total revenue expenditure realization in the current year. Business Intelligence (BI) is one of the tools that allows organizations to access and analyze data and information to improve and optimize decisions and performance. In Indonesia, there has not been much research related to the implementation of business intelligence dashboards for financial performance analysis in public service agencies. The research aims to create a business intelligence dashboard that can provide insight to leaders in making decisions to increase BLU cash balances. This research uses a qualitative descriptive method, and the system development method uses a business intelligence roadmap approach. The result of this research is that with the help of the BI dashboard, executives can gain insight to increase Blu's cash balance, improvements in receivables management are needed and they need to be more selective in choosing partners who use technology services.
Keywords: Dashboard, Business Intelligence, Public Service Agency, Financial Performance

INTRODUCTION

Dashboard Business Intelligence (BI) is a data visualization method well-known for finding insights and accelerating the decision-making process (Wikamulia & Isa, 2023). The company's goal is to utilize Business Intelligence (BI) so that each department can manage existing data and obtain quality information to optimize the decision-making process for company management and decision-makers (Widjaja & Mauritsius, 2019). Stable sources of high-quality data are a prerequisite for successful analysis and decision-making, and that data empowers decision-making (Kasten, 2020).

Business Intelligence is an essential priority for many companies because it significantly influences performance (Huang et al., 2022). This aligns with the research of Hani Zulkifli Abai et al., (2019), namely in managing and developing performance strategies in the public sector. It also requires in-depth analysis to encourage better decision-making in formulating and implementing strategies to improve organizational performance. The business intelligence dashboard presents the information leaders need to evaluate performance and make decisions (Noval, 2020).

The Public Service Agency (BLU) is an agency within the Government that was established to provide services to the community in the form of goods and/or services

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that are sold without prioritizing profit seeking and in carrying out its activities based on the principles of efficiency and productivity (Presiden Republik Indonesia, 2004).

The Technology Service Center (Pusyantek) is BRIN's central unit in providing technology services, which provide solutions to various technological problems and is at the forefront of disseminating technological innovations (Pusyantek BRIN, 2023). The Technology Service Center at the National Research and Innovation Agency is a government agency whose financial management implements the BLU financial management pattern (Menteri Keuangan Republik Indonesia, 2022). Pusyantek is tasked with disseminating Technology Product and Service Innovation to increase the Nation's Competitiveness and Independence and meet the needs for technology for all interested parties in Indonesia, starting from the Government sector, Private Industry, SOEs, and the Community.

Seeing the importance of business intelligence dashboards, to the author's knowledge, the implementation of business intelligence dashboards for financial performance analysis has yet to be done much. In addition, research related to the implementation of business intelligence dashboards for financial performance analysis in Public Service Agencies in Indonesia will be conducted. Several previous studies have discussed financial performance analysis at the Public Service Agency. A study conducted by Fathoni & Jayadi, (2022) explained how Metabase and Data Warehousing can answer the needs of the Palm Oil Public Service Agency by creating graphic visualizations. The successful implementation of the Business Intelligence Dashboard in the Palm Oil Public Service Agency will add to a series of successes and excellent examples for conveying decisions and policies for government agencies, especially the Public Service Agency. Silvia Febriola & Bai Saroh, (2023) revealed that BLU LEMIGAS's performance is affected by uncollectible receivables, which will have an impact on Services and Operational Expenditure for the Implementation of Service Activities. Patricia & Pamungkas, (2020) explained that the management of PNBP receivables has used a technology-based information system that can help improve efficiency, but in some cases, it still needs to be updated manually.

The value of BLU's cash balance can be influenced by the amount of revenue realization minus the realization of expenditure in the current year. In addition, it is also influenced by the amount of receivables that have not been received. There has never been any previous research related to the financial performance of the Public Service Agency of Technology Service Center BRIN.

Based on the description above, the author is interested in analyzing financial performance with the help of business intelligence dashboard at the Public Service Agency of the BRIN Technology Service Center. The benefits of the results of this study are expected to provide insight to leaders in order to increase BLU's cash balance, especially at the Public Service Agency of the BRIN Technology Service Center. The practical benefit of the results of this study is that it will contribute to the reader as an additional reference for knowledge about the implementation of business intelligence dashboards for financial performance analysis, especially in Public Service Agencies in Indonesia. In addition, it is helpful for further research, considering that research related to the Public Service Agency still needs to be conducted.

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METHODS

The research method used in this study is qualitative descriptive, which describes the current condition from observation using the analysis of existing facts so that this type of research is not the result of forecasting but the result of analysis of past and present conditions (Fauzi et al., 2021). The source of data in this study is primary data, namely 2019 – September 2023 which was obtained through observation and interviews. The subject of this study is the Public Service Agency of the BRIN Technology Service Center. The object of this study is a business intelligence dashboard that can provide insight to leaders so that it can help in making the right and effective decisions.

The research method used is the system development method with the Business Intelligence Roadmap approach which consists of 6 (six) stages, such as (1) Justification, will describe the process of identifying business needs; (2) Planning, will explain the evaluation process of technical and non-technical infrastructure; (3) Business Analysis, will explain the details of the analysis of the problems and business needs; (4) Design, will feature database and data warehouse designs; (5) Construction, will describe the ETL process; and (6) Deployment, will display a dashboard visualization using the Power BI app (Moss & Atre, 2003).

RESULTS AND DISCUSSION

This section will be divided into six subsections in the creation of business intelligence dashboards for financial performance analysis using Microsoft Power BI.

1. Justification

The business needs at BLU Pusyantek BRIN are to understand the target of determining potential partners for technology services and understand various trends related to technology services that can affect the achievement or realization of BLU's revenue. Existing service and financial data are still manual in Excel files, and no dashboard can display visualizations and provide insights to leaders for decision-making.

After analyzing the user's needs for information and the problems faced, designing a business intelligence system using Microsoft Power BI. The proposed business intelligence system will provide several advantages, such as:

1. Created a database for service and financial data;
2. A data warehouse is created for the data needed through the ETL process;
3. A dashboard was created that was able to provide insight to leaders as supporting materials in decision-making.

2. Planning

To build a business intelligence dashboard, various infrastructures are needed to support successful implementation. The infrastructure needed by the BLU Pusyantek consists of 2 (two) components, such as technical infrastructure and non-technical infrastructure.

The hardware specifications used by BLU Pusyantek BRIN are:

- Processor: intel corei5
- Memory: 8 GB
- Harddisk: 500 GB
- Display Adapter: NVIDIA GeForce MX350

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The specifications of the software used by BLU Pusyantek BRIN are:

- Operation System: Windows 11
- Database: XAMPP
- KNIME: as a tool for the Extract, Transform, Load (ETL) process
- Microsoft Power BI : as a dashboard processing and design tool

From the hardware and software specification data owned by BLU Pusyantek BRIN, these specifications are sufficient for the implementation of the business intelligence dashboard.

3. Business Analysis

The purpose of the business intelligence dashboard for BLU Pusyantek BRIN is as a tool to assist leaders in decision-making. The data displayed is very helpful in influencing decision-making.

The data used for the BI dashboard design includes data for the last 5 (five) years, namely from 2019 to 2023. From the overall Excel data that has been provided, an analysis will be carried out to get relationships between tables. Then, the data cleansing process is carried out before being entered into the database. Next, the ETL process is carried out in the data warehouse, and then the OLAP process is carried out using Microsoft Power BI.

Table 1. Financial Data 2019 – 2023

Year	Revenue	Account Receivable	Revenue Expenditure
2019	122.805.880.184	26.263.798.295	147.370.673.144
2020	106.175.149.449	17.111.339.221	110.298.839.985
2021	80.909.926.289	21.615.654.377	90.463.434.494
2022	98.542.990.265	17.718.852.085	105.243.216.852
2023	58.507.132.407	23.397.590.502	62.572.346.034

Source*:* data that has been processed by the author (2024)

Description: This financial data table presents data on the realization of revenue, account receivables and revenue expenditure that occurred during 2019 to 2023

This business intelligence design is displayed as a dashboard that can provide information to support expected decision-making, including:

1. Achievement of realization of revenue and expenditure, receivables, and financial ratios;
2. BLU revenue trends, BLU revenue expenditures, receivables, and blu cash balances;
3. Forecasting blu cash balance

4. Design

At this stage, the design of the database and data warehouse of the business intelligence system at BLU Pusyantek BRIN is adjusted to the needs of what information will be displayed and used to support decision-making.

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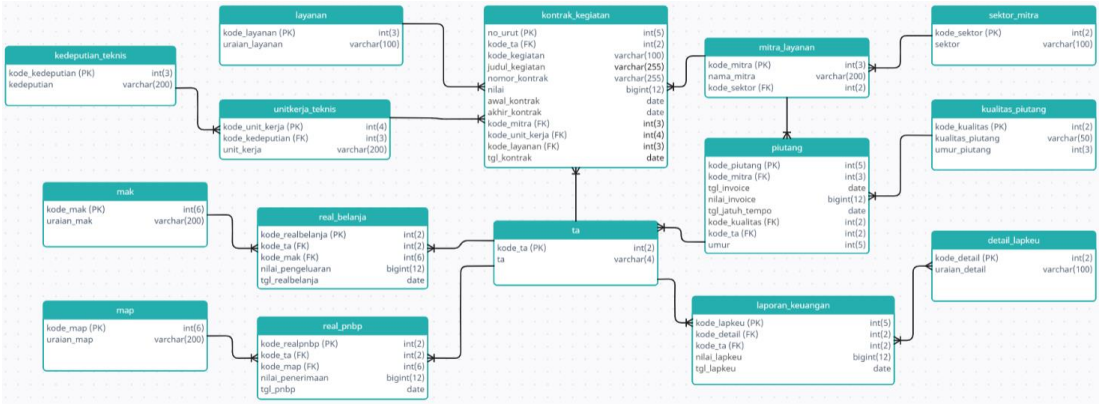

Figure 1. Snowflake Schema Database
Source: data that has been processed by the author (2024)

Description: database relationship tables

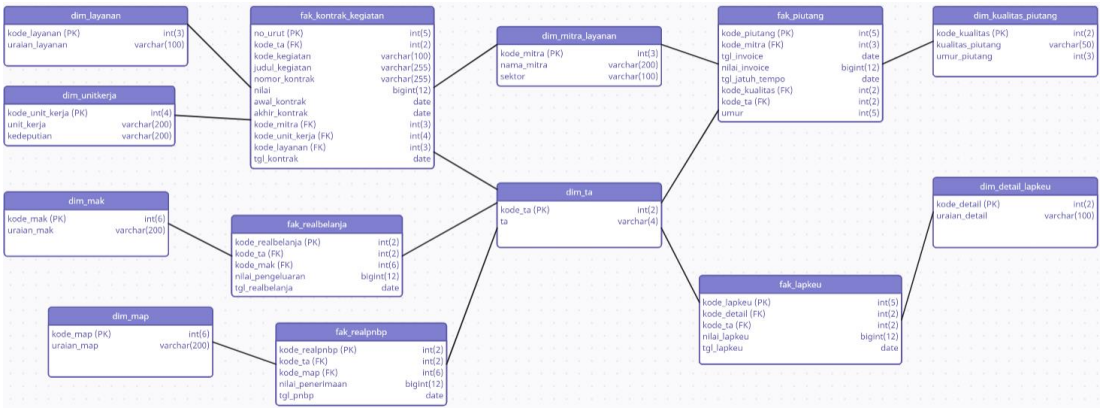

Figure 2. Galaxy Schema Data Warehouse
Source: data that has been processed by the author (2024)

Description: The data warehouse consisting of 5 (five) fact tables and 8 (eight) dimension tables.

5. Construction

Design the ETL process flow to move the source database (OLTP) into the data warehouse (OLAP) and determine the software to be used for the ETL process, namely KNIME.

The ETL process of the financial statement fact table is carried out to create a fak_lapkeu that involves a dimension table as a foreign key in the fact table and enter the quantity that is a fact in the galaxy schema of the dw_blu_pusyantek data warehouse.

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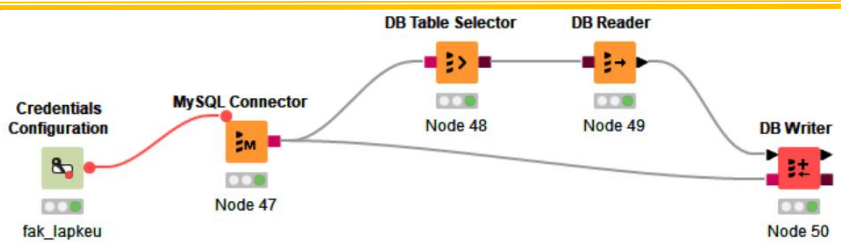

Figure 3. ETL Process of Financial Statement Fact Table
Source: data that has been processed by the author (2024)

Description: In the Credentials Configuration process, the configuration of the Name: "fak_lapkeu" variable for authentication is processed further and the configuration of username: "root" which aims to connect to the mysql database. MySQL Connector is configured with Hostname: "localhost" and selects the database "db_blupusyantek" to be used, as well as selecting credentials "fak_lapkeu". The DB Table Selector is configured with the schema "db_blupusyantek", the "laporan_keuangan" table and uses a query to retrieve the data on the "detail_lapkeu", and "ta" tables with the command:

```
SELECT laporan_keuangan.kode_lapkeu, detail_lapkeu.kode_detail, ta.kode_ta,
    laporan_keuangan.nilai_lapkeu, laporan_keuangan.tgl_lapkeu
FROM laporan_keuangan
INNER JOIN detail_lapkeu ON laporan_keuangan.kode_detail =
    detail_lapkeu.kode_detail
INNER JOIN ta ON laporan_keuangan.kode_ta = ta.kode_ta;
```

In the DB Reader select "write tables to disc", which aims to execute input queries in the database and retrieve the results into the KNIME data table. DB Writer is configured by selecting the destination data warehouse schema, namely "dw_blu_pusyantek" and the "fak_lapkeu" table which aims to insert data rows in the data warehouse based on the columns selected from the input table.

6. Deployment

Financial Dashboard that can provide insights to leaders regarding the realization of revenue, revenue expenses, account receivables, BLU cash balances and financial ratios that can be adjusted according to the fiscal year.

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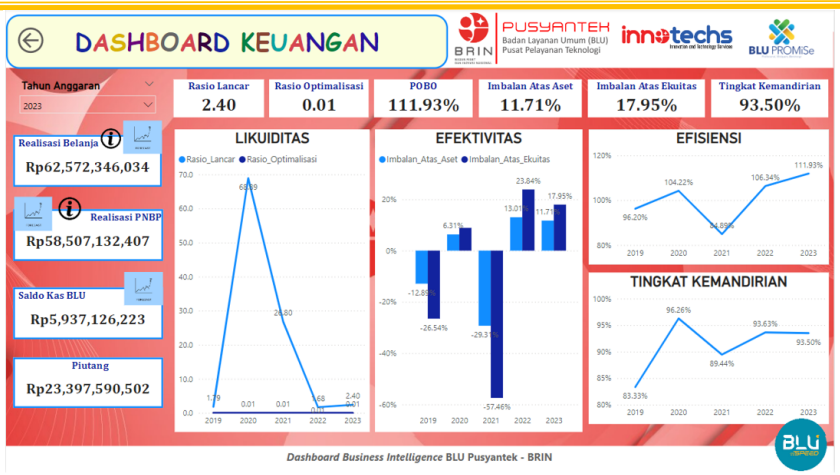

Figure 4. Dashboard Financial Performance
Source: data that has been processed by the author (2024)

Description: The Financial Performance Dashboard displays revenue and revenue expenses data, blu cash balances, account receivables, and financial ratio trends from 2019 to 2023.

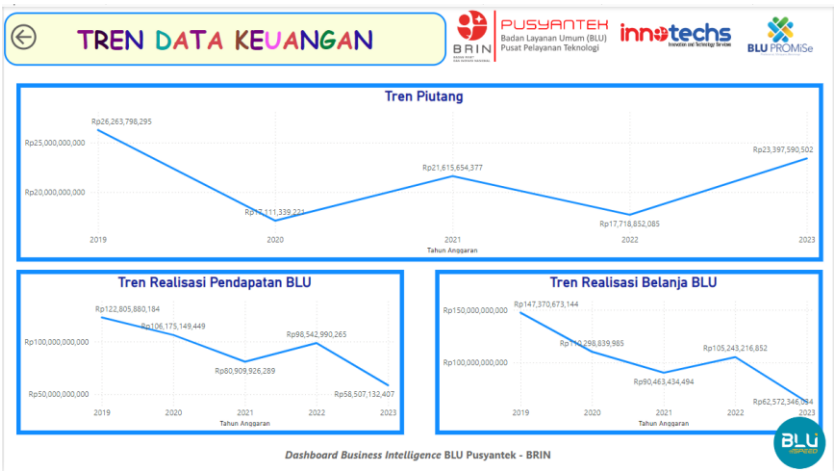

Figure 5. Trends Financial Data
Source: data that has been processed by the author (2024)

Description: This dashboard displays revenue, revenue expenses, and account receivables trends from 2019 to 2023.

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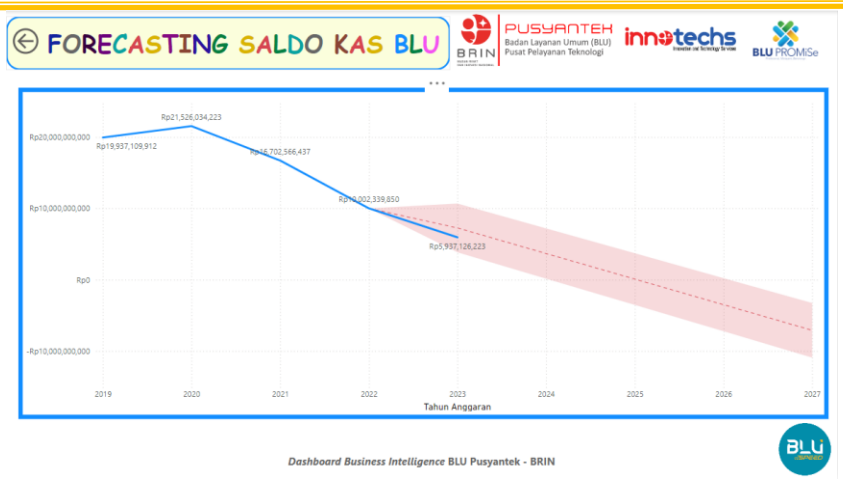

Figure 6. Forecasting BLU Cash Balance
Source: data that has been processed by the author (2024)

Description: This dashboard displays blu cash balance forecasting for 2023 – 2027

The insights obtained from the BLU Cash Balance Trend are as follows:

1. BLU's cash balance experienced a very significant decrease because the realization of expenditure (Rp62,572,346,034,-) was greater than the realization of PNBP (Rp58,507,132,407,-). This is because BLU Pusyantek can provide bridging to fund service activities,
2. The total value of significant receivables (Rp23,397,590,502) has not been received by BLU Pusyantek.

Therefore, in the future so that the blu cash balance is not always eroded, what must be done is to make policies related to the amount of bridging that can be issued to finance technology service activities, make an application for monitoring the budget for service activities so that spending can be controlled, and make improvements in receivables management.

CONCLUSION

The BI dashboard, which was built using the Business Intelligence Roadmap method, displays a visualization of the financial performance data of the BRIN Technology Service Center Public Service Agency. The BI dashboard is designed to help leaders make decisions to improve financial performance in terms of increasing BLU's cash balance. The insight obtained from this business intelligence dashboard is that to increase the value of BLU's cash balance, it is necessary to make improvements in better management of receivables, so that the value of receivables can be minimized. In addition, in the process of selecting technology service partners, they must also be more selective by looking at historical payment data from partners.

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