e-ISSN: 3108-9828 | p-ISSN: XXXX-XXXX
Volume 1 No 2 November 2024 | Page: 46-51
DOI: https://doi.org/10.64803/jocsaic.v1i2.19

Journal of Computer Science Artificial Intelligence and Communications

Journal Homepage: https://journals.raskhamedia.or.id/index.php/jocsaic

Visualization and Analysis of Employee Performance Data Using a Power BI-based Business Intelligence Dashboard

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ARTICLE INFO

Article history:

Received November 30, 2024
Revised November 30, 2024
Accepted November 30, 2024
Publish November 30, 2024

ABSTRACT

In the current digital and competitive era, the utilization of Business Intelligence (BI) technology has become crucial in supporting data-driven decision-making. This research aims to develop and analyze a Power BI-based Business Intelligence dashboard focused on visualizing employee performance. This study was conducted by collecting performance data from the Human Resource Information System (HRIS), which was then processed and visualized in the form of key metrics such as attendance rates, individual target achievements, productivity per division, and periodic performance evaluations. Power BI was chosen for its ability to integrate various data sources and present interactive visualizations that are easy for management to understand. The methodology used involves the ETL (Extract, Transform, Load) process, data model design, and the development of visual reports that support descriptive and comparative analysis. The results of this study indicate that the use of BI dashboards significantly helps the company in monitoring employee performance in real-time, identifying trends in productivity decline, and designing data-driven improvement strategies. In addition, this dashboard also serves as an effective communication tool between management and the HR division. Thus, the use of Power BI as a tool for visualization and performance analysis adds significant value to the strategic and data-driven management of human resources.

Keywords:

Business Intelligence, Power BI, data visualization, employee performance, interactive dashboard

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1. INTRODUCTION

In the rapidly evolving era of digital transformation, data has become a highly valuable strategic asset for organizations[1]. The ability to collect, process, and analyze data effectively has become one of the key factors in determining a company's competitiveness[2]. One form of data that is very important yet often not fully optimized in its use is employee performance data[3]. This data reflects the productivity, effectiveness, and contributions of both

individuals and teams towards achieving organizational goals. However, many companies still face challenges in presenting performance data in an informative, easily understandable manner that supports quick and accurate decision-making. This is where the role of Business Intelligence (BI) becomes very important. Business Intelligence refers to a set of technologies, processes, and tools used to transform raw data into meaningful information that can be used to support business decisions. One of the BI tools that is becoming increasingly popular among professionals is Microsoft Power BI. Power BI offers powerful, interactive data visualization capabilities and is integrated with various data sources commonly used in business environments, such as SQL databases, Excel, and Human Resource Information Systems (HRIS)[4].

Visualizing employee performance data with the help of Power BI not only helps the company understand productivity and performance trends but also enables early identification of potential issues, such as declining motivation, high absenteeism, or workload mismatches[5]. By displaying key performance indicators (KPIs) in the form of interactive dashboards, management can quickly obtain a comprehensive overview of the company's HR conditions without having to sift through lengthy and complex static reports[6]. Furthermore, integrated employee performance analysis through BI allows for a more strategic approach in human resource management[7]. relevant data, rather than just subjective assessments[8]. This aligns with modern management Decisions such as awarding, training, promotions, or performance interventions can be based on accurate and approaches that prioritize data-driven decision making (DDDM), which is the practice of making decisions based on measurable data and analytics. However, the implementation of a BI system for employee performance analysis also requires careful planning and design. This process includes data collection from various dispersed sources, data cleaning and transformation to make it suitable for analysis, as well as the creation of effective visualization structures. Challenges such as data quality, system integration, and end-user understanding of the built dashboard must also be taken seriously to ensure the system functions optimally and truly benefits the organization.

This research aims to design and implement a Power BI-based Business Intelligence dashboard that can effectively visualize and analyze employee performance data[9]. The main focus of this research is how performance data that has been stored in the HRIS system can be processed into visual information useful for strategic decision-making by management[10]. This project also emphasizes the importance of presenting data that is not only informative but also engaging and easy to understand for users from various backgrounds, both technical and non-technical[11]. In its development, this research will go through several important stages, namely user needs identification, data extraction and transformation, data model design, visualization building in Power BI, and evaluation of the effectiveness of the resulting dashboard. The ETL (Extract, Transform, Load) method will be used to process data from its original source, while good dashboard design principles, such as simplicity, consistency, and focus on important information, will be applied in building the visualizations[12].

With the presence of this dashboard, it is expected that the company can gain a better understanding of their employees' performance, both individually and collectively. Additionally, this dashboard is also expected to enhance transparency and accountability in the performance evaluation process, reduce bias in assessments, and facilitate more effective communication between the HR division and the company's management. Furthermore, this research also contributes to the literature in the field of Business Intelligence, particularly in its application to human resource management. Although BI technology has been widely used in various sectors, its application for employee performance analysis is still not very common, especially in organizations that have not fully adopted a data-driven approach. Therefore, the results of this research can serve as a reference or case study for other companies that wish to implement a similar system[13].

Overall, this study presents a practical and measurable approach to utilizing Power BI-based BI to enhance the effectiveness of employee performance management[14]. Through interactive and informative data visualization, companies can improve the quality of decision-making, identify problems more quickly, and develop more targeted and sustainable HR development strategies[15].

2. RESEARCH METHODOLOGY

This research uses a quantitative approach with a systems engineering method aimed at building a Power BI-based Business Intelligence (BI) dashboard for visualizing and analyzing employee performance data. The research is conducted in a structured manner through several main stages, starting from data collection, data processing, dashboard design, to system evaluation. The methods used are explained in the research structure as follows.

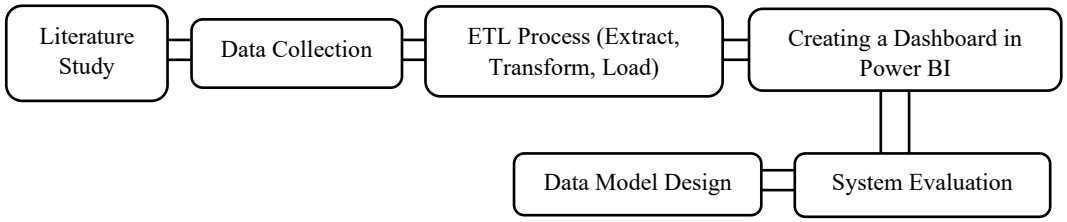

Figure 1. Research Flow

2.1 Literature Study

The initial stage involves reviewing theories and concepts related to Business Intelligence, data visualization, employee performance analysis, and the use of Power BI. The literature sources used include scientific journals, reference books, Power BI documentation, and case studies on the implementation of BI in human resource management (HRM).

2.2 Data Collection

The data used in this research is secondary data obtained from the human resource management information system (HRIS) of an organization. Data includes:

a. Employee information (name, division, position)
b. Attendance record
c. Results of periodic performance evaluation
d. Work targets and individual achievements
e. Absence and leave data
f. Key Performance Indicators (KPIs).

The data collection method is carried out through direct access to the company's database (if available) or through Excel/CSV files provided by the HR department

2.3 ETL Process (Extract, Transform, Load)

After the data is obtained, the ETL process is carried out as an important stage in data management:

a. Extract: Taking data from various sources, whether from Excel files or databases.
b. Transform: Data cleansing, removing duplicates, changing inconsistent data formats, and re-encoding if necessary.
c. Load: Entering the processed data into Power BI Desktop for the next steps.

2.4 Data Model Design

The loaded data will be organized into a relational data model using Power BI features such as Power Query Editor and Data Model View. The relationships between tables will be adjusted based on key fields such as Employee ID or Department ID. The goal of this stage is to ensure good data integration and efficiency in the aggregation process.

2.5 Creating a Dashboard in Power BI

This stage is the core of the research, which involves building an interactive dashboard that visually displays employee performance information. Some of the visual elements used include:

a. Bar and line chart for monthly performance trends
b. Donut chart for performance distribution by division
c. Table matrix for the list of employees with the highest and lowest performance
d. Slicer/Filter for interactivity based on time, division, and specific indicators

The dashboard is designed with attention to user experience (UX) principles, visual clarity, and navigation simplicity so that it can be used by non-technical users..

2.6 System Evaluation

The evaluation is conducted using two approaches:

a. Functionality Testing: Ensuring all visuals work as expected, filters operate correctly, and the displayed data is accurate.
b. User Acceptance Test: Using questionnaires for users (HR managers and HR staff) to assess the clarity of visualizations, the usability of the dashboard, and the benefits for decision-making.

2.7 Documentation and Analysis of Results

The entire process is documented for research reporting purposes. The results from the dashboard, user feedback, and analysis of employee performance trends are discussed in depth in the results and discussion chapter.

3. RESULT AND DISCUSSION

3.1 Implementation of Power BI Dashboard

After going through the ETL process and data model design, the Business Intelligence dashboard was successfully built using Power BI Desktop. This dashboard presents employee performance information in the form of interactive and easily understandable visualizations. The visualizations displayed consist of various key performance indicators (KPIs), such as average attendance, achievement of work targets, monthly performance evaluations, and productivity by division

Here is the view of the developed dashboard structure:

a. General Summary Page: Displays the total number of employees, average performance score, and monthly performance trend graph.
b. Employee Detail Page: Interactive tables and individual graphs based on employee names, evaluation scores, absenteeism, and achieved work targets.
c. Division Page: Provides performance visualization based on work units/divisions, allowing for performance comparisons between teams.

3.2 Visualization and Performance Findings

Based on data from 50 employees over 6 months, an analysis was conducted on performance trends and the factors influencing them. The table below displays a summary of performance by division:

Table 1. Average Performance and Attendance Scores per Division

Division	Average Performance Score (1–100)	Attendance (%)	Target Achieved (%)
Marketing	88.5	96.2	92.3
Operational	82.7	94.1	87.5
Finance	91.3	97,5	95.0
SDM	85.4	95.8	89.7
DIA	78.2	92.4	84.1

The Finance Division shows the best performance with the highest performance score and the most consistent target achievement rate. In contrast, the IT Division shows relatively lower performance scores and target achievements, although its attendance rate is still in the good category.

3.3 Monthly Performance Trend

The visualization of the performance trend over the past six months shows a significant peak in the fourth month, particularly in the Operations and IT divisions. This is likely due to seasonal work overload and temporary labor shortages that occurred.

Table 2. Monthly Performance Score Trend (Aggregate of All Divisions)

Month	Average Performance Score
January	84.3
February	86.1
March	88.7
April	79.5
May	85.9
June	89.4

There was a significant decline in performance in April, caused by several internal factors such as the adjustment to the new system and collective leave. After that, performance gradually improved until it peaked in June.

3.4 User Evaluation Dashboard

The evaluation was conducted through the distribution of questionnaires to 10 users (HR division staff and managers). Aspects that were evaluated include ease of use, clarity of visualization, usefulness of information, and contribution to decision-making. The evaluation results are summarized in the table below:

Table 3. User Evaluation Results

Evaluation Aspect	Average Score (Scale 1–5)
Navigation Facility	4.7
Clarity of Visualization	4.5
Data Relevance	4.6
Usefulness in Decision Making	4.8
General Satisfaction	4.7

The dashboard is considered very useful and easy to use by end users. Interactive features such as filters by month and division are very helpful in conducting more in-depth analysis. Simple yet informative visualizations are considered to enhance efficiency in unifying and performance.

3.5 Discussion

The results of the dashboard implementation show that Power BI can be an effective tool in supporting data-driven employee performance management. The interactive visualizations provided enable the company to:

a. Conducting real-time performance monitoring.
b. Identifying high or low-performing employees.
c. Analyzing performance trends across periods and divisions.
d. Making data-driven decisions more objectively.

However, this research also reveals several challenges, such as:

a. Dependence on the quality of data sources. Inconsistencies in input data in the HRIS reflect the accuracy of visualizations.
b. There is a need for a brief training for non-technical users so that they understand the use of the provided filters and analytics.

Overall, the developed dashboard is capable of enhancing transparency, efficiency, and accuracy in the employee performance evaluation process. These results demonstrate significant potential for the development of similar BI systems in other organizations, particularly in data-driven human resource management.

4. CONCLUSIONS

This research shows that the implementation of a Power BI-based Business Intelligence dashboard can provide an effective and efficient solution for visualizing and analyzing employee performance data. By utilizing Power BI's interactive features, data that was previously stored in a less structured and difficult-to-analyze format has been successfully transformed into visual information that is easy to understand, accurate, and supports data-driven decision-making. The developed dashboard is capable of displaying various key performance indicators such as average attendance, achievement of work targets, monthly evaluation scores, and performance comparisons. The analysis results show that this dashboard successfully identifies performance trends, detects performance declines at specific times, and assists in formulating productivity improvement strategies. Evaluation by end users also indicates that this system is very helpful in managerial activities, particularly by the HR division and unit leaders. Users find the dashboard easy to use, informative, and relevant. Asi, el uso de Power BI en la gestión y visualizacion de datos de rendimiento de los empleados ha demostrado proporcionar un valor añadido real, tanto en términos de eficiencia, transparencia y precision en la toma de decisiones. Para el desarrollo futuro, la integración automática del sistema HRIS a Power BI y el análisis predictivo basado en machine learning presentan oportunidades que pueden mejorar el valor estratégico de este sistema de BI en su conjunto.

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