

Implementation of Business Intelligence for Performance Evaluation of a Professional Certification Institution Using Microsoft Power BI

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Abstract

The Cipta Unggul Human Resource Management Professional Certification Body (LSP) faces challenges in its organizational performance evaluation process because operational certification data is still stored in various separate spreadsheet files that have not been optimally integrated. This situation results in manual report preparation, which is time-consuming, prone to data processing errors, and makes it difficult for management to monitor performance achievements quickly and accurately. This study aims to design a Business Intelligence system to evaluate the institution's performance using Microsoft Power BI. The research method employed is Design Science Research with a qualitative descriptive approach. The research stages included identifying information needs, collecting data for the 2023–2024 operational period, designing a Data Warehouse using the Star Schema model, performing the Extract, Transform, Load (ETL) process, and developing a dashboard based on key performance indicators (KPIs) aligned with the Balanced Scorecard. The research results show that the designed system is capable of integrating previously fragmented data into a single, concise information source, accelerating the reporting process, improving information accuracy, and facilitating interactive monitoring of performance indicators.

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INTRODUCTION

Advances in information technology are driving organizations to utilize data as a basis for fast, precise, and accurate decision-making. Data, previously used solely for administrative purposes, have evolved into strategic assets that can be transformed into valuable information through Business Intelligence (BI) (Sharda et al., 2021). Business Intelligence is a set of methods, processes, and technologies used to transform raw data into information that supports managerial analysis and decision-making processes (Kusumastuti et al., 2023). By implementing BI, organizations can integrate various data sources, conduct performance analysis, and present information visually through interactive dashboards.

A Professional Certification Institute (LSP) is an institution authorized to implement work competency certification and has obtained a license from the National Professional Certification Agency (BNSP). LSPs play a crucial role in ensuring the quality and competence of human resources in accordance with applicable work standards (BNSP, 2022). In its

operational implementation, LSP generates various important data such as certification participant data, assessment schedules, competency test results, certificate issuance, assessor data, and collaboration with Competency Testing Centers (TUK). At LSP MSDM Cipta Unggul, the institution's activity volume is quite high, with approximately 900 certification participants per year, approximately 900 certificates issued per year, supported by 31 assessors and 44 active TUKs. This large volume of data demonstrates the need for an integrated and efficient data management system.

However, data management at LSP HR Cipta Unggul still faces challenges because operational data is stored in numerous separate spreadsheet files. This situation results in manual report recapitulation, complicating data consolidation between departments, increasing the risk of input errors, and hindering management's ability to obtain information quickly and accurately. Furthermore, scattered data also makes it difficult for management to monitor performance achievements, analyze service trends, and evaluate assessor productivity and certification service effectiveness in real time (Rizqi Ni et al., 2024).

One solution that can be applied to overcome this problem is to build a dashboard-based Business Intelligence system. The BI system allows data from various sources to be collected, cleaned and integrated through the Extract, Transform, Load (ETL) process, then stored in the Data Warehouse as an analytical data center (Khan et al., 2024). The results of the data processing are then visualized in an interactive dashboard, making it easier for users to understand the overall condition of the organization. In this study, Microsoft Power BI was chosen due to its ease of use, strong data integration capabilities, and interactive visualization features suitable for management reporting needs (Imeldawaty Gultom et al., 2024a),(Anggraeni et al., 2024).

To support organizational performance evaluation, this study uses the Balanced Scorecard (BSC) approach. The Balanced Scorecard is a performance measurement method that assesses an organization from four perspectives: financial, customer, internal business processes, and learning and growth (Madsen, 2025). In non-profit organizations such as LSP, this approach can be adapted to the focus of service, accountability, process effectiveness, and improving the quality of human resources (Sobari & Muhammad Rifai, 2024). BI integration with the Balanced Scorecard allows key performance indicators (KPIs) to be displayed in a measurable manner and easily monitored via the dashboard.

Several previous studies have shown that implementing Business Intelligence can improve the quality of management reporting and support data-driven decision-making. BI dashboards have also proven effective in presenting performance information visually and in real time (Imeldawaty Gultom et al., 2024b; Jabar et al., 2025). However, research specifically addressing Business Intelligence implementation in Professional Certification Institutions remains relatively limited, particularly those that combine the Balanced Scorecard framework with dashboard visualization using Microsoft Power BI. This situation indicates a relevant research gap that needs to be developed.

Previous research shows that Business Intelligence has been widely applied to support decision-making in various organizational sectors through Microsoft Power BI-based dashboard visualizations (Anggraeni et al., 2024; Dian Dameria et al., 2024; Imeldawaty Gultom et al., 2024b). However, most research still focuses on the business and education sectors, while implementation in Professional Certification Institutions (LSP) is still very limited. Furthermore, previous research generally has not integrated the Balanced Scorecard approach as a basis for evaluating organizational performance. Therefore, this study has a novelty in the form of implementing Microsoft Power BI-based Business Intelligence combined with the Balanced Scorecard to produce a performance evaluation dashboard at Professional Certification Institutions. Based on this description, this study aims to design a Business Intelligence system for evaluating the performance of Professional Certification Institutions using Microsoft Power BI by integrating the Balanced Scorecard approach. The developed system is expected to be able to unify the institution's scattered operational data, present key

performance indicators through an interactive dashboard, and assist management in making decisions effectively, efficiently, and based on data.

METHOD

This study uses a qualitative descriptive approach with the Design Science Research (DSR) method. The qualitative descriptive approach was used to identify data management problems and management information needs at the Cipta Unggul Human Resources Professional Certification Institute (LSP). The DSR method was chosen because this study focuses on designing an artifact in the form of a Business Intelligence (BI) system capable of providing solutions to organizational problems (Hevner & Brocke, 2023).

The research was conducted from September 2025 to January 2026 at the LSP MSDM Cipta Unggul, Sidoarjo. The research object included the institution's operational data management process, including certification participant data, assessor data, assessment schedules, competency test results, certificate issuance, and Competency Test Location (TUK) data. The institution's operational activities, which reach approximately 900 certification participants per year, 900 certificates issued per year, 31 active assessors, and 44 TUKs, generate a significant volume of data, necessitating an integrated information management system.

Data Collection

The research data consists of primary and secondary data. Primary data was obtained through direct observation of the institution's business processes and interviews with leaders and administrative staff regarding management information needs. Secondary data was obtained from digital archives and spreadsheet files for the 2023–2024 period containing data on participants, assessors, assessment schedules, competency test results, and certificate issuance. Additionally, a literature review was conducted through journals, books, and previous research relevant to Business Intelligence, dashboards, and the Balanced Scorecard (Sugiyono, 2013).

The research instruments used included observation sheets, semi-structured interview guides, digital certification archive documentation, and a literature review. Observations were conducted on the institution's business processes, while interviews with management and administrative staff were conducted to obtain the information needed to be displayed on the Business Intelligence dashboard.

The research stages follow the Design Science Research method flow as shown in Figure 1. In the problem identification stage, an analysis was conducted to identify data

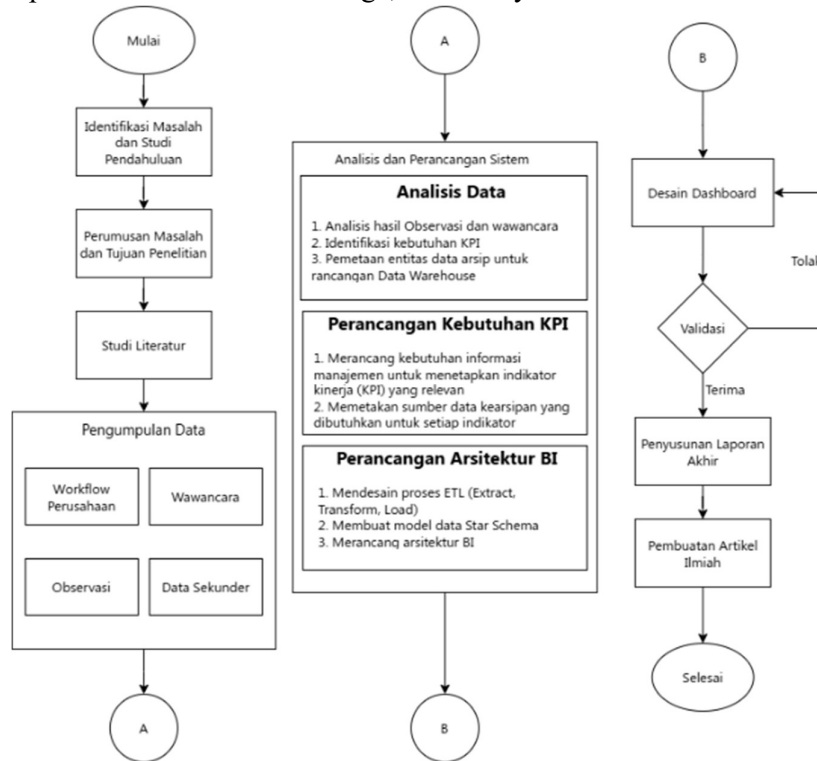


Figure 1. Flowchart of DSR Method Research Stages

management constraints, which were still scattered across numerous spreadsheet files. The next stage was data collection and system requirements analysis. The BI system was then designed by building a Data Warehouse using the Star Schema model, followed by an Extract, Transform, Load (ETL) process to clean, combine, and prepare the data for analysis (Setiawan & Isa, 2025). The integrated data was then visualized using Microsoft Power BI in the form of an interactive dashboard.

The Design Science Research method was chosen because it focuses on developing an artifact in the form of a Business Intelligence system capable of providing solutions to data management problems at LSP MSDM Cipta Unggul. This method allows for systematic problem identification, solution design, implementation, and system evaluation.

Performance measurement is carried out using the Balanced Scorecard (BSC) approach which includes four perspectives, namely financial, customer, internal business processes, and learning and growth (Dawali, 2024). Each perspective is translated into key performance indicators (KPIs) that are tailored to the needs of the organization.

Table 1. Key Performance Indicators

BSC Perspective	KPI Name	Definition and Purpose	Target
Finance	Number of Certificates Issued	Measures service volume and operational growth.	Maximize
Customers	Active TUK Availability	Calculates partnerts serving as Competency Testing Sites (TUK).	Maximize
Internal Process	Average Issuance Duration	Time from assesment to certificate issuance (SLA).	< 30 Days

Internal Process	Print Accuracy Rate	Percentage of successful prints without errors/returns.	100%
Learning and Growth	Equitable Assessor Workload	Measures the distribution of assessment assignments among assessors to ensure an equitable workload..	evenly

Data analysis was conducted descriptively by processing the institution's operational data into managerial information through a Business Intelligence dashboard. The analysis stages included data cleansing, data integration, performance indicator mapping, and interpretation of the dashboard visualization results to support the institution's performance evaluation.

System evaluation is conducted to assess the feasibility of the designed dashboard. Testing includes suitability for user needs, ease of use of the interface, and accuracy of the displayed data. Usability testing is necessary to ensure the dashboard is easy to use by end users (Kaban et al., 2020). The evaluation results are used to assess the effectiveness of the Business Intelligence system as a monitoring and management decision-making tool.

RESULTS AND ANALYSIS

The implementation of a Business Intelligence system at LSP MSDM Cipta Unggul resulted in an interactive dashboard based on Microsoft Power BI, which is used to support the institution's performance evaluation. The system was built by integrating digital certification archive data previously stored in various separate spreadsheets into a single, centralized data source. Implementation results demonstrated that the system is able to present information more quickly, accurately, and easily understood by management.

The initial implementation phase involved an Extract, Transform, and Load (ETL) process using SQL Server. Operational data from various source files was cleaned, standardized, and entered into dimension and fact tables in the Data Warehouse. This process included the creation of dimension tables such as certification scheme data, partners/TUKs, participants, assessors, and time.

```

1  --
2  --
3  # ** (1) ETL DIM_SKEMA**
4  --
5  --
6  -- sql
7  --
8  -- ETL DIM_SKEMA
9  --
10 --
11 TRUNCATE TABLE dim_skema;
12
13 INSERT INTO dim_skema (id_skema, nama_skema, biaya_sertifikasi, kuota_target)
14 SELECT
15     TRIM(id_skema),
16     nama_skema,
17     biaya_sertifikasi,
18     kuota_target
19 FROM stg_dim_skema;
20
21 --
22 --
23 # ** (2) ETL DIM_MITRA (dengan id_mitra dimulai dari 1)**
24 --
25 --
26 ## Tambahkan row_id jika belum ada:
27 --
28 -- sql
29 IF COL_LENGTH('stg_dim_mitra', 'row_id') IS NULL
30 ALTER TABLE stg_dim_mitra ADD row_id INT IDENTITY(1,1);
31 --
32 --
33 ## Insert ke dim_mitra:

```

Figure 2. Data Processing at the Extract, Transform, Load (ETL) Stage

The executive dashboard is designed to provide management with an overview of the organization's performance. It displays key indicators such as total certificates issued, total revenue, average service duration, annual certificate trends, and revenue by certification scheme name.

Based on the dashboard results, a total of 1,807 certificates were issued during the 2023–2024 period, generating a total gross revenue of Rp1,036,400,000. Furthermore, the average service duration was recorded at 45.47 days.

The operational dashboard is used to monitor daily activity and the distribution of assessments by partner/TUK and certification scheme. This dashboard helps management identify partner locations with the highest assessment volumes and the composition of partner categories, such as universities, private TUKs, and agencies.

Based on the dashboard visualization, the majority of assessment activities are still concentrated in a few key partners, while other partners have relatively low assessment volumes. This situation indicates the need for a strategy to optimize collaboration among partners and optimize the utilization of TUK.

The assessor performance dashboard is used to evaluate assessor productivity based on the number of assessment assignments during the 2023–2024 period. The visualization results show differences in the number of assignments between assessors. Some assessors have a high assignment frequency, while others have a relatively low frequency.

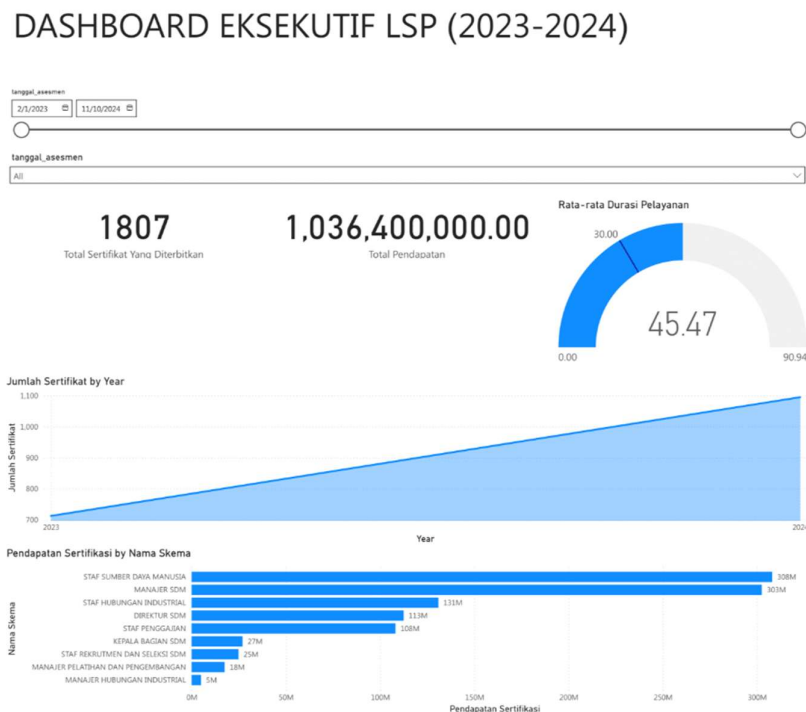


Figure 3. Operational Dashboard Visualization in Microsoft Power BI

This situation indicates that the assessor workload is not yet fully distributed equitably. This information is crucial for management in developing policies to distribute assessment assignments more evenly and improve human resource efficiency.

DISCUSSION

The results of the study indicate that the implementation of Business Intelligence using Microsoft Power BI can improve the effectiveness of data management at LSP MSDM Cipta Unggul. Prior to the implementation of Business Intelligence, the certification data management process was carried out manually using several separate spreadsheet files, which required longer reporting time and increased the risk of data inconsistencies. After the Business Intelligence system was implemented using Microsoft Power BI, data was successfully integrated into the Data Warehouse, allowing information to be presented through interactive dashboards more quickly, accurately, and easily understood. This change makes it easier for management to monitor performance indicators and supports data-driven decision-making processes.

The developed dashboard has also been validated by comparing the visualization results to the operational data used in the ETL process. The validation results indicate that the displayed information aligns with the source data, enabling the dashboard to be used as a monitoring and performance evaluation tool at LSP MSDM Cipta Unggul.

Data integration through the ETL process also improves data quality by bringing previously scattered data into a single, centralized source of information. This finding aligns with previous research that suggests Business Intelligence can improve information quality and support data-driven decision-making (Abrar & Rahman Akbar, 2025).

Furthermore, implementing the Balanced Scorecard approach through a dashboard provides added value because management can monitor performance from various perspectives, including financial, customer, internal processes, and learning and growth. Thus, the system developed serves not only as a reporting tool but also as a means of evaluating the organization's strategic performance.

CONCLUSION

This research successfully implemented a Business Intelligence system for performance evaluation at the Cipta Unggul Human Resources Professional Certification Institute (LSP), using Microsoft Power BI. The system was built through an Extract, Transform, Load (ETL) process and Data Warehouse design, allowing operational data previously scattered across various spreadsheet files to be integrated into a single source of information.

The implementation results show that the developed dashboard can present performance information quickly, accurately, and interactively. The executive dashboard displays a total of 1,807 certificates issued, total gross revenue of Rp1,036,400,000, and an average service duration of 45.47 days. The operational dashboard can monitor partner/TUK activities and assessment distribution, while the assessor performance dashboard shows that the assessor workload is still uneven.

The implementation of the Balanced Scorecard approach allows for a more comprehensive performance evaluation through financial, customer, internal business process, and learning and growth perspectives. The developed system has been proven to assist management in monitoring, identifying problems, and making data-driven decisions. This research is still limited to the use of LSP MSDM Cipta Unggul operational data for the 2023–2024 period and has not integrated the data in real time with the institution's operational system. Future studies may extend this work by integrating real-time data, incorporating certification trend prediction and service delay notification features, and applying the proposed system to other Professional Certification Institutions.

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