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Designing a Dashboard for Sales Trends and Analysis at Coventown Glodok Jakarta

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Abstract

Coventown is a coffee shop with a Chinese theme located in the Petak Enam Glodok area, Jakarta. The sales dashboard design allows Coventown Glodok Jakarta to identify sales patterns, and predict sales performance through historical data analysis. This study aims to present data in easy-to-understand visualizations to demonstrate the use of dashboards in improving the efficiency of sales monitoring, providing strategic insights into trends, and achieving sales targets to support more precise and effective decision-making. The prototype development iterations were planned quickly, and the data was processed using Microsoft Power BI and the Python programming language. The results of this study show that the sales dashboard at Coventown Glodok Jakarta effectively monitors sales in line with Key Performance Indicators (KPIs) such as time, category, product, price, and quantity. The resulting dashboard improves the efficiency of monitoring sales performance and helps the company display sales trends for best-selling products.

Keywords: *Sales; Dashboard; Prototyping; Python.*

1. Introduction

Indonesia's economy continues to experience rapid progress, with significant improvements in various key sectors. Overall economic growth remains stable, driven by increased investment flows both domestically and internationally. Additionally, business activities across different industries are growing, reflecting increased productivity and competitiveness of companies [1]. Data management in sales is an essential and mandatory activity for companies. With structured and accurate data management, a company can provide significant added value to its users. One example of this is the provision of accurate and relevant information that can serve as a foundation for supporting more informed decision-making processes. This valid information enables companies to enhance the effectiveness of their sales strategies and improve overall operational efficiency, ultimately contributing to achieving more optimal business objectives [2].

Coventown is a coffee shop located in the Petak Enam Glodok area of Jakarta, offering a Chinese-inspired atmosphere. Glodok's Chinatown is known for its strong Chinese cultural influence and has become a popular destination for tourists seeking to experience traditional Chinese culture and cuisine [3]. Coventown, located in Glodok, is a blend of historical sites, cultural diversity, and delicious cuisine, creating a unique and unforgettable experience for its

visitors. The area's rich cultural heritage, combined with its culinary offerings, makes it a standout destination for both locals and tourists alike [4]. Despite the rapid economic and business growth in Indonesia, many small and medium-sized enterprises (SMEs), including cafes and restaurants, still face challenges in managing sales data effectively and transforming it into actionable insights. In this case, sales data is often recorded manually or stored in separate systems, making it difficult for management to monitor and evaluate sales performance in real time. Furthermore, the lack of standardized performance measurement, such as the use of Key Performance Indicators (KPIs), prevents managers from accurately assessing business objectives and adjusting marketing efforts to meet sales targets [13], [14]. This situation highlights the need for a system capable of integrating, processing, and presenting data efficiently through interactive visualization, such as dashboards [5], [6]. A dashboard supported by Business Intelligence (BI) technology enables the presentation of complex data in a visual and measurable format, facilitating trend identification and performance monitoring to support strategic decisions [2], [15].

A dashboard is a tool used to visualize data collected from various activities within an organization or company. By using a dashboard, complex information can be transformed into a visual format that is easy for users to understand [5]. A dashboard presents data visualizations in an easy to understand visual interface. This allows users to quickly and comprehensively view and analyze data, facilitating decision-making processes. Similar approaches integrating BI tools and data mart architectures have also been successfully applied to decision support systems in both educational and commercial contexts, resulting in improved data accuracy and faster reporting processes [10], [15], [16]. These studies collectively support the significance of combining prototyping and dashboard-based BI systems to address challenges in data management and performance monitoring within small and medium enterprises. Therefore, designing an interactive sales dashboard prototype for Coventown Glodok Jakarta using the prototyping method to increase decision-making effectiveness is necessary [7], [9].

Prototyping is a fundamental approach in product development and innovation, by improving the quality of the final product.The main objective of this research is to design and develop an interactive sales dashboard prototype for Coventown Glodok Jakarta by applying the prototyping method. This research aims to improve the company's data management and visualization capabilities, thereby enabling a more accurate, efficient, and data-driven decision-making process. The developed dashboard is expected to provide measurable benefits by simplifying sales performance monitoring, identifying trends, and evaluating Key Performance Indicators (KPIs) in real-time [2], [7]. Through the integration of Business Intelligence (BI) tools, this system will facilitate the transformation of raw sales data into actionable insights, thereby improving business strategies, optimizing operational efficiency, and supporting the achievement of organizational goals.

2. Literature Review

Dashboards function as data analysis tools that present information visually and integrates prototyping methods with the development of interactive, Python-based dashboards for sales trend analysis emphasizes the flexibility and rapid iteration through prototyping methods to make the results more adaptable to the needs of business users. This shows on a research in several previous studies have explored the implementation of data visualization and business intelligence systems to improve organizational decision-making. Research in retail and service industries demonstrated that dashboards play a critical role in simplifying data interpretation and enhancing managerial performance by providing real-time analytical insights [2], [5], [6]. In addition, the use of the prototyping method in system development has been proven effective for refining user requirements and accelerating feedback cycles, as seen in projects such as Smart Village applications and interactive crime analytics dashboards [9], [13].

On the other hand in academic sector, successfully created a dashboard using Goal Directed Design method can visually present key performance indicators (KPIs) to improve stakeholder insight and reporting speed—findings transferable to small business dashboards [6], [16], which makes it easier to evaluate student and program performance. Evaluations using Performance Metrics and User Experience Questionnaires (UEQs) demonstrate that dashboards significantly increase data analysis efficiency [6]. Then, the study focused on sales data management through business intelligence with dashboard visualization [2]. This study used a data warehouse, a snowflake schema, and ETL processes with Pentaho to create interactive

dashboards that display trends, behavior, and top-selling products. This demonstrates the important role of interactive dashboards in business decision-making.

Several studies report implementations of dashboard-based business intelligence and decision support systems in retail and food-service contexts that closely match the present case. Implementation of BI for sales data management in retail demonstrated measurable improvements in sales monitoring and managerial decision-making, providing a direct parallel to a cafe environment [2]. Web-based ordering and canteen payment systems illustrate practical data-capture workflows and integration challenges typical for food-service outlets, which are relevant when designing a sales dashboard for a café [1]. Work on location- and venue-focused information systems for restaurants shows how domain-specific data (menu, location, transaction logs) can be modelled and visualized to support operations and customer-facing services [12]. Research on prototyping and iterative development methods emphasizes rapid user feedback and requirement refinement, supporting the choice of a prototyping approach for dashboard development in this study [9], [7]. Finally, literature on data-mart/DSS architectures and KPI cataloging provides established design patterns for integrating transactional data into analytical stores and selecting measurable business indicators, which underpin the technical and evaluative aspects of the proposed dashboard [15], [14], [10].

3. Methods

The software development method using the prototyping paradigm helps designers and stakeholders better understand what needs to be built when requirements are unclear [9]. In the prototyping paradigm, the process begins with communication, where users meet with stakeholders to define the overall software objectives and identify any known requirements. Rapid iterations of prototyping are planned. This prototype is used and evaluated by stakeholders, who provide feedback that is used to refine further requirements. Iteration occurs as the prototype is adjusted to meet the needs of various stakeholders while simultaneously allowing users to better understand what needs to be done [10]. The prototyping method includes several phases: Communication, Quick Plan, Modeling Quick Design, Construction of Prototype, Deployment Delivery & Feedback [11]. **Figure 1.** illustrates the process within the prototyping paradigm.

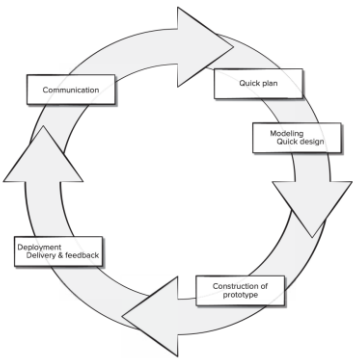

Figure 1. Paradigm Prototyping Process

1) Communication

At this stage, the communication process focused on identifying the functional and non-functional requirements for the Coventown Glodok Jakarta sales dashboard system. The functional requirements include features for displaying total sales, average products per order, average order value, best-selling products, monthly and daily sales trends, and achievement of sales targets. Each feature is designed to provide real-time and interactive visualization through charts and gauges, allowing users to monitor sales performance efficiently. The non-functional requirements cover data accuracy, ease of access, system responsiveness, and compatibility with existing data sources such as the Quinos point-of-sale (POS) system.

This method is used to obtain facts related to the system, its needs, and configurations [12]. User requirements are identified in the form of Key Performance Indicators (KPIs) that will be displayed on the dashboard. Key Performance Indicators (KPIs) are designed to assist in providing information about achievements in relation to the strategic goals that have been established [13]. At the strategic level, Key Performance Indicators (KPIs) are often influenced by

external stakeholder perspectives, focusing on long-term goals and outcomes. Meanwhile, at the tactical level (such as the operational level of a business model), managers utilize KPIs to allocate resources effectively and assess business performance in the context of broader strategic objectives [14].

Data collection was conducted through structured interviews and direct observation. The interviews involved Coventown management and staff who handle daily sales reporting and business performance evaluation. A total of five respondents participated in the process, consisting of the store manager, two sales staff, one data entry staff, and one marketing representative. The interviews aimed to obtain detailed information about sales monitoring problems, required dashboard indicators, and user preferences in data visualization. Additionally, sales transaction data from 2023 to 2024 were collected in digital form from the Quinos system and stored in an Online Transaction Processing (OLTP) database, managed using Microsoft SQL Server Management Studio. Table 1 presents the Key Performance Indicators (KPI), include sales targets. The analytical method used for sales prediction is linear regression, which helps in identifying trends and making informed decisions to achieve these targets.

Table 1. Key Performance Indicator (KPI)

No	Key Performance Indicators (KPI)	Description	Target	Target Descsription
1	Total Sales	Total income of all sales in a certain period.	5M	The target is achieved based on the maximum sales achievement according to the gauge chart, namely 5 billion in 1 period for 1 year.
2	Average Products per order	Average number of products sold in one order.	550 products /order	Increase the average value from the current (541.80) to the target of 550 through promotion
3	Average Order Value	Average revenue value from each transaction.	30.000/ transacti on	Current average order value is 27,078.62, need 10% increase to reach target.
4	Best selling products	Products with the highest number of sales during a 1 year period	10% increase	Promotional improvement strategy
5	Monthly sales	Total sales revenue by month in one year.	Monthly average: 400 millions	Targets are based on monthly performance analysis with December being the peak sales month.
6	Daily sales trends	Total daily revenue by day of the week.	20% increase in sales on Monday	Promotion strategy is focused on Monday to approach the best Sunday performance.
7	Sales target achievement	Percentage of achievement against sales targets.	100% from maximu m target	Currently it has reached 93.14%, additional efforts are needed to meet the target at the end of the period.

2) **Quick Plan and Modeling Quick Design**

In the design planning and modeling phase, the system dashboard is developed. This process includes designing the database structure in the form of a data mart, which serves to store and manage data in a structured manner. The data mart is designed to support data analysis and visualization needs on the dashboard, ensuring the presented information is relevant, accurate, and easily accessible to users. A Data Mart consists of a collection of predefined company data to support fast analysis and reporting [15]. The design of the data mart will result in an Online Analytical Processing (OLAP) database, aimed at accelerating data access and supporting more efficient analysis processes. The method used to design the data mart is the Nine-Step Kimball Method.

a) Choose the Process

In this step, the business processes involved in designing the data mart are determined. The business process used here involves daily sales transactions, which serve as the primary data source for analysis. These transactions are later extracted through the ETL

process using Pentaho Data Integration (PDI) connected to Microsoft SQL Server Management Studio (SSMS) to ensure data consistency and integrity.

b) Choose the Grain
This step determines the fact table entity obtained from the OLTP sales transaction database. The data used includes Product, Category, Time, Department, and Transactions. The data from multiple operational tables is extracted and transformed into a unified transactional dataset, maintaining a fine-grained level of sales data that supports time-series and product-based analysis.

c) Identify and Conform to the Dimensions
In this step, the dimensions to be linked to the fact table are identified. The dimensions designed in the data mart include the Product dimension, Category dimension, Time dimension, and Department dimension.

d) Choose the Facts
This step identifies the fact table for the data mart design. The fact table consists of transaction facts derived from the sales transaction process.

e) Store Pre-calculation in the Fact Table
At this step, calculations for an attribute, such as the total sales, are performed.

f) Round Out the Dimensions Tables
This step ensures that the data mart is easier for users to understand. Descriptions are added to each dimension table to provide information about the dimensions within the data mart.

g) Choose the Durations of the Database
This step determines the duration of the database to be used in the data mart design. The duration selected is one year.

h) Determine the Need to Track Slowly Changing Dimensions
In this step, slowly changing dimensions are tracked by updating or rewriting the attributes that change to store the latest values.

i) Decide the Physical Design
This stage involves implementing the Extract, Transform, Load (ETL) architecture and optimizing the physical structure of the data mart. Data from the operational system is extracted via Pentaho Data Integration (PDI), transformed through cleansing, joining, and key-generation processes, and then loaded into the Microsoft SQL Server data mart. The design emphasizes data accessibility, query performance, and scalability to accommodate future business growth. After ETL completion, data extraction tests are conducted to validate the accuracy and completeness of the load. The tested data is then visualized in Microsoft Power BI to confirm analytical readiness and ensure alignment with business objectives.

The data processing was conducted through the Extract, Transform, Load (ETL) process using Pentaho Data Integration (PDI) connected to Microsoft SQL Server Management Studio (SSMS). Once the database connection was established, data extraction, transformation, and loading were performed for the dimension tables Category, Product, Department, and Time. The ETL workflow began with the Table Input step to extract data from the SQL Server database, followed by Stream Lookup to merge data from master tables. The If Field Value Is Null function was used to handle missing values. The Select Values step was applied to rename and arrange relevant columns, while Add Sequence generated surrogate keys to uniquely identify each dimension record. After the processed data was loaded into the relational database using the Table Output step, creating the data mart within SQL Server. The Execute SQL Script step was executed to run the required Data Definition Language (DDL) queries, ensuring that the table structures were created and ready to receive the ETL outputs.

Figure 2 shows the ETL workflow for creating the Category Dimension (dim_category). Data is extracted from the source tables in SQL Server using the Table Input step. Then, Stream Lookup is used to combine data from related master tables to obtain category names. The If Field Value Is Null step handles missing or null values, replacing them with predefined defaults. Next, the Select Values step renames and selects relevant columns, and Add Sequence generates a surrogate key to uniquely identify each category record. Finally, the data is loaded into the dim_category table in the data mart using the Table Output step.

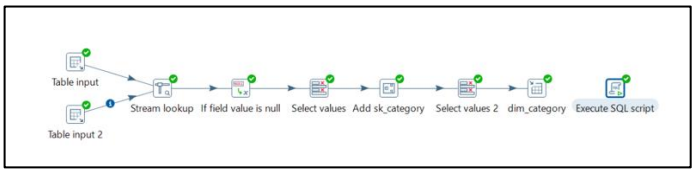

Figure 2. Transformation Steps of Category Dimension
Source: Personal Documentation

In this process, the dim_product table is created by extracting data related to product details. The steps are similar to the category dimension—data extraction via Table Input, joining reference data with Stream Lookup, handling null values, selecting and renaming attributes, generating surrogate keys, and loading the cleaned and structured product data into the data mart.

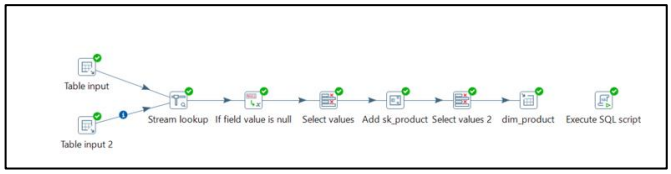

Figure 3. Transformation Steps of Product Dimension
Source: Personal Documentation

The ETL steps for building the dim_department table can be seen below in Figure 4. The process extracts department data from SQL Server, integrates it with related master data using Stream Lookup, and applies data cleansing operations. The transformation ensures each department record is complete and uniquely identified before loading it into the data mart through Table Output.

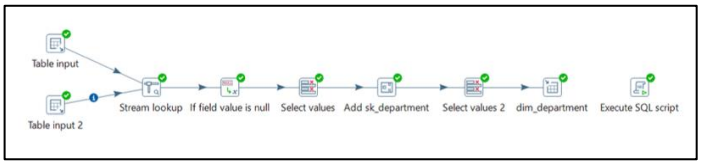

Figure 4. Transformation Steps of Department Dimension
Source: Personal Documentation

The Time Dimension (dim_time) ETL process extracts temporal data such as dates, months, and years. The transformation defines time-based attributes that facilitate time-series analysis. Similar to previous dimensions, Select Values and Add Sequence steps are used to structure and index the records properly before loading them into the dim_time table in SQL Server.

Figure 5. Transformation Steps of Time Dimension
Source: Personal Documentation

This figure illustrates the ETL process for creating the Fact Transaction (fact_transaction) table, which links all dimension tables through their surrogate keys. During this process, Table Input and Stream Lookup are used to retrieve foreign keys from dim_category, dim_product, dim_department, and dim_time. The Calculator step computes new metrics such as total_sales by summing sales values per transaction. The transformed transactional data is then loaded into the fact_transaction table in the data mart.

Figure 6. Transformation Steps of Fact Transaction
Source: Personal Documentation

The Star Schema shown in Figure 7 illustrates the logical data model used in the data mart design. At the center of the schema is the fact table (fact_transaction), which stores measurable data from sales transactions such as total sales, quantity sold, and transaction amount. Surrounding it are four dimension tables—dim_category, dim_department, dim_product, and dim_time—which provide descriptive attributes that give context to each transaction.

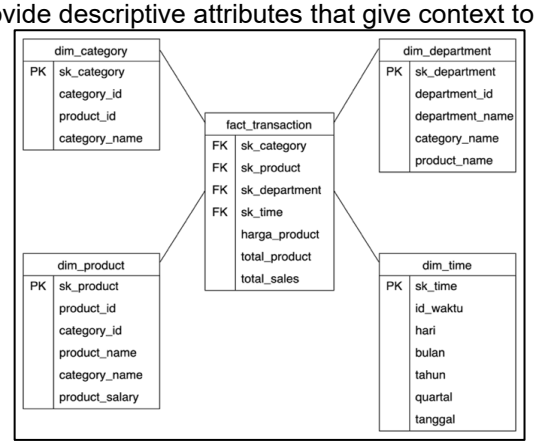

Figure 7. Star Schema Design
Source: Personal Documentation

3) **Construction of Prototype**

In this stage of the prototyping method, a prototype of the dashboard is designed. The data used in the dashboard design is first processed through the Extract, Transform, Load (ETL) process using Pentaho Data Integration (PDI). ETL is a critical mechanism in data processing that functions as a bridge to create a data mart by transforming transactional database data into a more structured and ready-to-use format [16].

After the ETL process, the data is visualized to produce the dashboard. In this study, Microsoft Power BI is used as the tool for data visualization. **Figure 2.** illustrates the architecture of the sales dashboard.

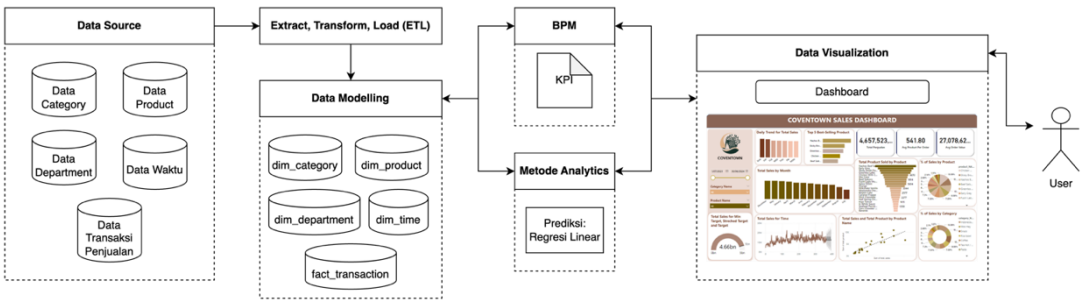

Figure 8. Dashboard Architecture
Source: Personal Documentation

4) **Deployment Deliver and Feedback**

In the final stage of the prototyping method, the designed prototype is delivered to the users. The purpose is to allow users to evaluate and provide feedback on the dashboard prototype. This feedback will be used to revise and improve the prototype. Users will also conduct testing using the User Acceptance Testing (UAT) method, which in this case employs the Black Box Testing approach to ensure that the dashboard functions according to the requirements.

4. Results and Discussion

4.1 User Interface

The designed sales dashboard for Coventown Glodok Jakarta provides an integrated and interactive visualization of sales performance. It was developed using Microsoft Power BI and connected to a structured data mart, each with a specific purpose and operational mechanism.

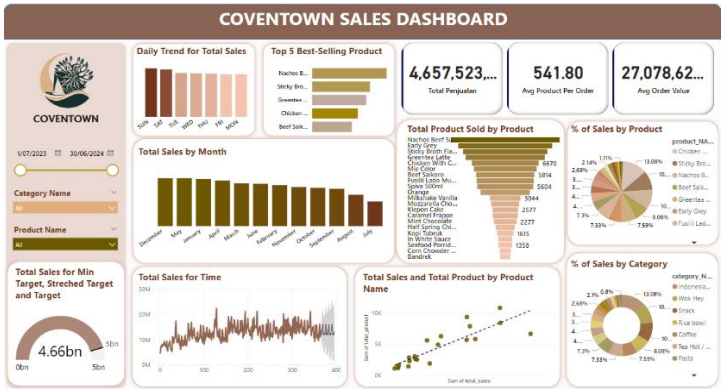

Figure 9. Sales Dashboard
Source: Personal Documentation

4.2 System Testing

System testing was conducted to ensure that the proposed sales dashboard system functions correctly and fulfills user requirements. With a strong emphasis process focused on validating both the data processing pipeline (ETL) and the dashboard functionalities using User Acceptance Testing (UAT). The testing procedures refer to the ETL workflow described in the ETL Process Document and were performed after the completion of the data mart and dashboard prototype.

The Extract, Transform, and Load (ETL) process was performed using Pentaho Data Integration (PDI), and the resulting data was stored in a data mart within Microsoft SQL Server Management Studio (SSMS). The data mart consists of several dimension tables—Category, Department, Product, and Time—and a Fact Transaction table representing sales data. For visualization, the processed data was extracted from SQL Server into Microsoft Power BI using the Get Data feature, enabling the integration of the data mart for analytical and interactive reporting purposes.

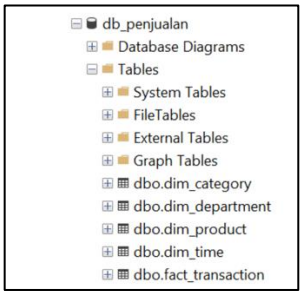

Figure 10. Data Mart in Microsoft SQL Server Management Studio
Source: Personal Documentation

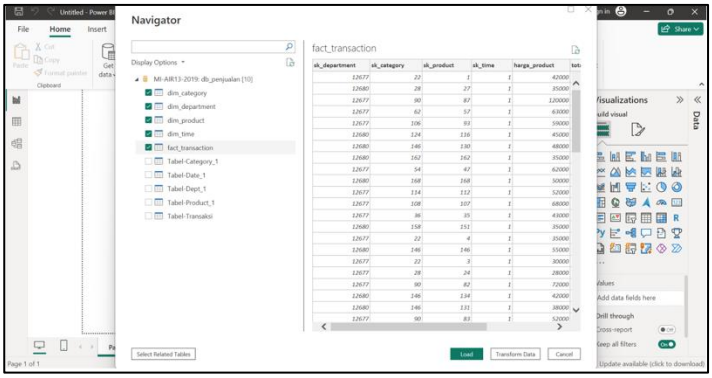

Figure 11. Selected Data to be Imported to Power BI
Source: Personal Documentation

After the ETL process was completed and validated, users interacted with the dashboard in Microsoft Power BI and performed predefined tasks based on Key Performance Indicators (KPIs), such as reviewing total sales, sales trends, best-selling products, and sales target achievement.

The UAT results indicate that the system successfully met user expectations. Users confirmed that the data presented in the dashboard were accurate, consistent with the source data, and easy to understand. The dashboard effectively supported sales performance monitoring and decision-making processes. These results demonstrate that the ETL-based system is acceptable to users and suitable for operational use.

Table 2. *User Acceptance Testing*

No	Instrument	Process	Results	Status
1.	UAT scenario sheet based on KPIs	Users validated total sales values displayed on the dashboard against ETL-processed data	Data matched user expectations	Accepted
2.	ETL validation checklist	Users verified data completeness and accuracy from ETL results in dimension and fact tables	ETL data were accurate and consistent	Accepted
3.	UAT task list	Users evaluated monthly and daily sales trends generated from ETL data	Visualizations were clear and understandable	Accepted
4.	User evaluation form	Users assessed KPI indicators and sales target achievement	All KPIs were displayed correctly and useful	Accepted
5.	User feedback summary	Users provided overall acceptance feedback on system usability	System accepted for operational use	Accepted

4.3 Discussion

This study has contribute to and reinforce existing research on dashboard based Business Intelligence (BI) systems and ETL-driven data integration for sales performance monitoring. Interactive dashboards significantly enhance managerial insight by transforming raw transactional data into meaningful visual information. For instance, Akbar et al. [2] demonstrated that BI dashboards improve sales monitoring and decision-making effectiveness in retail environments. The present study strengthens these findings by applying a similar BI approach in a small-scale café context, showing that ETL-based dashboards are not only applicable to large retail organizations but are also effective for small and medium-sized enterprises (SMEs).

Furthermore, the results align with previous studies emphasizing the importance of structured data modeling and ETL processes in supporting analytical accuracy. Jaleel and Abbas [15] reported that data mart architectures with star schemas improve query performance and reporting efficiency in decision support systems. This study reinforces their findings by demonstrating that the integration of ETL processes using Pentaho Data Integration and a star schema design ensures data consistency and reliability. Similarly, research by Nazir et al. [6] and Irvan et al. [16] highlighted that dashboards improve performance evaluation when KPI definitions are clearly aligned with business objectives.

The results of this study show that the data source used for the dashboard design consists of sales data from 2023 to 2024. The sales data from Coventown, stored in the Quinos system, is managed using a Database Management System (DBMS). The DBMS utilized for data processing is SQL Server. A quantitative analysis was conducted to compare sales performance and operational efficiency before and after the implementation of the dashboard. All the collected data is then presented in graphical visualizations using Microsoft Power BI, enabling deeper analysis to monitor sales trends at Coventown in Glodok, Jakarta. The gathered data is also used to design and build a data warehouse by implementing a star schema. The choice of a star schema is based on its ability to improve query performance, simplify data analysis processes, and facilitate the creation of reports more easily and quickly.

However, the dashboard has certain limitations. For instance, it relies heavily on the accuracy and completeness of the input data from the Quinos system. Any discrepancies or delays in data entry can affect the dashboard's output and reliability. Additionally, the dashboard's effectiveness is constrained by the lack of integration with external data sources, such as market trends or competitor analysis, which could provide a more comprehensive view of sales performance. Future improvements could include integrating additional data sources and implementing advanced predictive analytics to further enhance decision-making capabilities.

5. Conclusion

The design of the sales dashboard for Coventown Glodok Jakarta simplifies the monitoring of sales data, providing stakeholders with useful information for effective decision-making. The dashboard, implemented using Microsoft Power BI, successfully delivers comprehensive visualizations of sales performance at Coventown Glodok Jakarta. Through interactive data visualizations, users can easily understand sales trends and view the number of products sold over specific periods. The resulting dashboard serves not only as a data analysis tool but also as an effective medium for communicating information. Clear and well-organized data visualizations make complex information easier for various stakeholders to understand. Additionally, the dashboard allows stakeholders to identify trends, patterns, and opportunities that may be difficult to detect from raw data alone. Through thorough testing, it is ensured that the dashboard maintains high quality, strong relevance, and provides sustainable insights for the business. Using the prototyping method in the dashboard design process, the developed prototype is handed over to stakeholders for evaluation. This evaluation process involves reviewing and testing the prototype to ensure its design and functionality meet the stakeholders' needs and expectations. Iterations occur during this phase, where feedback from stakeholders is used to refine and improve the prototype.

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