The Implementation of Business Intelligence on Cost Accounting – Case Study of XYZ Company

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Case study

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Abstract

Introduction: XYZ is a company engaged in the port sector. XYZ is engaged in the business of loading and unloading terminal services and container buildup. To support the company's business processes.

Case Description: XYZ uses two applications in carrying out operational activities, namely the CARTOS application to manage bills and the Finance application to record company costs and revenues. To produce a cost accounting report, PT XYZ is still processing and visualizing it manually using Microsoft Excel applications with data sources from the two applications previously mentioned. There are problems related to the process, where the processing time to process data into information is quite long. So that reporting to management cannot be done in real time.

Discussion and Evaluation: The development of business competition is very rapid, the management of XYZ must be able to make decisions quickly and accurately, so company needs tools that can help the management to analyze and manage data into information in real time. The Business Intelligence (BI) method is one of the solutions to the company's needs, especially in analyzing and providing access to data to help make better decisions.

Conclusion: This study discusses the design and implementation of business intelligence solutions ranging from architecture, data warehouse, ETL processes and visualization in the form of a dashboard in accordance with the needs of PT XYZ. The method used in developing the business intelligence dashboard refers to the executive information system lifecycle method which consists of justification, planning, business analysis, design, construction and deployment. The results of this research are dashboard visualization using Power BI tools that display information and knowledge needed in the monitoring process and become material for generating management decisions related to cost accounting reports.

Introduction

A dynamic business development requires companies to be faster and more careful in every decision making. The wrong action can cause a lack of effectiveness which results in losses received by the company. Because of its importance, many companies are competing to extract information and knowledge from their data. The main objective is to support decisions made based on the results of information and knowledge analysis representing company decisions. One method used is Business Intelligence (BI). BI is defined as one of the data utilization methodologies to produce information to become knowledge in supporting strategic decision making. XYZ is a company engaged in the port sector, where PT XYZ serves terminal loading and unloading services and container buildup. To support the company's business processes, XYZ uses two applications, the CARTOS application to manage invoices and the Finance Application to record company costs and revenues.

Business Intelligence is a way to collect, store, organize, reshape, summarize data and provide information, both in the form of company internal business activity data, as well as company external

business activity data including business activities of competitors that are easily accessed and analyzed for various management activities [1].

Business Intelligence is a series of applications and technologies for collecting, storing, analyzing, and presenting data access to assist company officials in decision making [2].

In addition, according to DJ Powers, said that Business Intelligence explained about a concept and method of how to improve the quality of business decision making based on data-based systems [3]

From the three sources above, it can be concluded that Business Intelligence is the concept of collecting data, storing data and selecting data to provide information to help and improve the quality of business decision making for companies. So it can be said that the information system is a place for data entry, while the business intelligence application is a place for data analysis. Where the concept of business intelligence turns information into new knowledge and understanding for an organization.

Previous studies that are relevant to this study include research conducted by Muhd Zaimi Abd. Majid, Wan Zahran Zakaria, and Ali Keyvanfar with the research title Executive Information Site Management System for Project Performance Monitoring: System Requirements Study. In this research, it is discussed how to monitor and control the development of a construction project work by utilizing the Executive Information System technology[4]. The study uses the Classic Waterfall Model method in developing the system.

Next is a study conducted by Meyliana, Henry A. E Widjaja, and Stephen W. Santoso with the title of University dashboard research: An implementation of executive dashboard to university[5]. In this research the data warehouse development method uses the Key Performance Indicator approach which is owned by the university.

Based on research conducted by Mohammad Taleghani with the title Executive Information Systems development lifecycle explained the concepts and architecture in the development of EIS [6]. Also explained what criteria support in evaluating an EIS so as to produce an EIS that suits user needs.

Based on research conducted by Joko Christian by using a data warehouse development method using a business life cycle approach and using the functionality testing of the prototype in the form of white box testing as feedback from the user [7]. This research uses a web service system as an intermediary between the data warehouse and the applications used and the research produces a model that cannot be implemented yet.

Lutfi Izhariman, Eko Darwiyanto and Shinta Yulia Puspitasari conducted research under the title Design of Hospital Executive Information System for Evaluating Service Performance at Mohammad Hoesin Hospital Palembang [8]. In this study, it was discussed how to design an Executive Information System (EIS) that can support the processing of patient medical record data to display information on medical service indicators. The EIS design requires a data warehouse through the ETL (extract, transform, load)

process in hospital operational data and displays the results of data analysis using OLAP (Online Analytical Processing) technique.

Edy Martha, et al, also conducted research using the EIS system life cycle engineering methods and built a system model with the help of UML [9]. His research resulted in a web-based executive information system application to process data at the Cabinet Secretariat.

Research conducted by Arif N, et al, using the EIS life cycle development method with primary data contained in the data warehouse is processed so that it becomes a form that can be analyzed by OLAP Server and uses a dashboard application to perform and view the results of the analysis [10]. The results of his research are in the form of a model design in building an executive information system at UGM that can show conditions in an organization in the form of a graphical display on the dashboard, so that it can be used as a material for university executive level consideration for decision making.

This research will produce the design and results of the implementation of executive information systems in accordance with the needs of PT XYZ. This research will use the EIS Lifecycle development method in which there are 6 stages of development namely justification, planning, business analysis, design, construction and deployment. The data to be used in this application is sample data from XYZ that is pulled from the XYZ operational system.

Case Description

In the case of XYZ, currently to process data and visualize the data to be a cost accounting report is still done manually using the Microsoft Excel application. Based on the results of interviews with management, there are several issues related to the process, including :

1. Data obtained from the supporting application outputs mentioned earlier are still in the form of raw data and take time to process data into information.
2. Data that can be stored and processed in Microsoft Excel is limited so that the monitoring and view of historical data is still not optimal.
3. The process of reporting cost accounting reports to management cannot be done in real time.

PT XYZ requires a BI application that provides monitoring information related to profit and loss per project to improve management effectiveness and efficiency in strategic decision making. Therefore, the development of BI applications can be a solution to assist managers in monitoring business processes, specifically related to profit and loss per project. Development includes the design and implementation of business intelligence solutions ranging from architecture, data warehouse, ETL processes and visualization in the form of a dashboard.

Method And Simulation

In the development of executive information systems there are methods that can be used, namely the method of executive information system lifecycle. According to Taleghani, EIS life cycle is divided into 6 stages from justification to deployment [7]. In these six stages there are other stages. A description of the stages of the EIS Lifecycle can be seen in the following explanation.

Justification

In this stage, consideration is given to developing an EIS, at this stage consideration is given of business opportunities and business needs, as well as consideration of the development of an EIS with costs incurred with the benefits obtained, both business benefits or strategic benefits as decision aides.

Planning

In this stage there are two activities carried out, namely:

- Enterprise Infrastructure Evaluation

At this stage an organizational infrastructure is identified. We can carry out technical evaluation of infrastructure such as; hardware, networks, middleware, database management systems and tools.

- Project Planning

In this stage project management activities are carried out, project management is carried out so that the EIS development is carried out in accordance with the specified targets. Some basic activities in project management, namely determining the time of completion of the project, the costs required and determining who is working on the EIS development project.

Business Analysis

In this stage there are four activities carried out, namely:

- Project Requirement Definition

In this stage we define what needs are needed. There are several ways to identify needs, namely by conducting internal meetings with executives, interviewing EIS developers with executives and conducting literature studies.

- Data analysis

Data analysis focuses on identifying data sources, logic designs (ER-diagrams) and identifying attributes.

- Application Prototyping

Prototype is built to be validated in accordance with specified business requirements. The results of the validation of the prototype were evaluated and their shortcomings were corrected

- Metadata Analysis

Metadata is processed in the design and data sources are mapped to the metadata structure.

Design

In this stage there are two activities carried out, namely:

- Database Design

Activities carried out at this stage are designing logical models. Data model for processing and as data storage. Database development for EIS is different from building a database for operational systems, here are some considerations in building an EIS database, namely:

1. The purpose of the EIS database is designed to be simplified, high-performance data retrieval rather than for effectiveness and maintenance as in database operations.
2. Reducing or minimizing data redundancy or data duplication is not the target of designing the EIS database.

Multidimensional database design supports fast data retrieval over large data ranges. Two well-known multidimensional database design techniques are the star schema and the snowflake schema.

- Extract Transform Load (ETL)

Design ETL design is important in the development of EIS, ETL functions as extracting data from other databases or operational systems, Performing data cleaning and loading data into the EIS database. ETL is designed to solve problems that exist in data sources, namely primary key inconsistencies, data inconsistencies, format differences, inaccurate data and data synonyms / homonyms.

Construction

This stage is the stage of design realization in accordance with the previous design stages.

Deployment

At this stage, the implementation of all the series of stages that have been carried out previously will be carried out by testing the application system to the end user whether it meets the needs, so that it can fulfill all the information needed.

Discussion And Evaluation

In accordance with the formulation of the problems discussed in case description, XYZ has a need for a system that can help provide financial accounting based on cost accounting. With the cost accounting based financial statements, it can help XYZ managers in determining the cost of production, controlling costs and supporting decision making.

One solution that can be done for the above needs is the adoption of the BI system. BI can be one of the tools to produce cost accounting reports in the form of a dashboard. Through this research it is expected to provide the best solution for XYZ according to their needs.

Project Requirement Definition and Data Analysis

Information needs analysis is done with observe things that are needed at XYZ Company. Then conduct interviews and field observations. Based on the results of these methods, the information needs to be used to develop the BI model in XYZ companies include:

1. Business segmentation information based on location
2. Business segmentation information based on services
3. Business segmentation information based on customer
4. Business segmentation information based on equipment
5. Business segmentation information based on commodity

Data sources that will be used are operational data from the Oracle EBS application and CARTOS application used by XYZ companies in carrying out company operational activities.

Database Design

Based on the development of the method already described, the data warehouse modeling made is as follows such as Fig. 3.

Extract, Transform, Loading (ETL) Process

ETL process is a process to move data from a database source (OLTP) into a data warehouse (OLAP). This ETL process uses the Pentaho Data Integration spoon application. Data warehouse stores data that is used to produce the information needed. The ETL process in this study uses the Pentaho Data Integration (PDI) tool. In PDI there are several icons used in the ETL process. The ETL process is carried out on 6 dimension tables and 1 fact table. One example of these ETLs can be seen in Fig. 4 below.

Application Of Microsoft Power BI

Microsoft Power BI desktop is an analytic application for analyzing data. Microsoft Power BI can also be called a visualization tool used to represent data in a data warehouse. Before visualizing the data, the first step taken is to retrieve data from the data source by selecting get data on the initial display when opening the application. After that, a dialog box will appear to select the data source to be used. There are 5 types of data that can be used, namely files, databases, Azure, online services, and others. In this study the data source used is an Oracle database. The visualizations used for developing the Business Intelligence model in this study are graphics and text. Visualization results are described in the form of a dashboard. Figure 5 contains information on the composition of the company's revenue, costs, and profit and loss seen from the perspective of the company's location.

Figure 6 contains information on the composition of the company's revenue, costs, and profit and loss seen from the perspective of the company's services.
Figure 7 contains information on the composition of the company's revenue, costs, and profit and loss seen from the perspective of the company's customers.
Figure 8 contains information on the composition of the company's revenue, costs, and profit and loss seen from the perspective of the company's equipments.
Figure 9 contains information on the composition of the company's revenue, costs, and profit and loss seen from the perspective of the company's commodities.

Conclusion And Future Work

The visualization presented in the graph on the dashboard makes it easy for executives to see information about expenses used based on location used, services used, customers served, tools used and commodities used. With the existence of a cost accounting report in the dashboard, XYZ company can control costs for divisions that are considered unprofitable. So then the company's operational activities can be more effective and efficient.

Declarations

Availability of data and materials

Not applicable

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

"FLG provided with the problem analyzing and data collecting as well as processing that initiate the drafting the manuscript. LA performed with testing and some calculations of the experiment result and continuing in writing the manuscript. The TM provide some survey literatures and some administration matters as well as process the payment of the research. All authors read and approved the final manuscript."

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Not applicable

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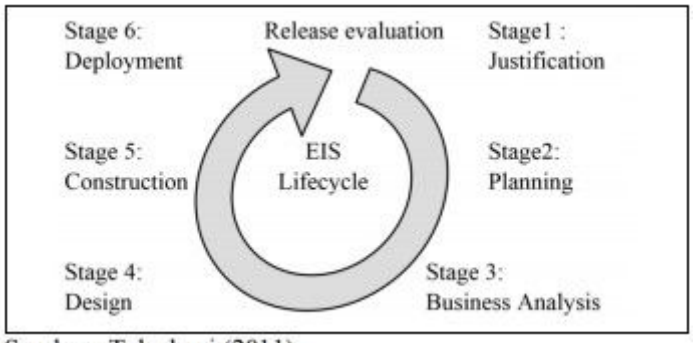
Figures



Sumber : Taleghani (2011).

Figure 1

Executive Information System Lifecycle [7].

Figure 2

Business Intelligence Data Sources.

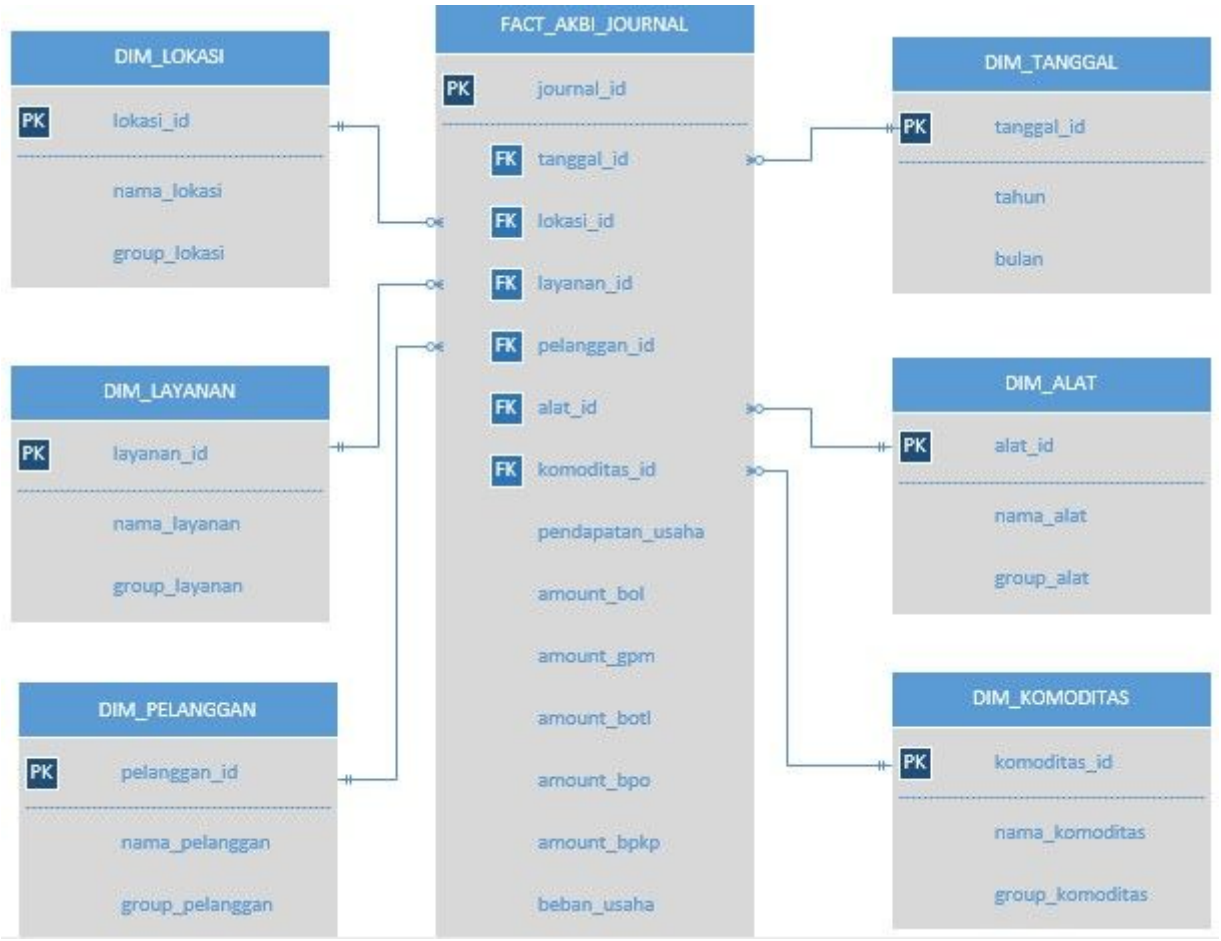


Figure 3

Data Warehouse Schemes.

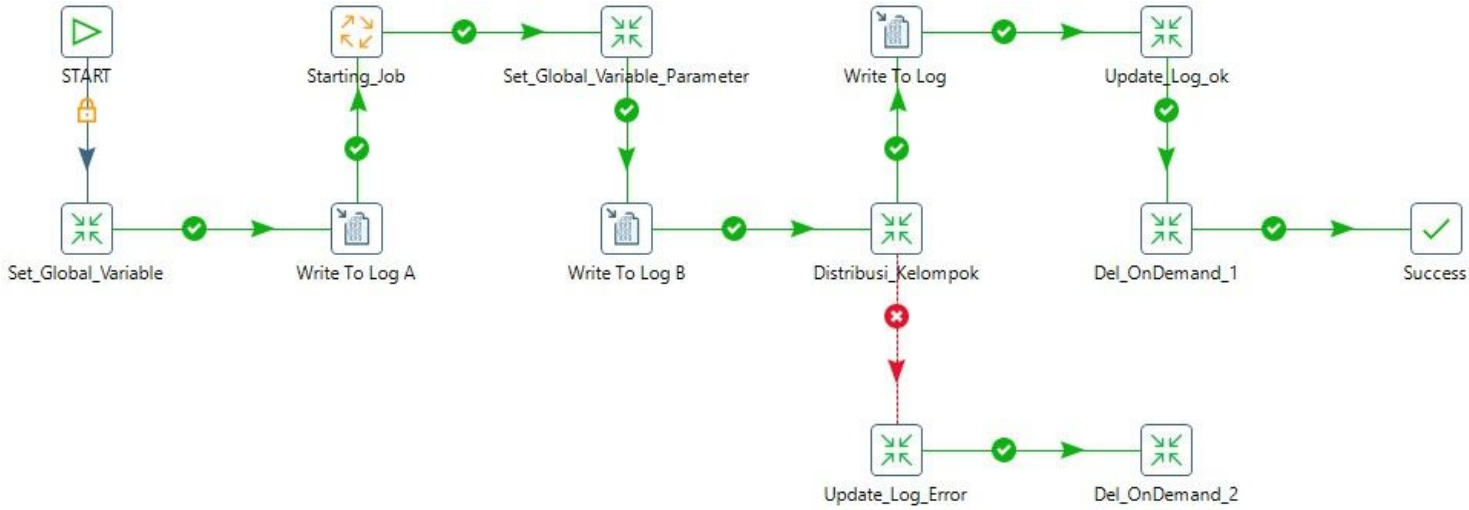


Figure 4

ETL Process.

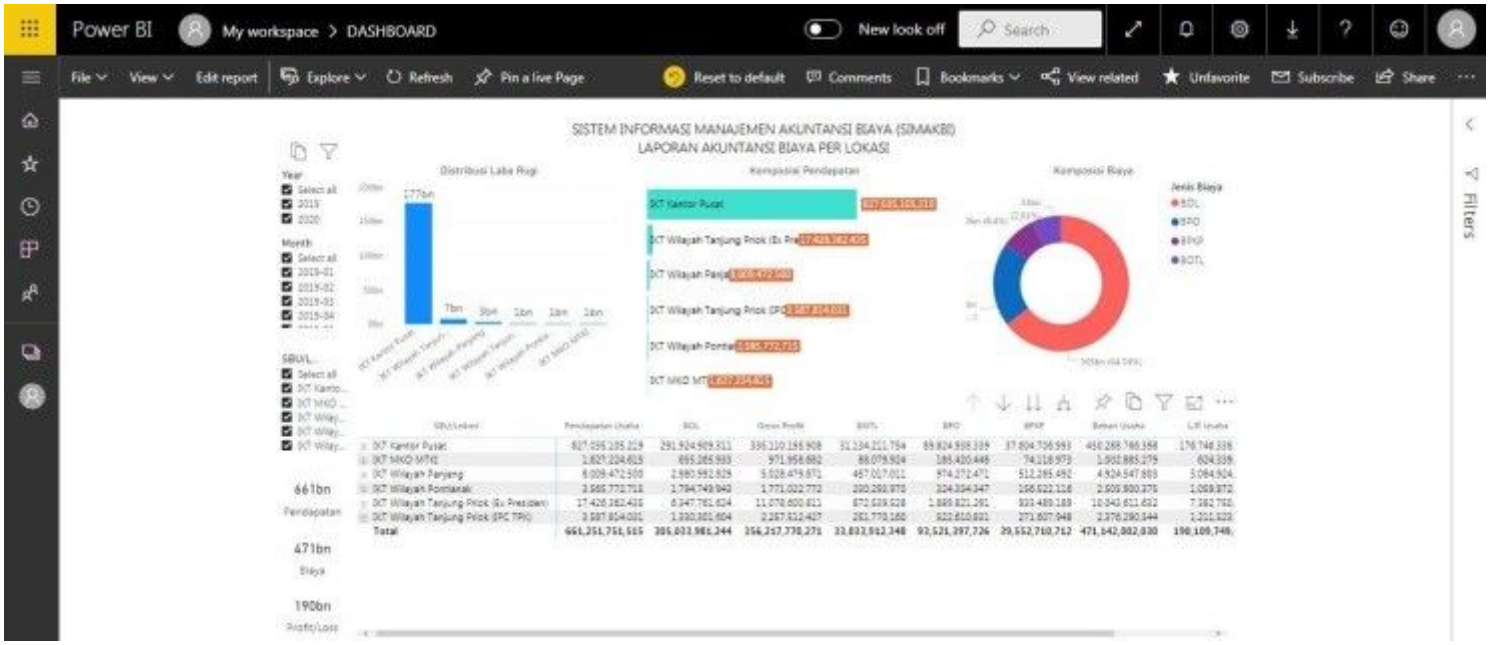


Figure 5

Cost Accounting Dashboard based on Location.

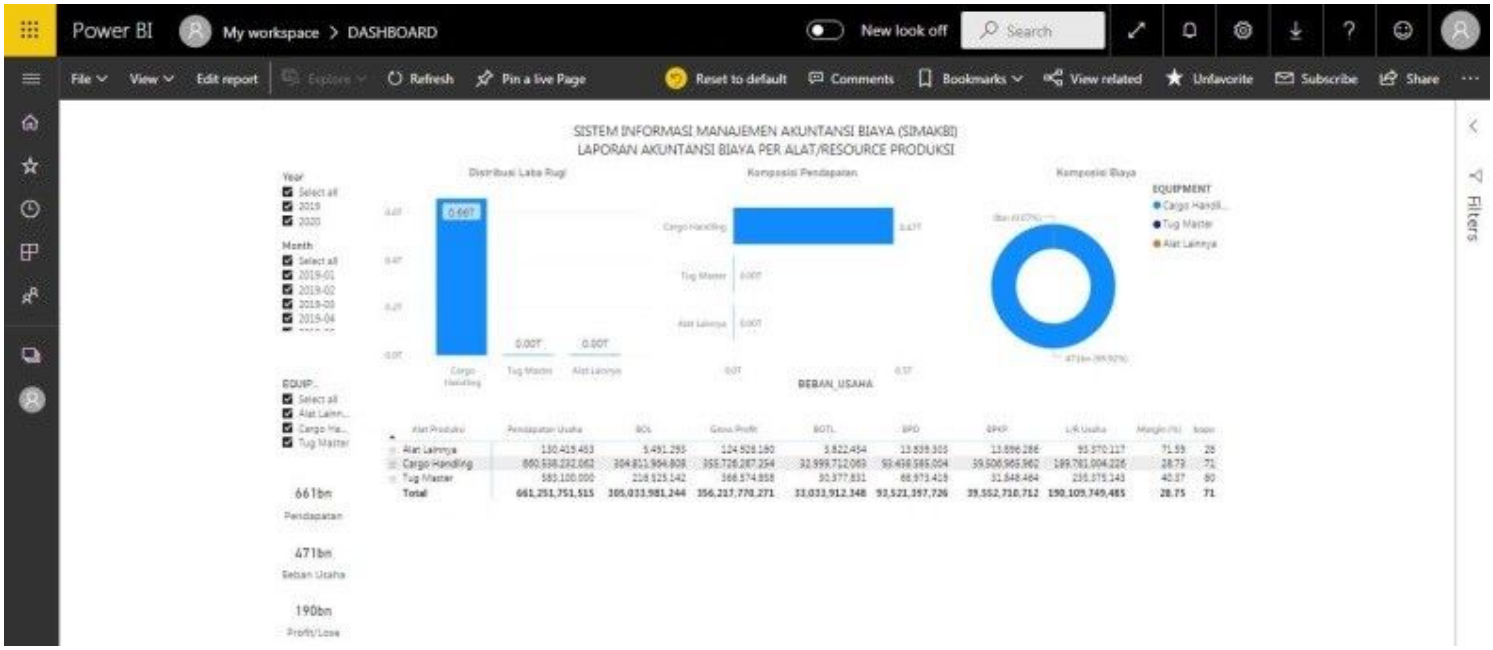


Figure 6

Cost Accounting Dashboard based on Services.

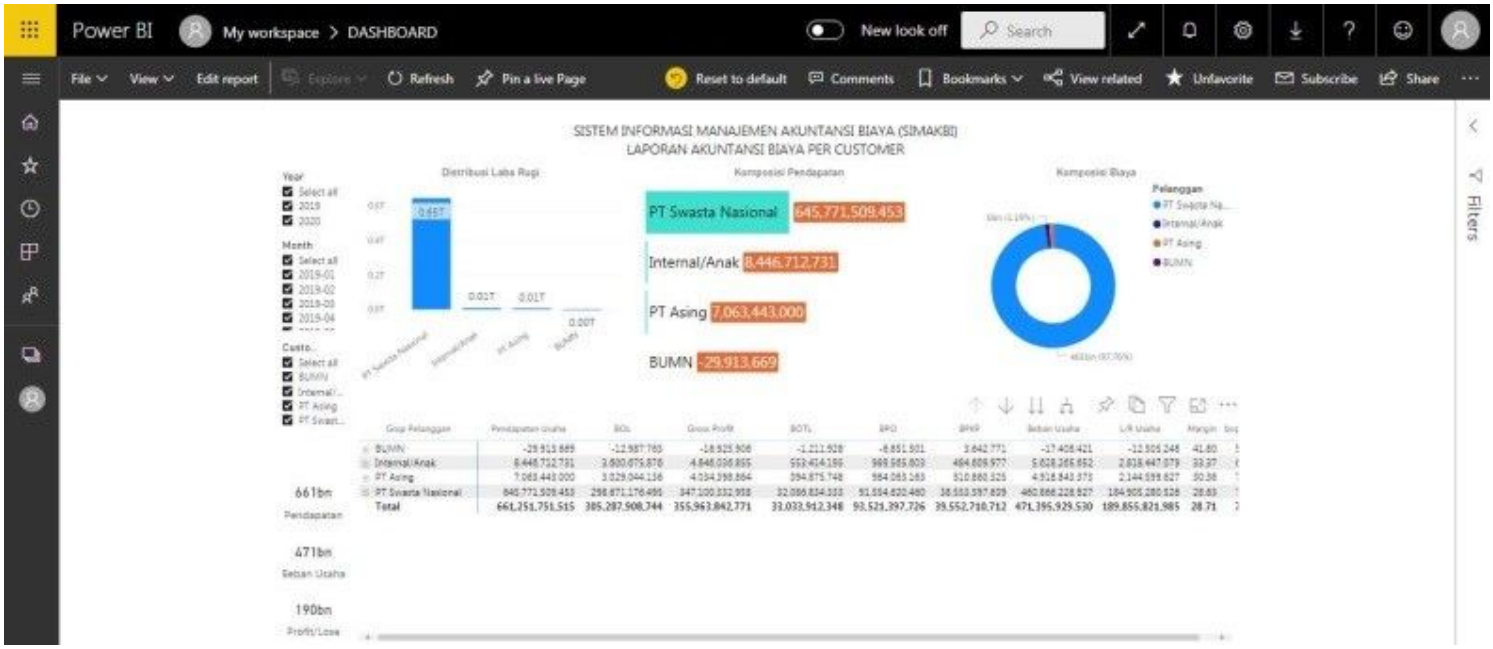


Figure 7

Cost Accounting Dashboard based on Customers.

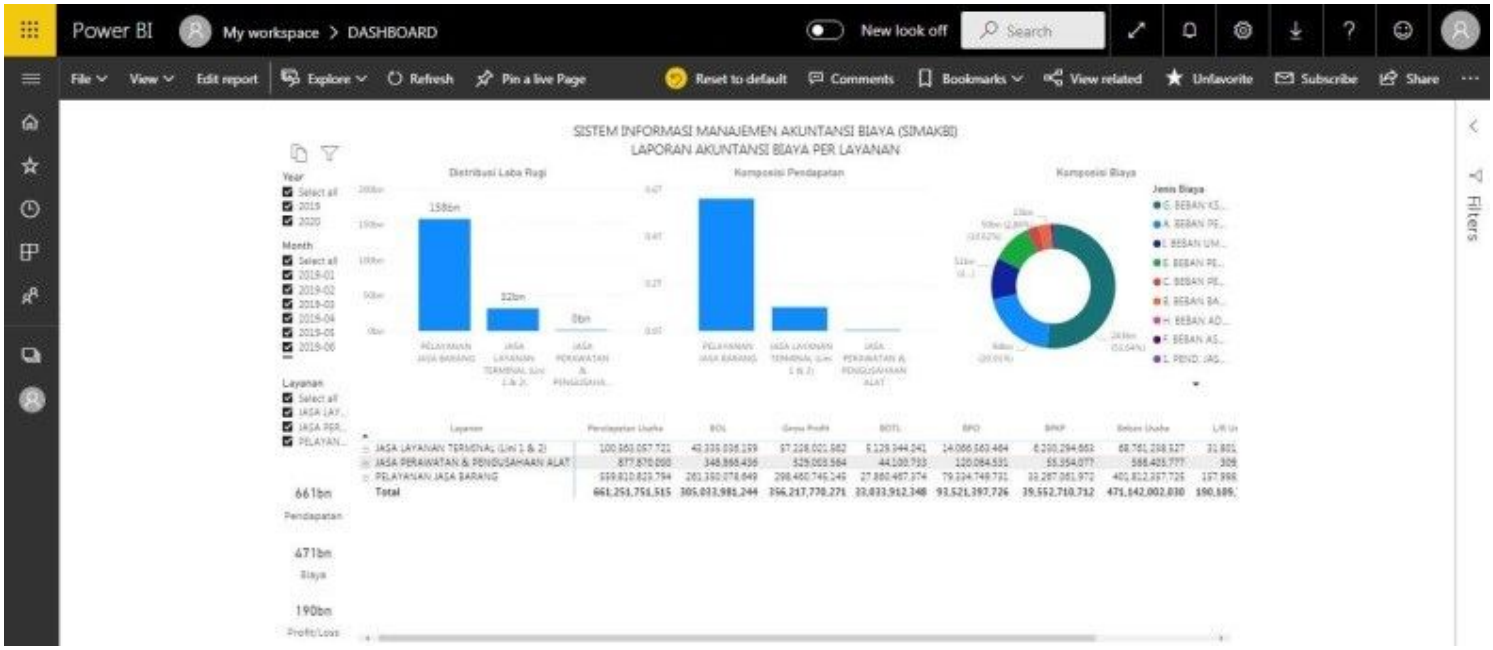


Figure 8

Cost Accounting Dashboard based on Equipments.

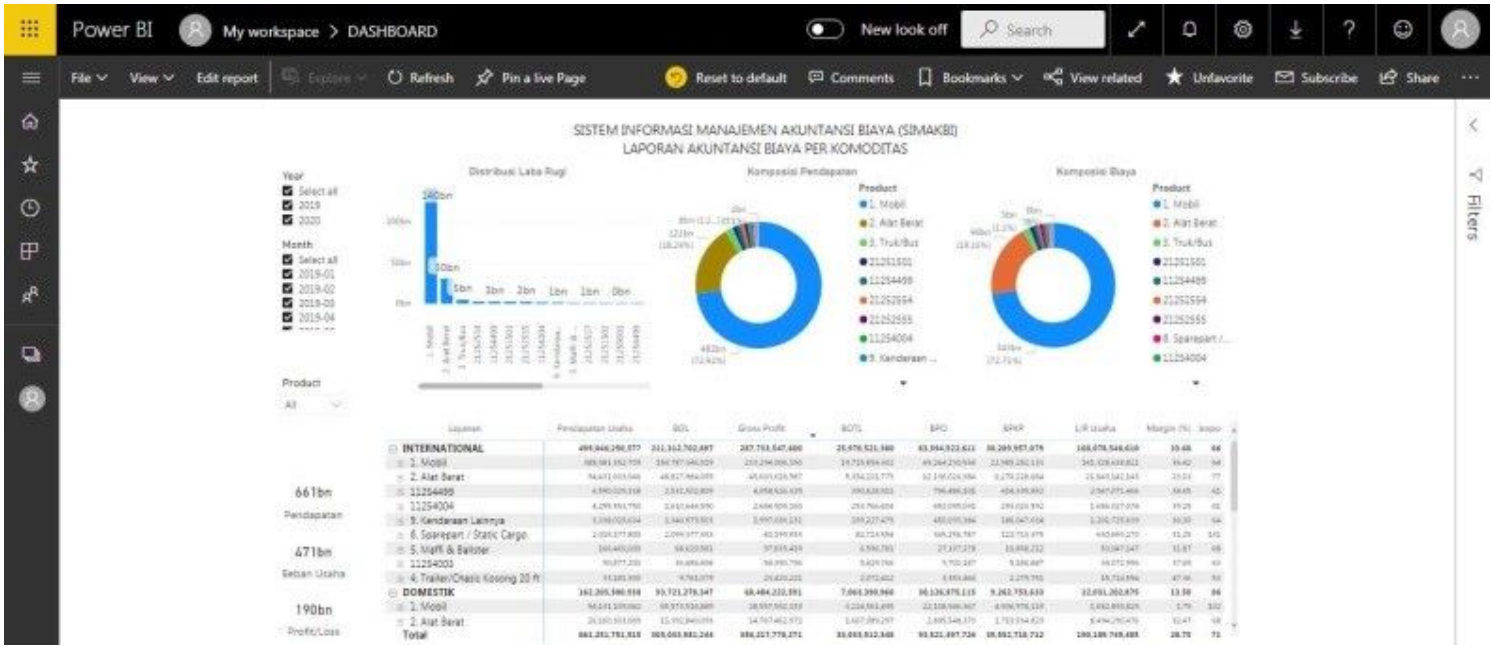


Figure 9

Cost Accounting Dashboard based on Commodities.