

# CH2 - THORIQULHAQ

*by* Thoriqulhaq Jibril Al Qudsy

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## 5 CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter provides a brief description related to literature review that is relevant to the proposed project which is Power Plants Performance Monitoring System In PT PLN (Persero) UP3 Pamekasan. It provides sufficient background information based on relevant literature reviews from some equivalent systems in the current market. By comparing the related existing systems with the proposed system, we can use it as a reference in making improvements for our proposed system in the future.

#### 2.2 Case Study

This project is studying about the monitoring activity of the power plants performance in PT PLN (Persero) UP3 Pamekasan. But, due to PT PLN (Persero) UP3 Pamekasan plans to increase the number of power plants. A system that can handle the monitoring process with a larger number of power plants is needed since some issues were discovered on the current system such as inefficient and inconvenient ways to monitor the power plant performance in PT PLN (Persero) UP3 Pamekasan.

### 2.2.1 Company Organization Structure

PT PLN (Persero) is an Indonesian government-owned corporation that was established on January 1st, 1965 which has a monopoly on electricity distribution in Indonesia and generates the majority of the country's electrical power. Since its establishment, PT PLN (Persero) has spread to every region in Indonesia. We can see the branch offices everywhere when we stop in an area located in Indonesia. Since it is the only electricity company and the largest in Indonesia, its role is very important in the survival of each region. One of its branches is PT PLN (Persero) UP3 Pamekasan which is located in Pamekasan Regency, Madura. PT PLN (Persero) UP3 Pamekasan itself is responsible for the Madura Island area and its surroundings.

As for the purposes of monitoring the performance of power plants, it includes 4 parts. Starting from the bottom, namely the operator staff whose activities are to collect data about all things about power plants in the field. Regarding the absence of operator staff in the company's organizational chart because the operator staff themselves have the status of outsourced workers. Then there is the PIC staff who will verify whether the data collected by the operator staff is appropriate and also document it to an excel sheet document. Unlike the operator staff, the PIC staff themselves have the status of permanent employees. Then after everything has been documented, the Supervisor will retrieve all the documented data from all power plants under his responsibility. After everything is collected, all data will be reported to the center by the supervisor, precisely Network Section Manager (Manajer Bagian Jaringan). The organizational structure of the company is as Figure 2.1.



### **2.2.2 Manual Operation**

For the process of monitoring power plants performance, it starts with the data gathering which still uses manual methods by using a platform namely WhatsApp. For this step, every staff operator from each power plant will report data that has been recapitulated in the field, every day. But, unfortunately the format of the data that has been reported by the operator staff is still using various formats. After all the data from every power plant was gathered, there will be a data checking or validation from the PIC staff. This activity is also done by using WhatsApp. So, after the PIC staff reviewing the data, they will inform the status of the data whether it is approved or not by replying to a message through WhatsApp. If the data was rejected, operator staff need to resend the data that has already been revised. But if data was approved, we can continue to the next step which is data classification. Unlike the previous step, this step was done without any tools or platform. So the data will be classified manually based on the report type by moving the data from the WhatsApp to the specific excel document template which has been provided previously with certain formulas. If the placement of the data in excel is deemed appropriate, then we can proceed to the next step which is data processing. In this last step, the data will be calculated by the excel based on the formula that was already set before. After the calculation process is done, it will produce something we call organized data. This data will be used as a reference for various purposes, including maintenance of the power plants itself.

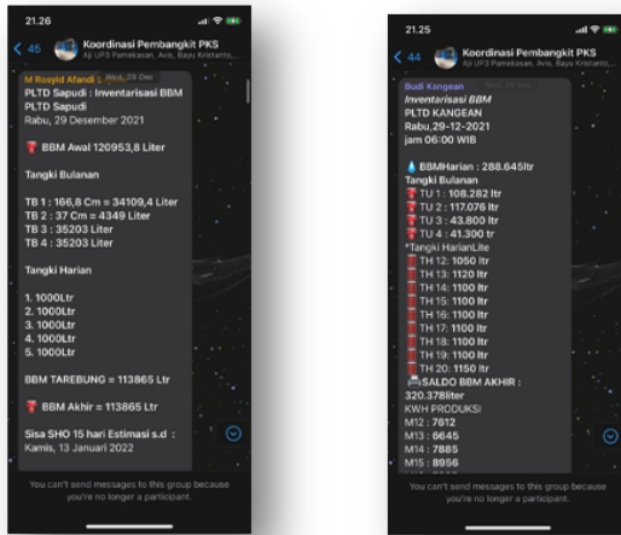


Figure 2.2 Data Reporting message of monitoring power plants performance in WhatsApp group

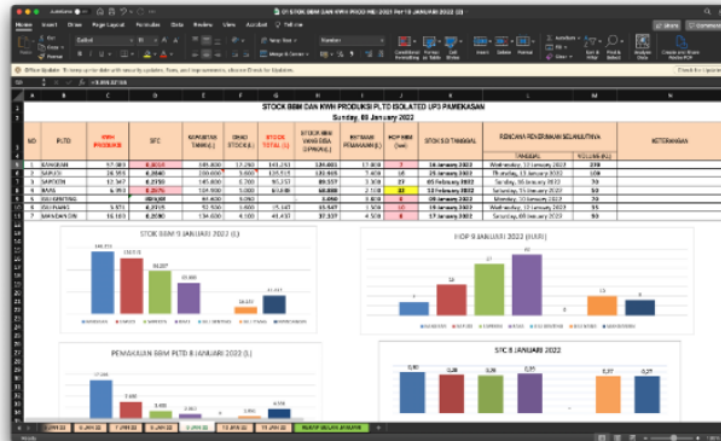


Figure 2.3 Organized data of monitoring power plants performance in Excel Sheet

### 2.3 Current System Analysis

The current system used by PT PLN (Persero) UP3 Pamekasan for monitoring power plants performance uses a manual method for storing their power plants performance information which still did not use a centralized system. This system itself involves several software products in its application. Some of them such as WhatsApp as a means for collecting data from the operator staff in the field and also as verification whether the data is approved or not from the PIC staff. Then, there is also Microsoft Excel as a tool for collecting data on report results that have been received from the operator staff in the field if it has been approved and also a tool for data processing such as calculations so that it can produce the desired output according to a predetermined formula. The figure 2.4 will explain in more detail about the current system workflow.

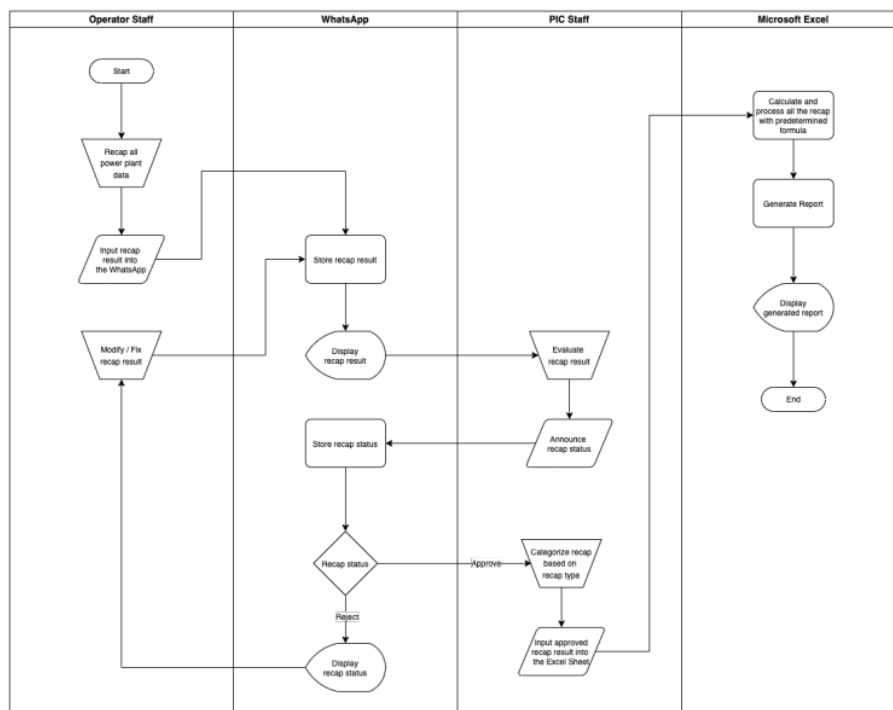


Figure 2.4 Current System Workflow

## 2.4 Comparison between existing systems

There are a few existing applications in the current market. In this case study, the analysis of the existing applications that provide similar system functions and features are conducted to examine their characteristics, strengths, and weaknesses. It is to obtain ideas on the characteristics and functionality to be adapted to the proposed application. From our analysis, there are several systems which we can refer to such as Avnet's Smart Diesel Generator Monitoring Solution System, Technoton's Diesel Generator Monitoring System and Sekawan Media's Logistics Delivery Monitoring System.



### 2.4.1 Avnet's Smart Diesel Generator Monitoring Solution System

Avnet's Smart Diesel Generator Monitoring Solution System is a mobile application that provides a remote access feature to monitor a diesel generator (Smart Diesel Generator Monitoring. Avnet, n.d.). Figure X.X shows the user interfaces of Avnet's Smart Diesel Generator Monitoring Solution System.

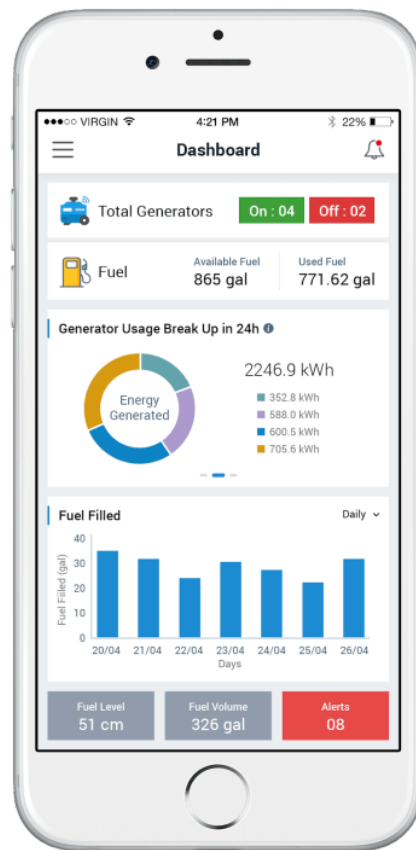


Figure 2.5 Dashboard UI for Avnet's Smart Diesel Generator Monitoring Solution System

2.4.2 Technoton’s Diesel Generator Monitoring System

Technoton’s Diesel Generator Monitoring System is a web application that provides a solution that allows for fuel monitoring, monitoring of diesel generator operation parameters and engine diagnostics, obtaining electrical data from the alternator, and remote genset control (Diesel Generator Monitoring. Technoton, 2022). Figure X.X shows the user interfaces of Technoton’s Diesel Generator Monitoring System.

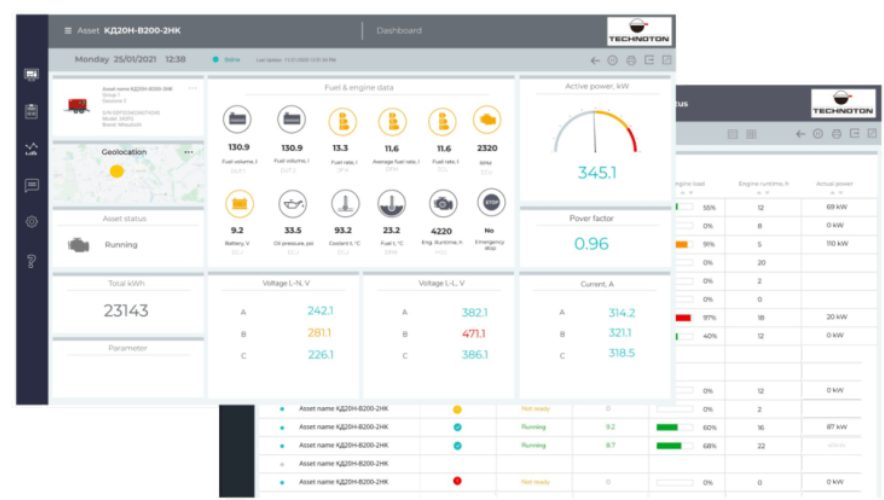


Figure 2.6 Dashboard UI for Technoton’s Diesel Generator Monitoring System

### 2.4.3 Sekawan Media's Logistics Delivery Monitoring System

Sekawan Media's Logistics Delivery Monitoring System is a web application that is designed to manage and monitor activities related to logistics fleets, including trucks, box cars, containers, and other vehicles (Fleet Management System: Solusi Monitoring Armada Logistik, 2022). Figure X.X shows the user interfaces of Sekawan Media's Logistics Delivery Monitoring System.

PT Sekawan Media Informatika

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Figure 2.7 Dashboard UI for Sekawan Media's Logistics Delivery Monitoring System

**Table 2.1      Comparison Between Existing System and Proposed System**

<b>No</b>	<b>System Feature</b>	<b>S1</b>	<b>S2</b>	<b>S3</b>	<b>S4</b>
<b>1</b>	Cross-Platform Availability	No	Yes	Yes	Yes
<b>2</b>	Multiple User Role Type Access	No	No	Yes	Yes
<b>3</b>	Downloadable excel-based report	No	No	Yes	Yes
<b>4</b>	Displaying data in a chart form.	Yes	Yes	Yes	Yes
<b>5</b>	Centralized Database	Yes	Yes	Yes	Yes
<b>6</b>	User Data Management	No	No	No	Yes
<b>7</b>	Master Data Management	No	No	Yes	Yes
<b>8</b>	User Authentication	Yes	No	Yes	Yes
<b>9</b>	Admin Console	No	No	Yes	Yes
<b>10</b>	Data Verification / Approval	No	No	Yes	Yes
<b>Note :</b> S1 - Avnet's Smart Diesel Generator Monitoring Solution System S2 - Technoton's Diesel Generator Monitoring System S3 - Sekawan Media's Logistics Delivery Monitoring System S4 - Power Plants Performance Monitoring System					

## **2.5 Literature Review of Technology Used**

This section will discuss the tools and technology used for the development of the proposed project which is Power Plants Performance Monitoring System In PT PLN (Persero) UP3 Pamekasan.

### **2.5.1 Laravel**

Laravel is an open-source PHP framework that provides support for our project development of Power Plants Performance Monitoring System In PT PLN (Persero) UP3 Pamekasan. Beside, Laravel also implements the MVC (Model-View-Controller) concept so that the website development process can be done more quickly and efficiently. Also, by using Laravel, we can implement the use of reusable components so that later we can speed up the coding process and also make it easier to trace bugs when there is a problem with the code. Last but not least, Laravel also provides complete, clear and easy-to-understand documentation for both beginners and experts.

### **2.5.2 Tailwind CSS**

Tailwind CSS is one of the most widely used CSS frameworks. In terms of documentation, it's even better. Especially if it is implemented with Laravel and applies reusable components because Tailwind itself is basically a low-level CSS framework.

### **2.5.3 Vue JS**

Vue is a JavaScript framework for developing UI or we could say the front-end side. Compared to other frameworks, Vue JS is very light and has a fairly complete library for us to use later. This is where we will apply the reusable component later.

### **2.5.4 Inertia JS**

Inertia JS is a new approach to create a SPA-based web application or Single Page Application using a framework such as Vue JS without the need to create a Rest API or in other terms The Modern Monolith. This allows us to create single page applications (SPAs) that render completely on the client side, without much of the hassle that is common when developing SPAs in general.

### **2.5.5 MySQL**

MySQL is a type of database management system that is open source and is included in the RDBMS (Relational Database Management System). Some of the advantages are that it supports integration with other programming languages, a flexible table structure and also from a security perspective.

### **2.5.6 DataGrip**

DataGrip is a multi-engine database environment by JetBrains that is designed to query, create, and manage databases. It supports MySQL, PostgreSQL, Microsoft SQL Server, Oracle, and more. Also it allows us to run databases locally, on a server, or in the cloud.

### **2.5.7 Visual Studio Code**

Visual Studio Code is a fairly lightweight source-code editing software made by Microsoft. Visual Studio Code provides features such as syntax highlighting, code completion, code snipping, code refactoring, defaulting, and Git. In addition, there are many other extensions provided by Visual Studio Code that can be used to simplify our development process.

### 2.5.8 <sup>6</sup> Amazon Elastic Compute Cloud (Amazon EC2)

Amazon EC2 is one of the AWS products that allows us to host our dynamic website. Some of the advantages of using AWS products alone are broad platform support, worldwide data centres and flexible pricing models. For the Amazon EC2 itself, it has the advantage of configuring the size of the server that we use.

### 2.5.9 Draw.io

Draw.io is a full lifecycle UML based modelling tool used to help us in the planning, design and construction of software systems and business processes.

### 2.5.10 Figma

Figma is a UI and UX design application and prototyping tool with web-based and additional offline features that we can use to create smaller websites, apps, or user interface components that can be integrated into other projects. Some of the advantages are, cross-platform is available, lightweight, complete documentation and many extensions both from the community and official that we can use to simplify the design process.

## 2.6 <sup>2</sup> Chapter Summary

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