

Digitalization Of Name Plate Equipment PLTU Pangkalan Susu Using Qr Code

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The primary purpose of this innovation is to prevent equipment specification errors. This innovation is conducted by pouring the contents of the specification into a QR code, where the data will be stored in the database. The database for this research uses google drive media. We carried it out using a direct field survey method. The results showed that the specifications of equipment are easily damaged, if it is poured into written form on a nameplate that uses iron material. Further, it is easy to cause corrosion which will cause data errors when an audit will be carried out or when replacing the equipment. This innovation utilizing QR codes provides a breakthrough to validate equipment specifications.

Keywords : Equipment, Specifications, Qr Code

1. Introduction

Technological progress in Indonesia as a developing country is exploding. The demand for electrical energy will continue to grow in line with economic growth. Electrical energy is a vital need for daily activities. Almost all the equipment used requires electricity, from household appliances to industrial machines that require electrical energy. Thus, power plants were built as suppliers of electrical energy. There are several types of power plants such as Hydroelectric Power Plant (PLTA), Gas Power Plant (PLTG), Diesel Power Plant (PLTD), Steam Power Plant (PLTU), and others.

Each machine equipment orders a specification nameplate that is clearly represented on the equipment, which functions as a provider of information when carrying out maintenance. Besides being useful as a provider of information when carrying out maintenance, nameplates are also useful as information if one day the equipment is damaged and can no longer be used, where the damaged equipment will be replaced according to the specifications of the existing equipment. If the nameplate is damaged or lost, it will be difficult to purchase new equipment. Because the nameplate contains machine parameters such as type of equipment, RPM (Rotation per minute), electric motor voltage, the brand of bearing, the brand of grease, and others related to the operation of the plant. Proper data management and storage to help find out a specification to match what is expected. Here, the engineering field in charge of carrying out preventive maintenance and planning for equipment replacement needs a nameplate so that miss-communication does not exist while on duty.

One example of this development is the use of two-dimensional codes in data storage, such as Datamatrix, Maxicode, and QR Code. QR Code is widely used in everyday life. QR Code suffices to help consumers to get information on the products they consume. QR Code is a matrix symbol comprising a string of squares arranged in a larger square pattern. These square boxes are then referred to as modules. The extent of this square pattern will determine the version of the QR Code. QR Code was created in 1994 by Denso, one of the Toyota group of companies. Initially, the QR Code marked the results of the production of automotive companies. However, it has now been approved as an international standard (ISO/IEC18004) in June 2000. Nowadays, the use of QR Codes has expanded in

many fields and has experienced a significant increase.

Google Drive is a service feature from Google that allows all users to store various files, backup files, and edit files. Based on the Cloudwards page, Google Drive is a cloud-based service that allows any user to store files beyond the limitations of a typical hard drive. Everyone could enjoy this service from Google for free without having to pay anything.

This study will synchronize the QR code with the database. The database here uses Google Drive storage media. Google Drive will load all specifications of the generator equipment. And every specification that has been loaded on Google Drive will be given a link where the link will be converted into a QR Code form.

PLTU Pangkalan Susu OMU is the plant included in the list of Operation and Maintenance (O&M) services at PT Indonesia Power, namely Pangkalan Susu OMU units 1-4. This power plant itself has an important role in supplying electrical energy in North Sumatra (with an abbreviation in Indonesian called is Sumbagut) and has an important role in regulating voltage in the Aceh area. For this reason, it is necessary to maintain the reliability of the generator so that it can continue to serve customers. Here, PT PLN (Persero) UPB SBU. The effort to maintain the reliability of this generator is to improve the system for storing equipment specifications. Therefore, the title of this journal is "DIGITALIZATION OF NAME PLATE EQUIPMENT PLTU PANGKALAN SUSU USING QR CODE".

2. Literature Review

System Information

Following O'Brien, an information system is an organized combination of people, hardware, software, communication networks, and data resources that collect, transform, and disseminate information within an organization. Meanwhile, according to Satzinger, Jackson, & Burd, an information system is a set of interconnected components that collect, process, store and present the results as information needed to complete business tasks. From the above opinion, it can be concluded that an information system is a combination of separate components (data, hardware, software, telecommunications, people, and procedures) that are used to meet the needs of daily transaction processing and support activities in an organization. organization where data is collected and processed into information and distributed to users.

Information System Components

An information system is a combination of people, hardware, software, communication networks, and data resources that collect, transform, and disseminate information within an organization. From this explanation, it is recognized that there are components that support an information system. Covering the following:

1. *Data*
Data is a source that is required exclusively to be processed to produce helpful information.
2. Human (Human Resources) which covers:
 - a. *End user*: end users are people who adopt information systems.
 - b. *IS Specialist*: People who create or develop, manage, maintain, and operate information systems.
3. Hardware:
 - a. *Machines*: keyboard, monitor, mouse, printer, and etc.
 - b. *Media*: flash, external memory and etc.
4. Software:
 - a. *Program*: program used to run or operate a computer device.
5. Procedure: procedures for processing information. Network:
Access such as internet, intranet, extranet and as media such as satellite, wireless which can help

- connect an information system.
6. Input Data Resources:
Entering information sources as data, where the data entered will then be processed to produce information.
 7. Processing Data into Information:
After getting the required data, the next step is to process the data. The components needed to carry out the processing include human resources, software, hardware, and networks.
 8. System Performance Control:
Control is needed to ensure that data processing runs properly, as expected.
 9. Storage of Data Resources:
A place where data and information are stored regularly so that they can be reused if needed.
 10. Information Product Output:
Represents the results got after the entered data has been processed and is as information.

QR Code

A QR code is a machine-readable optical data set. Humans cannot read it because this barcode is as an image of line width and parallel line spacing or 1D (1-dimensional) linear symbology. Besides 1D (1 dimension), there are also square shapes, points, hexagons, and other geometric shapes in the image, which are called matrix codes or 2D symbology (2 dimensions) or QR Codes. QR Code (Quick Response) or commonly known as QR Code. And it is barcode evolution from one dimension to two dimensions. QR code is a type of matrix code or two-dimensional barcode with the main functionality of being easy to read and to convey information quickly and get a fast response. In contrast to barcodes, which only store information horizontally, QR codes can store information horizontally and vertically, therefore automatically QR Codes can accommodate more information than barcodes. QR Code is a two-dimensional matrix symbol comprising a string of squares arranged in a larger square pattern. These square boxes are then referred to as modules. The extent of this square pattern will determine the version of the QR Code. The following is an example of a QR Code form.



Figure 1. Format of qr code

QR Code Structure

QR Code has sections that will be presented in the image below.

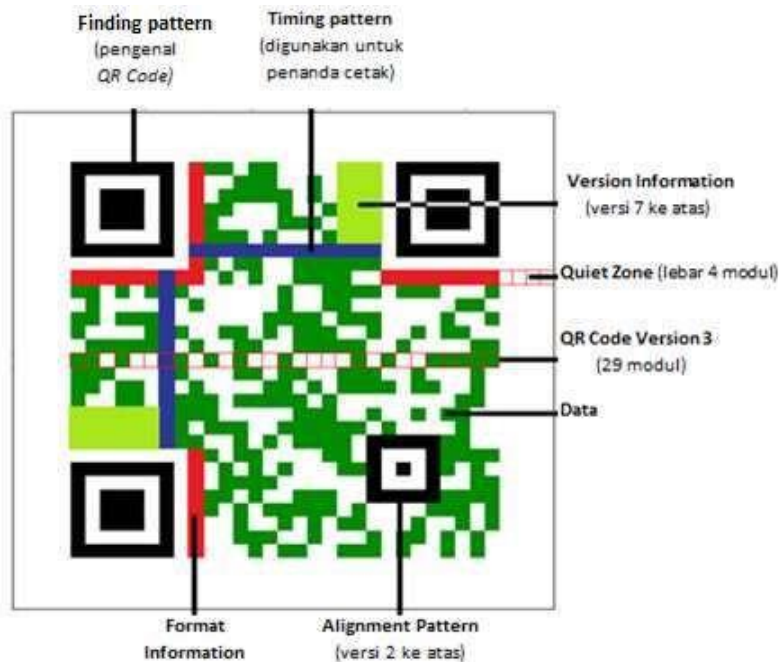


Figure 2. Structure of qr code

The image above presents the structure of a QR Code. The terms related to the QR Code are:

- Finding Pattern: Pattern to detect the position of the QR Code.
- Timing pattern: The pattern used to identify the coordinates of the center of the QR Code. Made as alternating black and white modules.
- Version Information: Version of a QR Code. The smallest version is 1 (21 x 21 modules and the largest version is 40 (177 x 177 modules).
- Quiet Zone: An empty area on the outside of the QR Code that makes it easier to recognize the QR identifier by the CCD sensor.
- QR Code version: QR Code version. In the example image, the version used is version 3 (29 x 29 modules).
- Data: The area where the data is stored (encoded).
- Alignment Pattern: A pattern used to correct QR Code deviations, especially non-linear distortion.
- Information about error correction level and mask pattern. QR Code was developed to take advantage of Pdf147, high data density from Datamatrix, and reading speed from Maxicode. Two-dimensional symbols contain more data than linear symbols, roughly 100 times more

QR Code Version and Size

There are 40 types of sizes from the QR Code, which are described as version 1, version 2, up to version 40. Version 1 is 21 x 21 modules, version 2 is 25 x 25 modules, and so on, where if the version increases by one, the number of modules will rise by 4 modules x 4 modules.

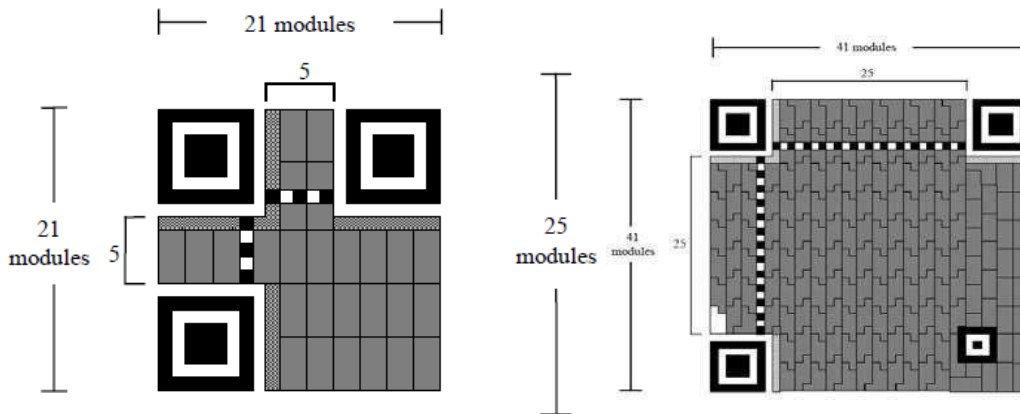


Figure 3. Qr codes version 1 (left) and version 2 (right)

Google Drive

Google Drive is a stockpile utility owned by Google, Inc. since April 2012. This application comes from Google Docs, which has a free storage capacity of 15 gigabytes (GB). Google Drive can be easily accessed anywhere, anytime, and using any device to store files as photos, videos, text documents, spreadsheets, and presentations (Rusmanto Maryanto, 2015, pp. 11-12). Google Drive is also integrated with other Google services, such as Gmail accounts, Google Plus, Google Search, and others. It has other advantages, such as being able to recognize objects systematically in indexing objects, whether people or places, as content in common file types (.txt, .html, .xml, and others). In addition, Google Drive uses OCR (Optical Character Recognition) technology to identify a text as images or files in .pdf format (Google Developers, 2018).

QR Code Reader Application

The QR code reader is an application that can read QR codes. Besides being able to scan or read QR codes, this application can also scan or read Bar Codes. It's easy to use and available for free on the Google Play Store and App Store.

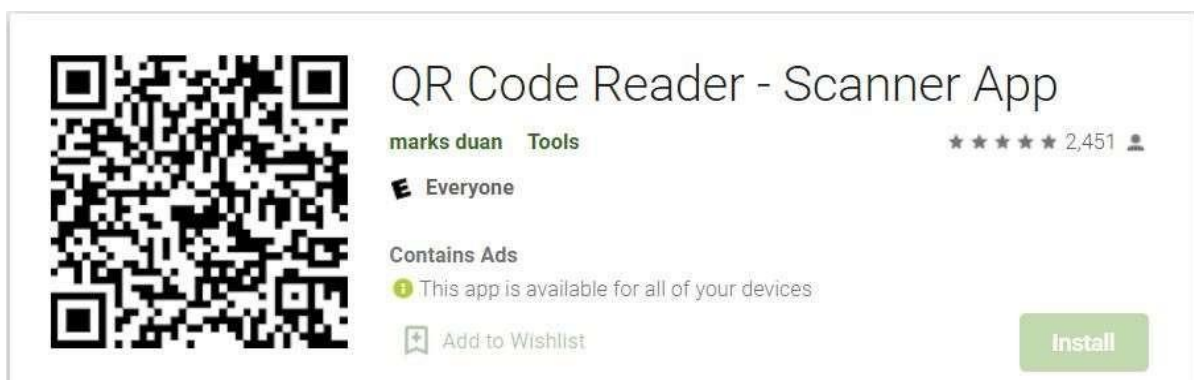


Figure 4. QR code reader app for android on google play store QR Code Generator

The QR code generator is a website that can create a QR code for free, its use is also easy, just to visit the website <https://id.qr-code-generator.com/> and register using your email or google account. The advantage of this website is the creation of a QR Code that is fast and directly integrated with the link that is converted into it.

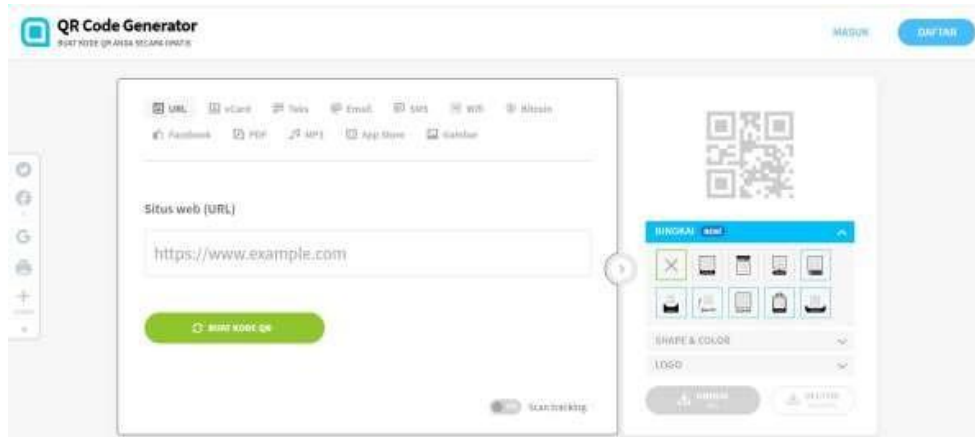


Figure 5. Display the qr code generator website

3. Methods

QUICK RESPONSE CODE QR-Code is a two-dimensional symbol type developed by Denso Wave in 1994. Each QR-Code symbol is constructed in a square shape and comprises function patterns and encoding regions. All symbols are surrounded by quiet zone boundaries on all four sides. There are 4 types of function patterns, including finder patterns, separators, timing patterns, and alignment patterns. The encoding region contains data, which represents the data format version of information and error correction.

Equipment, Specifications, Qr Code Research Flowchart

Equipment, Specifications, Or Code

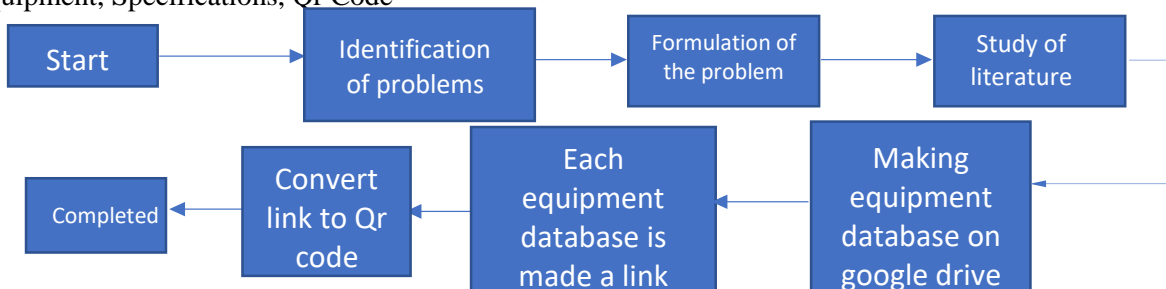


Figure 6. Research flowchar

The illustration above presents a research flowchart for digitizing nameplates using a QR Code. The explanation is:

1. Start: Constructing the concept of digitization
2. Identification of the problem: It is a limitation or point of what is the basis to be described or to be solved.
3. Formulation of the problem: Asking several things related to research. Later, the answers to these questions will be the focus of the research.
4. Literature study: Searching for theoretical references that apply to the cases or problems found
5. Creating database equipment on google drive: Researchers fill or create a loader of data needed on google drive which will later be converted to a QR code.

6. Each database equipment link is created: Loader data that has been created on Google Drive is converted into a link that will be inputted into the QR code and read by the QR code.
7. Convert link to QR Code: The previously created database link will be converted as a QR code.
8. Completed: The QR code has been completed and the equipment specification data has been integrated.

System Design

The system design on the Qr-Code Application tells whether the Qr-Code is registered or not in the database.

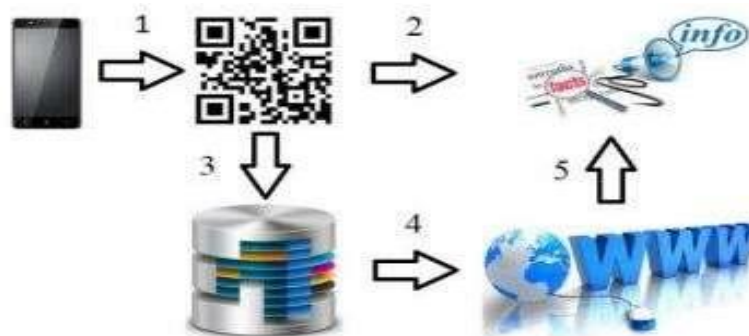


Figure 7. Block diagram

1. Android operates a scanner on the QR code
2. A QR code that has not been registered will display information as a translation of the QR-Code
3. The registered QR code will be searched for the database.
4. The registered QR code will display a website containing equipment specifications



Figure 8. Result of Scan out QR code on one of the equipment

4. Results And Discussion

Results

The research finding was the easiness problem of damage to the nameplate on the equipment has

been resolved. The problems in question are:

1. Corrosion appears on the equipment nameplate, leading to inaccurate specification data.
2. Missing nameplate on equipment.



Figure 9. Corroded equipment nameplate



Figure 10. Equipment lost nameplate specification

Result of digitizing nameplate applying QR Code on PLTU Pangkalan Susu equipment.

[EQUIPMENT] FIRE FIGHTING PUMP FOR BUILDING UNIT 3 dan 4 (PS03ETD01AP003-003)

| SPESIFIKASI | | | | | | | |
|-------------|---------|----|-----|------|--------|------|--------|
| NO | VOLTAGE | HZ | KW | RPM | A | COS | WEIGHT |
| 1 | 380 Δ | 50 | 90 | 2970 | 159.5 | 0.91 | 572 Kg |
| 2 | 660 Y | 50 | 90 | 2970 | 91.82 | 0.91 | |
| 3 | 440 Δ | 60 | 108 | 3570 | 137.73 | 1.09 | |
| 4 | 760 Y | 60 | 108 | 3570 | 79.74 | 1.09 | |

Figure 11. Utilizing qr code and scan out results on main motor fire fighting.



Figure 12. Utilizing qr code and scanning out results on equipment jockey pump

Discussion

From the findings showed that the using of the QR code has valuable impact. Field workers no longer have difficulty finding specification data, if one day they will replace equipment such as electric motors, pumps and others will prevent specification errors.

5. Conclusion

The results showed that the specifications of equipment are easily damaged, if it is poured into written form on a nameplate that uses iron material. Further, it is easy to cause corrosion which will cause data errors when an audit will be carried out or when replacing the equipment. This innovation utilizing QR codes provides a breakthrough to validate equipment specifications. The design made can be proposed as a reference for making the nameplate equipment digitization system at PT. Indonesia Power PLTU Pangkalan Susu. Digitizing nameplate equipment can save company expenses.

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