e-ISSN: 2614-8404
p-ISSN : 2776-3234

Design of Warehouse Information System for KCM Division Using Javascript

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Abstract - *Increasingly advanced technological developments force business people to be adaptive, especially when there is an increase in production. The KCM division, one of the PT XYZ business units operating in the media sector, experienced increased production. This causes the production equipment to be borrowed irregularly, and information on the warehouse of production equipment is also difficult to find. The Warehouse Information System is the solution to this problem. This research aims to create a warehousing information system that records all information on borrowing production equipment, fulfills warehousing information needs, and solves several existing warehousing problems. This research method is an experimental one-shot case study designed with the Framework for the Applications of System Thinking (FAST) and using simple, easily accessible, and free tools, namely Google Spreadsheet and Javascript coding. The results of this research are that the KCM division's warehousing information system that has been created has been tested to be 100% capable of meeting information needs for borrowing production equipment and resolving existing warehousing problems based on system tests that have been carried out. It is recommended that this system be further developed in future research to overcome minor errors in coding.*

Keywords *: Warehouse Information System; Google Spreadsheet; JavaScript.*

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I. INTRODUCTION

Current technological advances make the need for information important for everyone. This is no exception for business people in various industries. Company or organization leaders must be adaptive to circumstances if they want their business to survive. More than 85% of results from a survey of organizations have adopted technology and used digitalization to adapt in their country [1]. This means they also use technology in various company activities, from operations to production processes, including a warehouse area for storing various production equipment.

Company warehouses with large amounts of data and information must be managed with a well-structured management system. This becomes a new challenge for companies regarding the need for information on production equipment, which is not linear with increasing production.

KCM is a division under the business unit of the parent company, PT. XYZ, which operates in the media sector. The increasing production of programs makes the flow of information, especially warehousing information, overloaded. There are two types of information overload. First, people get too much information to handle at work, beyond their capabilities. The amount of information organizations produce is greater than what society can manage. Second, the time required to process information for a task is more than the time available.[2]

The problem of excess information can be simplified to the need for information on production equipment stored in warehouses. Therefore, in this research, warehousing information needs will be used as the basis for designing an information system that can solve several warehousing problems that arise in the KCM division.

Information systems include two things, namely physical and functional. From a physical perspective, an information system means an arrangement of hardware, software, or both that collaborate to support a job. In terms of function, an information system is a sequential process starting from data collection to its distribution and communication. An information system is said to be effective if it can produce good information and content that is clear, accurate, complete, concise, and timely [3]. So, to measure the functioning of the designed information system, the Framework for Applications of System Thinking (FAST) method will be used in this research [4]. And use Google Spreadsheets with the JavaScript coding language as the software.

Google Spreadsheet is Google's default application, which functions similarly to Excel. It has the advantage of storing, summarizing, analyzing, and sharing data in real-time, and it is free for its users [5]. Even though the functions and settings in the spreadsheet are almost the same as in Excel, they could be lacking. Google still allows users to make their own settings for data processing with the App-Script feature in the Extensions menu.

Google Apps Script is a fast way to create custom business tools that work with Google Workspace. It uses Javascript as its programming language to write code that is immediately ready for use in various Google products, such as Gmail, Google Calendar, Sheets, and others. Another advantage is that there is no need to install anything else; coding can be created directly in a web browser and can run now on Google servers. [6]

Meanwhile, FAST is a framework or agile model for creating and testing systems that suit learning needs and connect them to existing systems [7]. This method is used not only for system design and application creation but also often in information engineering, structured system analysis, and object-oriented design projects [8]. This method was chosen because of its flexible characteristic, which can be used in sharing projects and strategies and can also be combined with system development with commercial and reference methods [9].

Research related to the design of a warehouse information system was previously carried out by Yasin and Sari (2020) with the results of the GA Storage information system, which uses the FAST method based on VBA macro Excel to make it easier for employees to pick up work equipment because it can reduce the time for picking up goods [10]. Subsequent research by Bagir and Putro (2018) resulted in a warehousing information system connected to every part of the warehouse, thereby speeding up the time for inputting raw material data [11]. Then, research by Islakhuddin et al. (2021) produced an information system that makes it easier to collect data on incoming and outgoing goods and provide inventory information quickly and accurately [12]. Lastly, research was carried out by Fauzan et al. (2022) with the results of designing a warehouse information system to be a solution to four warehouse problems, namely ordering, purchasing, production, and goods management [13].

The four studies above describe a system design process using too complex tools. Thus, to overcome these shortcomings, this research uses readily available and easy-to-use tools, such as Google Spreadsheets. This research aims to design a system that can record all information on borrowing production equipment, meet warehousing information needs, and solve several existing warehousing problems.

II. RESEARCH METHODOLOGY

This study's research method is an experiment using a one-shot case study approach to test the impact of new tools on productivity. This model compares productivity levels before and after implementing the tool. [14]

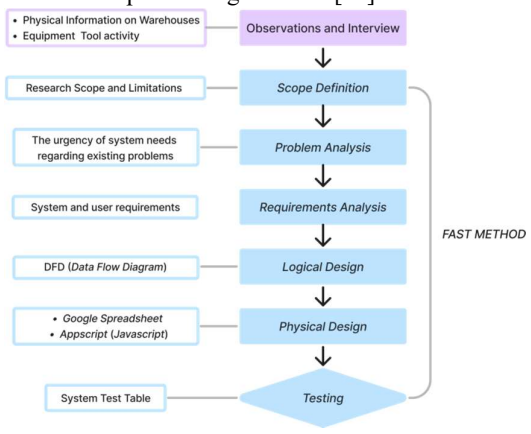

Fig.1 FAST Method

e-ISSN: 2614-8404
p-ISSN : 2776-3234

The first step taken was data collection through observation and interviews. Observations are carried out by looking directly at the physical condition of the warehouse and the production equipment stored there. The interview was conducted with the warehouse manager of the KCM division, the person in charge of the warehouse. Then, the data will be processed using the Framework for Applications of System Thinking (FAST) method.

This method has several stages [15]:

1. Scope Definition
   The initial phase defines the scope, the parameters of the warehouse information system are clearly outlined, and the limitations of the desired information are clearly outlined.
2. Problem Analysis
   Problem analysis is carried out to accurately describe the scope, problems, and cases that occurred before, after, and during the development of the information system.
3. Requirements Analysis
   This stage involves identifying system requirements that are important in designing information systems. This stage includes determining user needs and system requirements.
4. Logical Design
   Using an object-oriented design method, this design phase uses DFD (Data Flow Diagram) as the primary tool.
5. Physical Design
   At this stage, the logical design will be translated into physical form in terms of a digital system, which includes designing database tables using Google Spreadsheets and Javascript coding.
6. Testing
   Finally, there is a trial of a system that has been designed with the desired information needed for a certain period..

III. Results And Discussion

3.1 System Description

The KCM Division's warehouse information system is a system that only provides information related to borrowing production equipment, distribution, and tracking of equipment, as well as equipment inventory information stored in the warehouse. It is a simple system whose output is not a website or application but only a simple loan recording system using Google's default application, Spreadsheet. The warehouse manager will later use the data stored in the Spreadsheet to monitor the use of valuable tools for making decisions on production arrangements..

3.2 System Development

1. Scope Definition

This research has the scope of designing a warehouse information system for the KCM PT division, XYZ, with the problem of needing information on borrowing production equipment from the warehouse.

2. Problem Analysis

The problem will be analyzed using cause-and-effect analysis.

Table 1. *Cause and Effect Analyze*

Cause and Effect Analyze	
Problem or Opportunities	***Cause and Effect***
Production equipment is sometimes located in other places or divisions when needed	There is no neat recording, so information about the whereabouts of the equipment is unknown
There is no information on the time for borrowing or using production equipment	Equipment returned late
Equipment was not returned on time.	Difficulty setting program production schedules
The condition of production equipment is different between those entering and leaving the warehouse.	Decreased tool performance.
Storage of production equipment mixed with other items	unable to create a production tool database.
The need for equipment does not meet the number of employees who need itn	Delays in the production process
There is no neat tool database yet	The tool information stored is not known to certain
Recording of equipment loans is still manual	Reduction production process time

Several problems and weaknesses related to the KCM division's warehousing are shown in Table 1, which will affect the production process. Thus, it is necessary to design a warehouse information system to handle these problems and information needs.

3. Requirements Analysis

Entity/Actor

The following are entities/actors that are directly related to the KCM warehouse division

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Table 2. Entity/Actor

Entity	Description
Warehouse Manager	The second user can access, edit, and find out all the information in the system
Warehouse Officer	The first user can access and input data and information but cannot edit the system
Videographer	Users can only access, view, and find out information in the system
Produser	Users can verify the tool list data provided by the videographer in the system

User Requirements

Table 3. User Requirements

User	Requirements
Warehouse Manager	Could change data in the system Has full system access rights Could update the inventory of goods in the system Could edit other users' access rights
Warehouse Officer	Could edit other users' access rights Could input data on borrowing production equipment into the system Could see the stock of tools
Videographer	Could see information on the tool being borrowed
Produser	Could check information on the availability of equipment and tools that are being borrowed

Hardware and Software Requirements

Table 4. Hardware and Software Requirements

Jenis Perangkat	Kebutuhan
PC	Laptop or ordinary computer
Browser App	Google updated (*Chrome* 109)
Internet	Minimum connection speed is 500 Kbps
Windows System	Minimum Windows 7
Keyboard	*All device*
Mouse	*All device*

4. Logical Design

The data flow design will use a data flow diagram (DFD). The initial stage in building a DFD involves developing a level-0 diagram, called a context diagram. This diagram serves as a broad representation of the entire system and its feedback [16]. Next, DFD levels 1 and 2 are formed. Figure 1 illustrates the context diagram for the KCM division's warehousing information system.

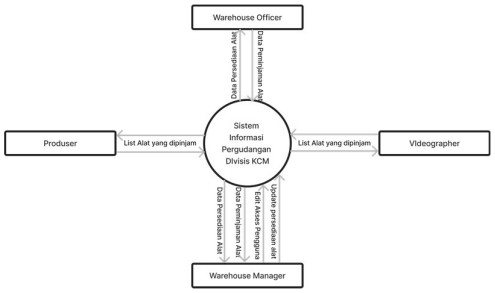

Figure.2 Context Diagram

The context diagram above explains several entities interests in the KCM division's warehouse information system. This is designed in general form before going into the more detailed in DFD level 1 in Figure 2.

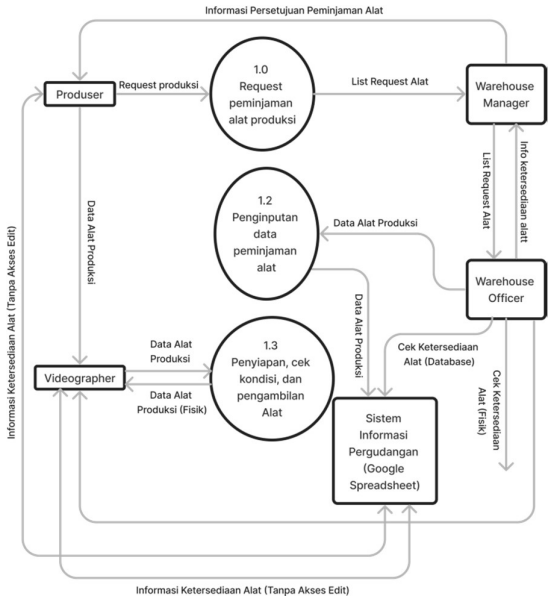

Fig.3 DFD level 1

DFD Level 1 shows the data flow, starting from information on requests for production equipment from the producer, then approved by the warehouse manager, and then the data is input by the WO into the warehouse information system, namely Google Spreadsheet. Finally, the equipment list information is received by the videographer and then taken together with the WO in the warehouse.

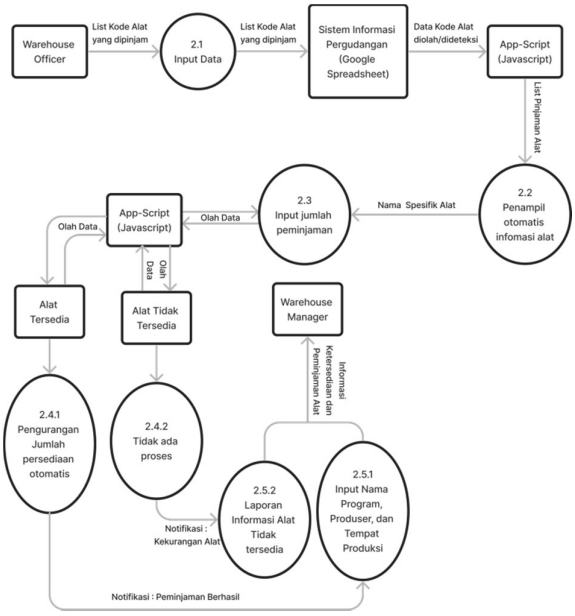

Figure.4 DFD level 2

DFD Level 2 is the data flow received by the WO and will be input into the system. It begins with equipment information received by the WO and then entered into a spreadsheet that records equipment borrowing. At this

e-ISSN: 2614-8404
p-ISSN : 2776-3234

stage, JavaScript coding is used to make it easier to input data and reduce the amount of inventory data in the warehouse automatically, thereby speeding up recording time..

5. Physical Desgin

The next step is to directly interpret the logical design that has been created into the physical design, namely the information system. This uses the help of a tool that is already available and can be easily accessed using the internet, namely Google Spreadsheet..

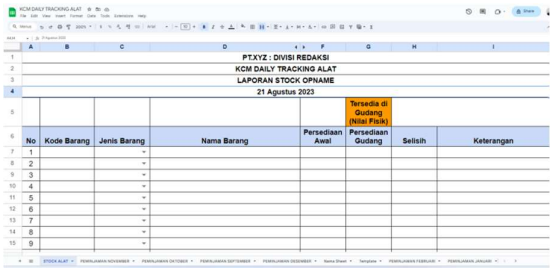

Fig.5 Tool Stock Database Sheet

The Tool Stock Database Sheet was created as a database of information on what tools are owned and stored by the KCM division, both physically and in digital records. Previously, stock-taking had been carried out first.

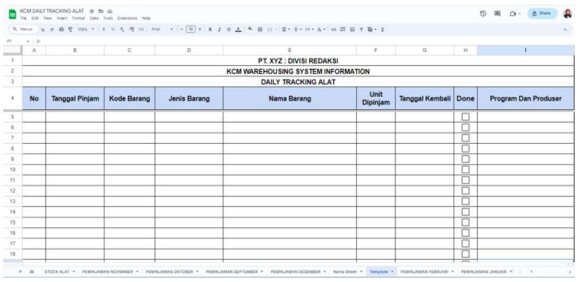

Fig. 6 Tool Tracking Sheet

The Tool Borrowing Tracking Sheet was created to record the borrowing of production equipment used every day. From here, you will find out all the information relating to the equipment borrowed, the program produced, the production location, and the videographer and producer who are responsible for the equipment..

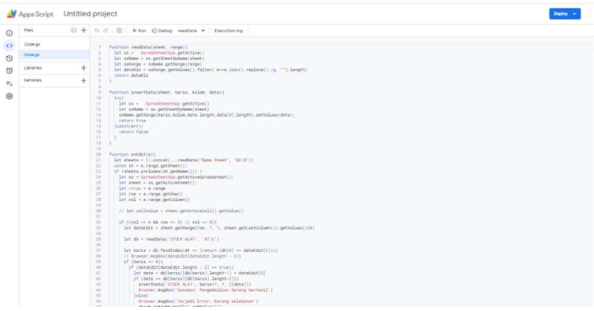

Fig. 6 Coding *Javascript*

Due to the limitations of some of the built-in spreadsheet functions, JavaScript coding is used in Google Extensions, namely Apps Script. It will bring up a new function in the form of automatic reading and detection. When the item or tool code appears, the specific name of the tool will also appear in a matter of seconds. It will also automatically reduce and add equipment inventory to the stock-taking sheet to provide information on successful borrowing, shortages of goods, and successful returns on the equipment loan tracking sheet...

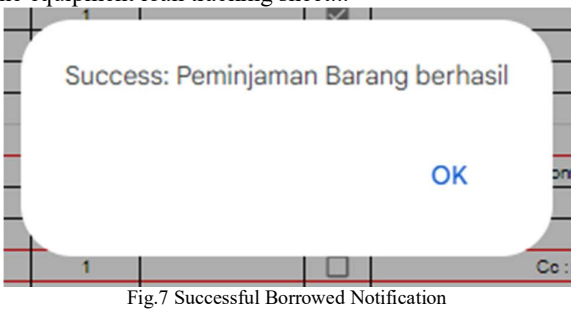

Fig.7 Successful Borrowed Notification

This notification is for sign that automatic deduction for successful item borrowing.

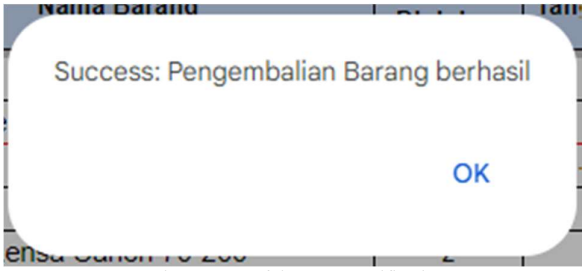

Fig.8 Successful Return Notification

This notification is for sign that automatic addition of returned goods is successful.

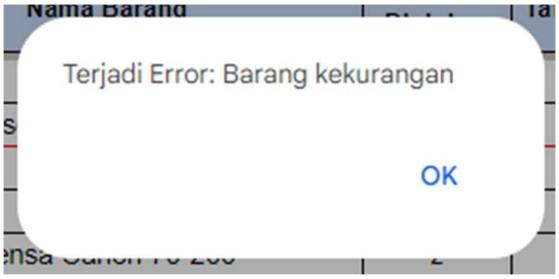

Fig.9 Less Stock Notification

This notification is for sign that there is no process for shortages of goods.

The notification above will only appear when data on the number of tools borrowed is entered in the Borrowed Unit column. All of these notifications are a sign that the Javascript coding has been successfully executed, and changes to the inventory data in the Equipment Stock sheet, specifically in the Warehouse Inventory column, have also changed

6. Testing

The final step is testing the system that has been created. This was done to measure the achievement of existing problem solving by the KCM division's warehousing information system. The following is the system test table:

e-ISSN: 2614-8404
p-ISSN : 2776-3234

Table 5. System Test Results

Indicator	How To Test	Achievement	Test Result
Equipments Inventory Information	WM inputs tool data and information in the form of item code, name, and quantity available.	√	The Stock Name Sheet was formed as a database tool that can be used flexibly by simply adding data to the next empty column without disturbing Javascript coding
Equipments Borrowed Information	WO inputs data and information on borrowing equipment.	√	The notification "Succes : Peminjaman Barang Berhasil" appears
Equipments Retunr Information	Check the box in the Done column	√	The notification "Succes : Pengembalian Barang Berhasil" appears
Equipments Availaibility Information	Input a number that exceeds the tool inventory amount	√	The notification "Terjadi Eror : Barang Kekurangan" appears
Equipments Existense Information	-	√	It's in the Program and Producer column
Neatness of Equipment Storage	-	√	A stock tool sheet is available digitally, and a physical stock take has been carried out.
Equipment Condition Information	-	√	There is no solution yet due to the fast and flexible distribution of production equipment

IV. CONCLUSION

This study designs a simple KCM editorial division warehousing information system. By focusing on recording production equipment loans, this system was built using free and easy-access tools, namely Google Spreadsheet and Javascript coding. This system is suitable for application in the KCM division because it has resolved various problems and fulfilled warehouse information needs based on evidence of system test results 100%. Hopefully, This system can be further developed for complex uses with simple tools. Creating solutions to Javascript coding errors and bug problems in further research is also recommended..

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