# Designing A Desktop-Based Information System For Change Over Time Reporting Using The SDLC Method

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**ABSTRACT**

PT. XYZ is an industrial company specializing in high quality packaging. The implementation of the input process and data management in monitoring of Change Over (CO) time reports is still constrained and manual. The problem arose after analysis and observations during May-September 2022. Based on the results of analysis and observations on the process of reporting time change over opened up a number of problems i.e. there is repeated work done by the Group Leader (GL) also done by administrator on the input process and indicated the management of data on the old system is still manual so resulting in the time required for input process to be long. Total time based on observation results on the GL input process for 13 minutes and 35 seconds while for administrator until 40 minutes more 5 seconds. Business process improvement is applied by proposing a new flowchart process, including developing a new system design using the System Development Life Cycle (SDLC) method. The proposed improvement is in the form of redesigning the flowchart process and implementing a new system to make CO time reporting more effective and efficient. Based on final results and observations of improvement, the total average time consumed for group leader input is 7 minutes and 20 seconds, with a reduction percentage of 46%, and for administrator input, it is 2 minutes and 45 seconds, with a reduction percentage of 94%.

**Keyword**: Change Over Report, Process Input, Time Consumption, Flowchart Process, System Development Life Cycle, Desktop Apps (MS Access)

## 1. Introduction

In today's fast-paced business world, information technology has become an essential part of any successful company. With the advent of advanced computing and communication technologies, companies are constantly striving to leverage these tools to optimize their operations, increase productivity, and enhance their competitive edge. One area where effective use of technology can be particularly valuable is in the management of business data. As businesses generate an increasing amount of data, the need for efficient and effective data management becomes more critical. The use of good information systems can improve company performance and can assist managers in making more appropriate business decisions.

To produce something efficiently, the production process needs good management information and a coordinated flow of resources. According to a 2019 journal publication by Roh, et al., that waste in information management can include any additional actions or inactivity that arises as a result of not providing data with direct access to the correct, accurate and up-to-date information they need. Therefore, coordinating well and managing business processes in a system must also be well designed to make it easier to work on so that it can save time efficiently and easy to monitor the production activity process.

PT XYZ is an industrial company specializing in high quality packaging. However, the implementation of the input process and data management in monitoring Change Over time reports is still constrained in the preparation department so that an administrator cannot complete the job desk completely and the data that has been input cannot be managed properly as a reference for evaluating employee performance and production results. This is where the role of information technology is needed to be able to assist the process of monitoring and inputting data from CO (Change Over) time results that can be systemized so that this technology is expected to have efficiency and effectiveness in assisting the implementation of the process so that the data input and output process becomes more effective and efficient.

To avoid the problems in future, a desktop system will be designed, and the flow process for an administrator and user will be improved. This will make it simpler to input, read, and monitor data and will also shorten the time required for the input process. System Development Life Cycle (SDLC)

is the approach utilized to resolve these issues.. The method used in solving these problems is the System Development Life Cycle (SDLC) method. According to Pressman (2015), the System Development Life Cycle (SDLC) model, also known as the waterfall model, is sometimes referred to as the classic life cycle. SDLC represents a systematic and sequential approach to software development. Each step in the SDLC has the specific goals that align with the objectives of developing the system, which involve creating an information system efficiently and effectively (Irawan, 2017).

## 2. Material and Methods

### 2.1 Research Methodology

Methodology analysis is the main approach or method used to categorize, gather, and analyze data about a topic matter; this chapter outlines the steps and stages of the research. The organized method acts as a road map. The right methodology and organized steps should be used when conducting research.

Introduction
- Identify Problem Background

Material and Methods
- Business Process Management
- System
- SDLC method
- Activity Diagram
- Context Diagram
- Data Flow Diagram

Conclusion
- Concluding Achived Research Objectives

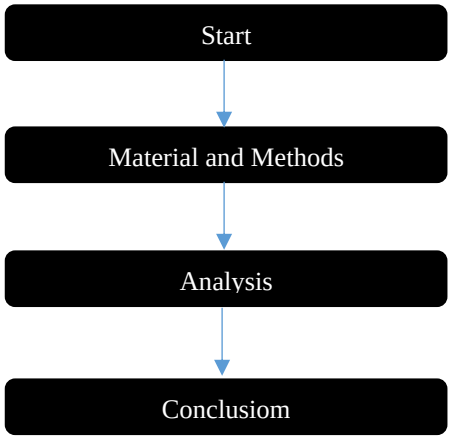


Figure 2.1 Research Framework

### 2.2 Business Process Management

The commitment of business process management (BPM) to the analysis, planning, and execution of continuous process improvement for organizational operations is widely established. BPM is a systematic method for analyzing and continuously improving core business functions including production, marketing, communications, and other significant areas of an organization's operation.
BPM primarily focuses on the core business operations that have high leverage and a significant amount of added value. The following guidelines must be followed when using BPM :

- Significant actions must be accurately plotted and documented.
- By establishing horizontal connections between important tasks, BPM focuses attention on consumers.
- To assure discipline, consistency, and repetition of quality performance, BPM depends on systems and established procedures.
- BPM depends on measurement activities to evaluate each process's performance, define goals, and provide output levels that can satisfy corporate objectives.
- BPM must be founded on an ongoing process of optimization through issue resolution and gaining further advantages.
- In order to ensure that greater competitiveness is attained, BPM must be motivated by best practice.
- Having the correct systems and structure in place alone will not result in cultural transformation; rather, BPM is a strategy.

## 2.3 System

A system is a collection or mixture of interrelated, dependent, or interacting elements that form a unified entity (Arnold, 2015). While (Sillitto, Dori, & Griego, 2017) said that a system is a collection of interconnected elements, subsystems, and assemblies that work to achieve a specific goal. These components include things like procedures, people, information, techniques, facilities, services, and other supporting aspects. Products (hardware, software, and firmware) are also included. The characteristics of the system are functional, infrastructural, easily connectable, adaptable/versatile, reliable, and produces additional benefits (or problems) (Amaravadi & Lessard, 2017).
System Specifications The components (system components), boundaries (system boundaries), environments (environment outside the system), interface (system liaison), input (system input), output (system output), process (system processing), objectives & goals of the system must all be distinguished in order to build and develop a good system (system goals and objectives).

a. System Components (Component): A system is made up of several parts that communicate with one another in order to function as a single entity. Subsystems or individual system portions might be considered system components.
b. Boundary System: A boundary system is a line separating one system from another.
c. Environment: Anything outside of the system's limits that has an impact on how the system functions is considered the external environment of the system.Liaison System (Interface):
d. Liaison system is a media liaison between a system with other subsystems.
e. System Input (Input): Energy entering a system is referred to as input.
f. System Output (Output): After energy has been handled, it is divided into useful output and residual output, which must be disposed of.
g. A system may have a processing part that will translate input into output.
h. System Objective: A system has to have a target or targets (objective). The system's objective is to identify the input required by the system and the output that the system will generate.

## 2.4 Sustainable System Development Life Cycle (SDLC) Method with Waterfall Model

The waterfall model SDLC development method, which consists of several stages as stated as follows (Sadi, Lucitasari, & Khannan, 2019). Methodology SDLC is an acronym for (Software Development Life Cycle). According to English grammar, the meaning of Methodology Software Development Life Cycle is a software development life cycle methodology, which means it is a methodology used for the process of making and changing systems. Usually the system is a computer system or information system. There are various types of development models from the SDLC methodology, such as prototype models, RAD models, agile models, fountain models, v-models, RUD models, waterfall models, scrum models, iterative models, spiral models, big bang models, UP models, extreme programming. After knowing the types of models that exist in the SDLC methodology. Researchers decided to use the Waterfall model because its structured flow from Planning, Analysis, Design, Implementation, Operation to maintenance is very suitable for use and implementation. Waterfall Modeling The Waterfall model or commonly referred to as the waterfall model is a classic systematic life cycle model in developing a software (or what is commonly known as software). The system development flow is structured starting from planning, analysis, design, implementation, operation and maintenance. (Ridwan, Fitri, & Benrahman, 2021).
Consequently, the SDLC is a conceptual framework or process that takes into account the organization of the steps involved in the creation of an application, from the first phase of a feasibility study through the deployment and maintenance of the final product. There are a number of models that provide different methods for the SDLC process. Typically, the stages that are followed within the life-cycle framework are described using an SDLC model. It is important to keep in mind that a model and a methodology differ in that the former only describes what to do, whereas the latter also includes instructions on how to do it. Therefore, a technique is prescriptive, but a model is descriptive. As a result, we evaluate SDLC models in this article based on how applicable they are to certain kinds of software projects. This method takes into account the environment in which an SDLC model is applied.

The phases of the systems development life cycle (SDLC) is following :

1. Requirements Analysis Requirements Analysis
   System requirements analysis assess and define issues with information systems and organizational processes, as well as potential remedies
   - Analysis of Problem Identification In systems analysis, problem identification is the initial stage. The issue has to be identified and resolved at this point.
   - Need assessment creates user requirements after analyzing the software system's (user) user needs.
   - Analysis of System Feasibility the likelihood that the suggested solution will be successful is assessed using feasibility studies. This stage checks that the suggested solution can be implemented.
2. Design
   System design is designing information system outputs, inputs, file structures, processes, hardware, and software.
   - Procedure Design A logical model is used in the process design of data flow diagrams to further explain to the user how the logical operation of the information system will operate.
   - Table layout The system is created using a table design. By creating linkages between tables, tables are created to create an identity that symbolizes the database design.
   - Interaction Design It is necessary to complete the interface design before creating an application. The user's perspective is taken into consideration when developing the application page.
3. Implementation
   System implementation from the software available became easier to use after improved, and creates the software required to support the system and conduct accurate tests. All improved process inputs from system design. Each unit is developed and tested to determine the functions associated with the unit.
   The process of building a new system (including the physical database architecture and actual program coding) and putting it into use is known as systems implementation. In other words, the term "implementation" refers to the actions that lead to the system being computerized. Coding traditionally represents the bulk of the systems implementation phase's work. Code generators, screen generators, and report generators are three examples of automated coding aids. These CASE tools are all readily accessible, and employing them will significantly boost the amount of code produced.
4. Testing
   Testing the system and assessing whether it can work according to the expected functionality. System testing applied, tests, and uses the hardware and software. If an application can perform its functions successfully, effectively, and adequately, it is said to be useful. Effectiveness has to do with how well people utilize software to accomplish their objectives. In order to accomplish these objectives, users must operate smoothly. The acceptance of the program by the user has an impact on satisfaction. Testing for usability is done to determine whether or not a program satisfies user needs.
   - Ease of Learning
     Measures usability by comparing the time spent learning a computer system with which one is not familiar with, to the time it takes to do the same thing in another way.
   - Ease of Use
     Measures the number of actions used to complete a job. In the example, how much input time and clicks are received at the time of use in inputting the data.
5. Maintenance
   System maintenance assists with the operation of information systems and makes facility adjustments or enhancements. Maintenance can be interpreted as an activity to maintain or maintain factory facilities/equipment and make necessary repairs or adjustments/replacements so that there is a satisfactory state of production operations in accordance with what was planned. In addition, there are various opinions regarding the

meaning of maintenance, including a combination of every action taken to maintain an item in or to repair it to an acceptable condition.
Maintenance can also be said to be an act of combining managerial, administrative and technical in order to maintain items or goods so they can work according to their needs. The statement of the merger between managerial, administrative and technical means that these three elements must be mastered by people who are experts in the field. So that maintenance is carried out properly and correctly and is not carried out carelessly so that these maintenance activities result in goods being able to function properly for a longer period of time.

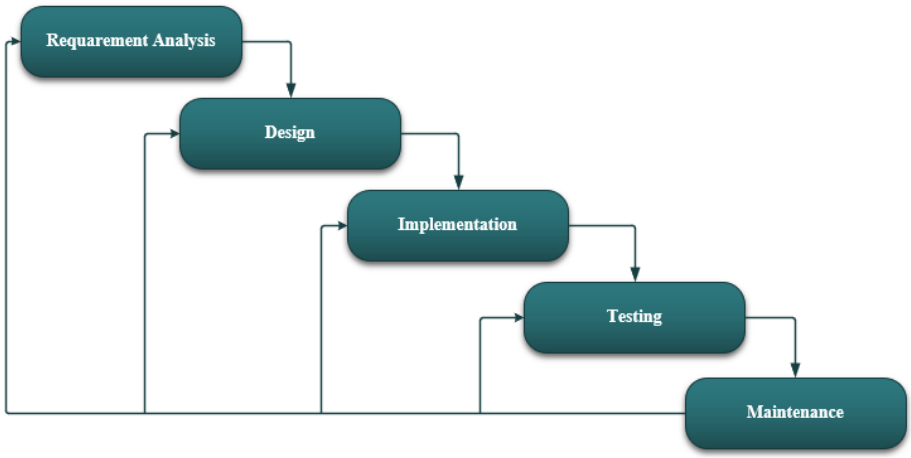


**Figure 2.2 SDLC Method With Waterfall Model**

### 2.5 Activity Diagram

The activity diagram is an advanced version of the flow chart. It is used to show the steps or the flow of the process in a system. An activity diagram shows the operational workflow of any system. An activity ultimately results in some action. It describes the flow from the start to the finish point. Sequential processing and concurring processing can be depicted using an activity diagram (Khurana, Chhillar, & Chhillar, 2015).
Activity Diagrams describe the workflow (workflow) or activities of a system or business process. Activity diagram is a depiction of the workflow of a business process contained in the software. Simply put, it is a design made with flow from start to finish. Further explanation put forward by Sukamto and Salahuddin states that the activity diagram does not explain the behavior of the subject, but rather describes the system's activities in detail and sequentially. The activity diagram can also be used to categorize workflows, which aids in the efficient operation of an activity process. The arrows in this setup serve as a connection between the various streams.

### 2.6 Context Diagram

A context diagram is a diagram that consists of a process and describes a scope of a system. This diagram is called the highest level on the data flow diagram. It depicts all of the inputs and outputs of a process or system. The data flow sourced from the user is processed in the system and produces output in the form of application menu options. With regard to data leakage, it was not possible to visualize the evidence because the officer admitted there was no data leak (Tanabe & Kobayashi, 2019). For this reason, previous research states that it is necessary to clarify the scope of the officer's responsibilities. It considers that the scope of nondisclosure of information is included in the scope of responsibility (Tanabe & Taniguchi, A Proposal of A Tool that Visualizes Data-Flow and Assures No Data Leakage: using Context Diagram and Assurance Cases, 2019).

### 2.7 Data Flow Diagram

A tool used to show how data flows through a process or system is called a data flow diagram (DFD). It contains both the input and the output from every processing unit. It also illustrates the system's data information and the data flow process A tiered approach is used to develop DFD. Context diagram (CD) is the first step, followed by DFD level 1, DVD level 2, DVD level 3, and so forth,

depending on the complexity of the system being designed. DFD is a tool that seeks to plan a system that connects to the data flow by utilizing a breakdown concept, but it is free of any decision-making or repetition obligations. It can be used to define a human-understandable analysis or planned system. DFD may also be used as a modeling technique that can assess customer requirements and translate them into a comprehensible structure. This is primarily used in software development to examine functional requirements and determine the complete design of the system being built. As a result, various system components can be identified at various levels of abstraction. Due to the identification of all functional components by DFD, it is simpler to estimate tasks for each component, leading to more accurate project duration estimation.

## 3. Result and Discussion

This section will analyse the throughout research following on the initial condition using the process of SDLC methodology. Reporting time changes over which are still manual has a significant impact on the efficiency of work and its effectiveness. This requires a new system that can reduce errors and processes that are more efficient and targeted.

### 3.1 System Requirement

The process of input and monitoring data is a long -term work because complete validated data will be used when problems occur as consideration and evaluation of performance both from workers or all that are helpful in the production process in a manufacturing company. The preparation department at PT Supernova Flexible Packaging uses Microsoft Excel as a software for input and monitor data of CO Time as a final report, but there is no system development included in excel software for user activity diagrams to input and monitor the CO time Report. The administrator just input and checks data manually into Microsoft Excel file.

**Current Condition**

In this process, two results are obtained. These results are in the form of problems that occur in the flowchart process that occur in the change over time reporting activity on the printing machine, and the second result of the analysis is an analysis of needs as a condition for finding solutions that will be developed in the current reporting activity.

**Table 3.1 Total Time Consumption In Current System**

| No | Number Input Pershift (average) | Total Time For One Proces Input (average) In Second | Total Time In second | Total Time In Minutes |
|---|---|---|---|---|
| 1 | 9 | 89 | 801 | 13.35 |

**The Weakness of Current System**

Evidenced by the collected information in the process updating the CO time report in the current system, and the input data still manually, several weaknesses of the current process were identified before in tables and figures given . The weaknesses of current system as follows:

1. Input process manually so that data can occur errors in the form of incompatibility in the process of input data between JI code and product article names
2. The features available in the system cannot be utilized properly for the data monitor process.
3. The display of data is limited because excel sheet
4. The data store cannot be extracted neatly and continues for data analysis
5. Process input for CO time report take a long time

**User Requirement**

The user requirement is used to determine the needs of the user. From the result of the direct interview, the user requirements are as follows.

- Reduce the manual input system
- Provide flow process of inputting data
- Design the system to make it easy-to-understand and how to use the desktop apps.

- The system provided feature for filtering data to monitor the data and check the missing update for Change Over process in each cerutti (printing machine), and features to filter data as data analysis needs based on date, group and machine name (cerutti).
- The system easyly to extracted data and the report data has been well arranged in the form of sheets.

### 3.2 System Design

In this process is an analysis of the system used at present with the system to be developed.

**Current Activity Diagram**

**Figure 3.1** shows the activity system in excel, in that system there is only a data input process, after which the process is complete, there are no improvised other activities in it

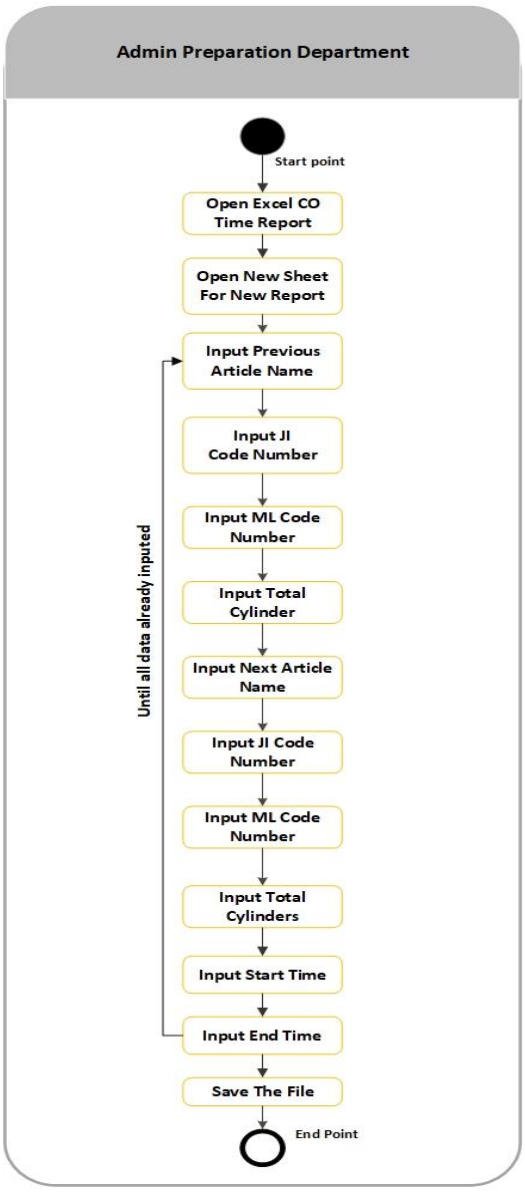


Figure 3. 1 Current Activity Diagram

**Proposed System of Activity Diagram**

- **Process Login**

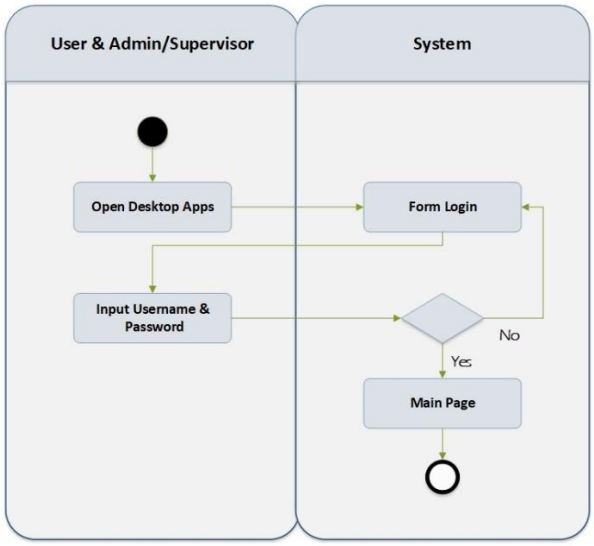


Figure 3. 2 Process Login

- **Process CO Time Report Input**

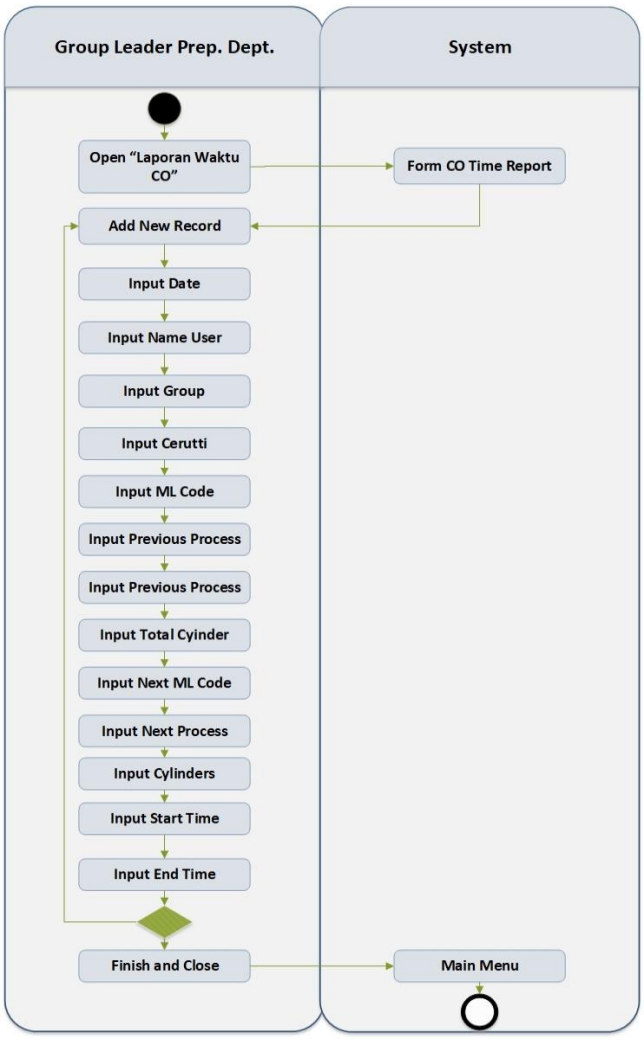


Figure 3. 3 Report Process

- **Monitoring Data**

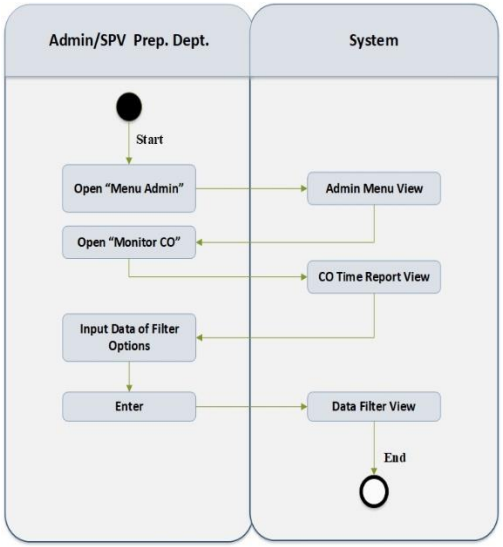


Figure 3. 4 Monitoring Activity

**Context Diagram**

The highest-level data flow diagram is this context diagram. Typically, there is just one process to represent the complete system, process number is zero, and there are no data storage as in figure

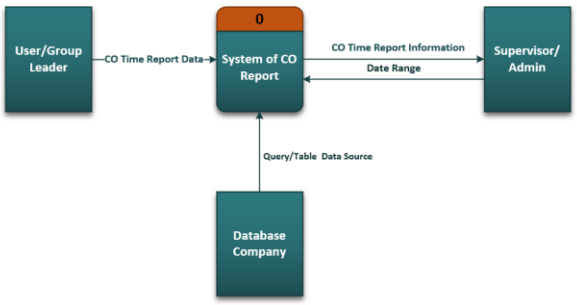


Figure 3. 5 Context Diagram

**DFD Level 0**

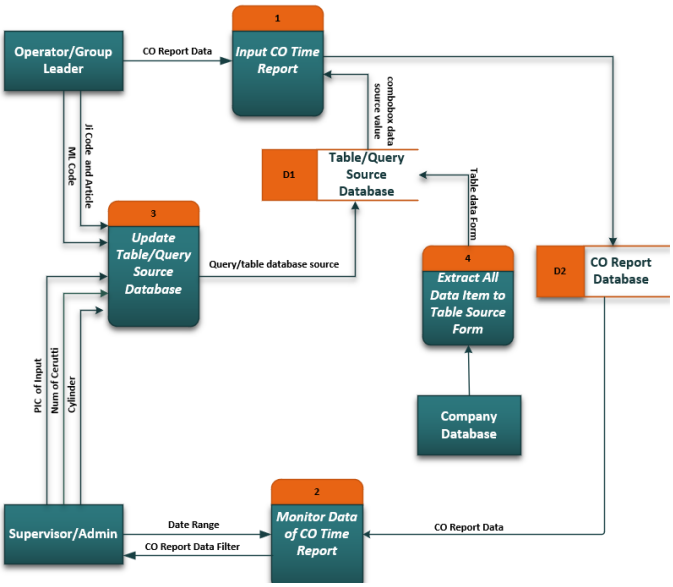


Figure 3. 6 DFF Level 0

**DFD Level 1**

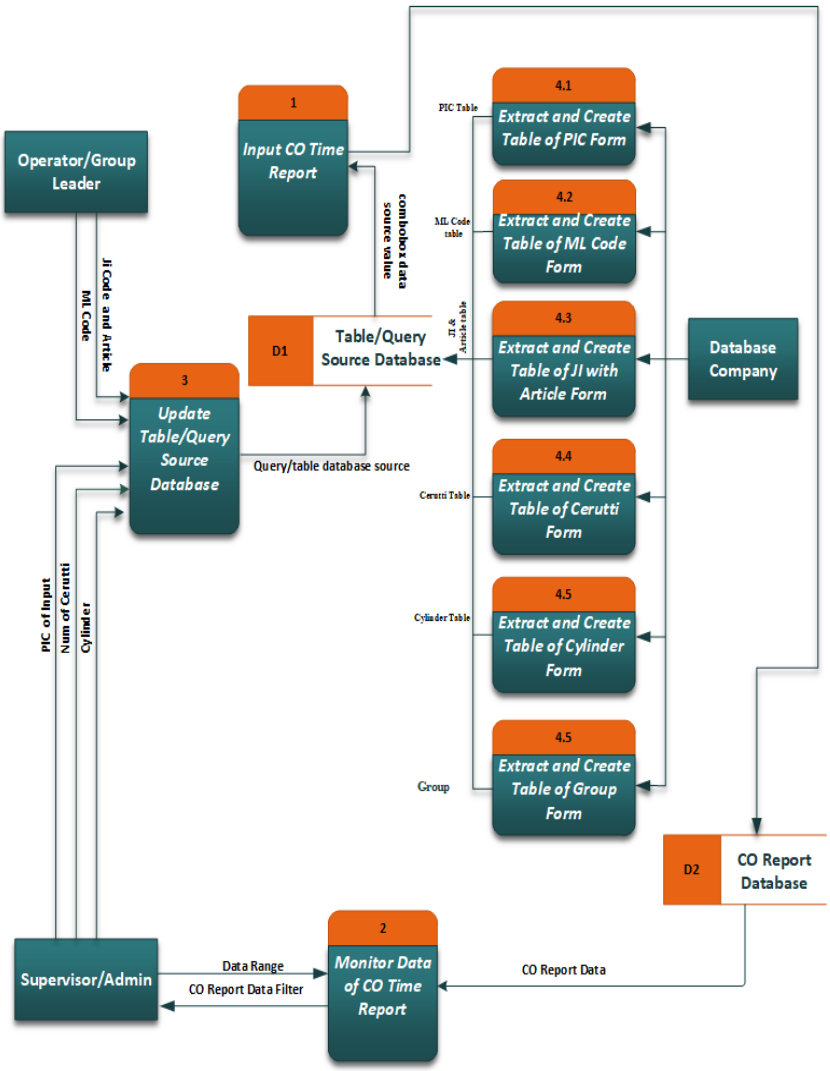


Figure 3. 7 DFD Level 1

### 3.3 Implementation

For the realization process of the proposed application system, the implementation uses a desktop-based application using a Microsoft access database, because the development is more precise and the maintenance and updating of features does not cost more. The application development proposed by the author is intended to simplify the CO time reporting process and reduce the administrator workload so that the department does not need to add new administrator employees. In the system, it has been explained that there are two accessors, namely the user and the administrator.

### 3.4 Testing

In this test of the proposed system, it will show all the process stages of the implementation of the reporting CO time process. There are 4 processes, the first process is login test, second process is Chang Over input Time Report, the third is process update and the fourth process is monitoring data input.

### 3.5 Maintenance

In this research project, there were no maintenance stages because after implementation, no problems occurred, but if there was a maintenance process on the system, it could be handed over to the team in charge there. The maintenance stage intends to maintain stability so that excessive errors do not occur. System maintenance assists with the operation of information systems and makes facility adjustments or enhancements, at this stage no problems or other feature requirements have

been found after the application implementation and testing stages. the possibility that with developments and other industrial needs does not rule out the possibility that it will continue to be developed and even replaced with newer and more up-to-date systems.

### 3.6 Result

The process of comparing results after improvisation is underway, both in terms of the activity flow of the time report CO and also the development of a new application system for the data input process. There are two comparison results, starting with the comparison between the current input system and the new system proposed, and the latter is the comparison of the administrator's workload before the improvisation and after the improvement.

1. **Comparison between Current System Input and Proposed**

   From the table 3.1, the long duration of the input process for each group is averaged to be 7.2 minutes or 432 seconds from 13.35 minutes or 801 second to input the CO time report process in one full work shift for each working group.

Table 3 1 Comparison Total Time Consuming of Inputting Process Before And After

| Description | Total Consumption of Current Process Input | Total Consumption of Proposed Process Input |
|---|---|---|
| Number Input Pershift (average) | 9 | 9 |
| Total Time For One Proces Input (average) In Second | 89 | 48 |
| Total Time In second | 801 | 432 |
| Total Time In Minutes | 13.35 | 7.2 |

From the explanation of the table that difference The input process efficiency differs significantly between the proposed system and the current system. In the results, about 369 seconds were different. And the percentage for reduction is 46 % as described in figure

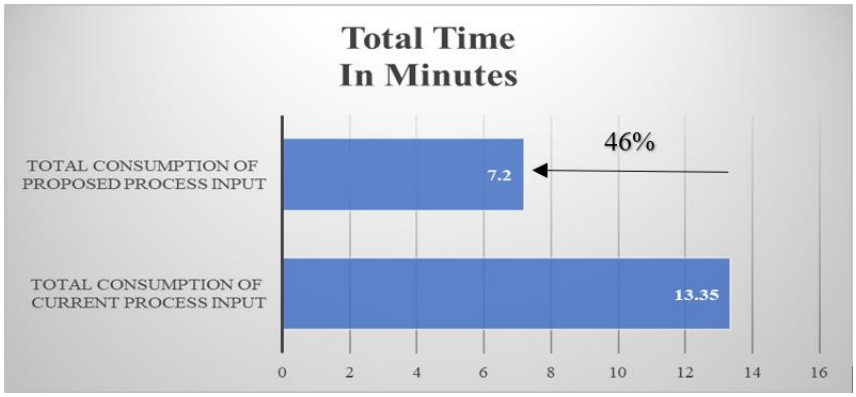


Figure 3. 8 Percentage of Time Reduction

2. **Comparison Workload Administrator Before and After Improved**

   The administrator's task on the new system is to check/monitor the completeness of the incoming data input per day, and the task for the process of inputting CO time report data is for each group leader/user who is on job as a CO operator during work shift hours. Prior to the new system and flowchart improvisation in CO time reporting, the administrator was in charge of inputting data per day or 3 work shifts, if the total time of the input process was calculated based on the observations of the input process in the previous system as in table 3.2 that every time the input process takes and the number of inputs based on one work shift.

Table 3. 2 Total Time Consumption For Administrator To Input CO Report

| Description | Total Consumption of Current Process Input |
|---|---|
| Number Input Per shift (average) | 9 |
| Total Time For One Process Input (average) In Second | 89 |
| Total Time In second | 801 |
| Total Time In Minutes | 13.35 |
| Full day Work | 3 |
| Grand Total Time of 1 Day (In second) | 2403 |
| Grand Total Time of 1 Day (In Minutes) | 40.05 |

The administrator input process to input the Change Over time report in 3 shifts (24 hours) is 40.05 minutes or 2403 seconds long. Table 3.3 explains the length of the administrator/supervisor monitoring process in checking the completeness of the CO time report data.

**Table 3 3 Total Time Consumption For Administrator To Monitor Data**

| No Observation | Open "Monitor CO" | Input Date Range Start | Input Date Range Finish | Process Monitor | Close |
|---|---|---|---|---|---|
| 1 | 4 | 4 | 6 | 128 | 4 |
| 2 | 4 | 5 | 5 | 131 | 3 |
| 3 | 3 | 4 | 4 | 111 | 4 |
| 4 | 3 | 6 | 4 | 136 | 5 |
| 5 | 4 | 4 | 5 | 142 | 4 |
| Total | 18 | 23 | 24 | 648 | 20 |
| Grand Total | 733 | | | | |
| Average | 146.6 | | | | |
| Roundup (In second) | 147 | | | | |
| Total Time (In Minutes) | 2.45 | | | | |

In table 3.3 , the total time to monitor the completeness of the data CO time Report is based on the results of repeated time trial observations of 5 trials resulting in the time to input data for 2.45 minutes or in seconds for 147 seconds. starts after the administrator logs in to the application. The results of the efficiency comparison before and after improvisation is 94% with much significant results as shown in Figure 4.7

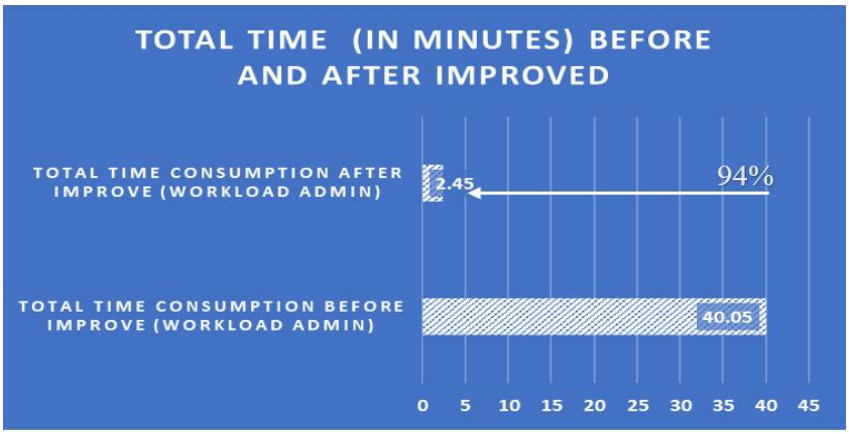


Figure 3. 9 Percentage of Difference For Administrator Workload Before and After Improved

## 4. Conclusion

In conclusion, the study identified significant issues in the Change Over (CO) time report process at PT XYZ. The manual and time-consuming nature of the report book, coupled with the use of sensitive paper which results in data loss or damage, hinders the efficiency and effectiveness of the process. Additionally, the data input process into Excel was lengthy, and the lack of organized data storage and automated monitoring further compounded the challenges.

To address these issues and achieve the study's goal, the research project implemented effective measures. By developing a new process flowchart and a desktop-based application, the study significantly improved the CO time report process. The new system eliminated the need for manual report books and allowed Group Leaders/CO operators to input data directly into the application, reducing processing time. Furthermore, the application facilitated streamlined data storage and automated monitoring, alleviating the burden on the administrator. Overall, the proposed changes demonstrated promising results in enhancing the efficiency and effectiveness of the CO time report process at PT XYZ.

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