Analysis Of The Design And Implementation Of The Use Of Google Spreadsheet For Daily Reports Of Incoming Goods At Pt. Putra Kelana Makmur Uses The Six Sigma Method (DMAIC)

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Abstract

This study designed and implemented a Google Sheets-based daily incoming goods reporting system to address reporting challenges at PT. Putra Kelana Makmur. The main problem was not with the Sunfish ERP system, but rather with human factors, such as multi-level approval processes and a lack of transparency between departments. A Six Sigma approach with the DMAIC framework was used to create a more responsive, flexible, and collaborative system. The implementation showed a significant increase in reporting time efficiency, from 1-2 days to less than 1 minute. The user acceptance rate reached 87.18%, indicating high satisfaction with ease of use, real-time access, transparency, and cross-departmental collaboration. It is important to note that Google Sheets serves as an alternative tool to complement the Sunfish ERP, providing faster, more flexible, and mobile data access. This study contributes practically to the company's logistics operational efficiency and theoretically to the development of cloud-based management information systems in the logistics and distribution sector.

Keywords: Google Spreadsheet, Six Sigma, DMAIC, Management Information System

1 Introduction

In an era of increasingly fierce global competition, efficient warehouse management is one of the key factors in maintaining a smooth supply chain and increasing the company's competitiveness, especially in the logistics and distribution sector such as PT. Putra Kelana Makmur. The smooth flow of incoming goods not only has an impact on the production and distribution process, but also plays an important role in meeting customer needs in a timely manner. Therefore, an accurate, responsive, and accessible incoming goods reporting system is a vital element to support fast and informed decision-making across the company's operational lines.

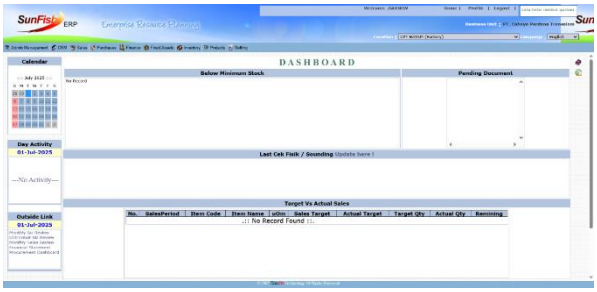


Fig. 1. Sunfish ERP Dashboard

Currently, PT. Putra Kelana Makmur has implemented *an Enterprise Resource Planning* (ERP) system, namely a web-based Sunfish ERP, to support warehouse management activities, including incoming goods reporting. ERP systems are basically designed to integrate various business functions in one centralized platform, so it is expected to improve efficiency and coordination between departments. Although the existing ERP system is capable, specific challenges arise in the process of reporting incoming goods. This problem does not originate from the weaknesses of the ERP system itself, but rather due to the human factors involved in the workflow.

One of the main problems is the limitation in terms of data access speed and information transparency between departments, especially for operational departments that require real-time incoming goods information to control inventory on ships to be handed over to the ship's crew, the shipping department also uses incoming goods data to help develop daily work plans, especially when their work requires the availability of materials or specific inventory. The problems faced do not stop there, the Approval process is staged which takes up to one to two days due to human factors that contribute to the length of this Approval stage.

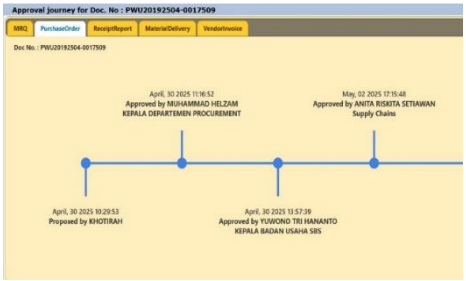


Fig. 2. Approval Stage Flow in ERP

ERP systems often leads to data delays, which has a direct impact on the smooth running of work processes in other departments. In addition, access to incoming goods reports is still limited to one department, so other departments cannot independently monitor the status of goods that have been received. This condition creates *a bottleneck* in team coordination and slows down the response to operational dynamics in the field. Another challenge faced is the limited access to ERP systems that can only be operated through certain devices, such as office computers, so that they do not support work flexibility, especially when access to information is needed on mobile or from outside the office.

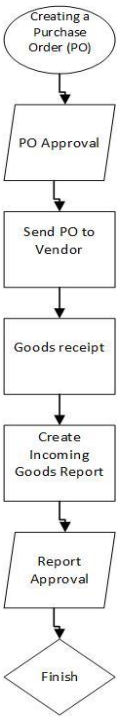


Fig. 3. Procurement Flow

The following is the process of procurement of goods that occurred at PT. Putra Kelana Makmur, the first process is the process of making *a Purchase Order* (PO) made by purchasing staff, then followed by *a* multi-level Approval process carried out by various stakeholders such as the head of the procurement department, the head of the supply chain, the head of the operational department, the head of the shipping department, after all stages *of Approval* finished, followed by the purchasing staff sending a PO to the vendor so that the goods are sent immediately, after the goods arrive and are inspected by the warehouse staff, the production of incoming goods reports begins which is resumed with *a tiered Approval* process , after all the *Approval stages* are completed, the goods report is automatically updated in the ERP system.

This condition confirms the importance of an efficient goods administration system to support good inventory management, a crucial aspect that is also emphasized by [1]. They highlighted that neatly organized, detailed, and clear inventory management is the key to operational efficiency in a business, something that is very lacking in the reporting system of incoming goods of PT. Putra Kelana Makmur before this intervention

Seeing these challenges, there is a need for alternative solutions that are more adaptive and practical without sacrificing data integrity and accuracy. One potential solution is the use of *Google Sheets*, a cloud-based platform that enables *real-time* collaboration, can be accessed from multiple devices, and offers high flexibility in the design of reporting according to user needs. Research by [2] also shows that the use of *Google Sheets* can significantly increase the effectiveness of team performance, although there are still some technical obstacles that need to be overcome.

While *Google Sheets* offers advantages in cloud-based collaboration and accessibility, it's important to recognize that it has some limitations that are worth considering, especially in the context of use for research purposes or complex system implementations. One aspect that needs to be considered is performance. When dealing with very large volumes of data or when calculations involve complex formulas and extensive interconnections between sheets, *Google Sheets* tends to show performance degradation. This can result in slower processing times, which can potentially hinder efficiency, especially for users who are used to the speed and responsiveness of *the Google Sheets software*.

It is important to affirm that the proposed implementation *Google Sheets* in the process of reporting incoming goods at PT. Putra Kelana Makmur is designed as an alternative solution, not as a replacement for the system *Enterprise Resource Planning* (ERP) Sunfish has become the backbone of the company's operations. Existing ERP systems have basically managed to integrate various business functions in one centralized platform. Its presence is a fundamental strategic investment for the company. As explained by

[3] in the context of enterprise-level technology adoption, organizations generally prefer to integrate complementary technology solutions to enhance specific functions, rather than replacing existing core systems, such as Enterprise Resource Planning (ERP). Therefore, the implementation of Google Spreadsheet in the process of reporting incoming goods at PT. Putra Kelana Makmur is a strategic step as an alternative solution that complements Sunfish's ERP system which has become the foundation of the company's operations, without intending to replace it

To ensure that the solutions implemented are truly effective and sustainable, the methodological approach used in this study is *Six Sigma* with DMAIC (Define, Measure, Analyze, Improve, Control stages. The *Six Sigma* method has proven to be effective in identifying and reducing process variations and defect causes, as stated by [4] and [5] making it particularly relevant to address inefficiencies in current reporting systems. This approach also emphasizes the importance of data-driven decision-making and cross-functional collaboration to achieve continuous process improvement.

To maintain the focus and depth of analysis, this study is limited to the design and implementation of the daily reporting system of incoming goods in the warehouse of PT. Putra Kelana Makmur by using *Google Sheets* as the main tool. The research does not include outbound goods reporting, overall stock management. The study also did not evaluate the financial aspects in depth, such as the cost calculation or economic efficiency of the system switch. The main focus is on improving the speed of data access, ease of use, and collaboration between departments in reporting incoming goods. The methodological approach used is limited to the *Six Sigma* framework (DMAIC) as a tool to analyze and improve the existing reporting process.

Theoretically, this research is expected to contribute to the development of science in the field of logistics management, especially related to the integration of information technology in the reporting and warehouse management process. The use of *Google Sheets* as a reporting tool studied through *the Six Sigma* (DMAIC) approach is expected to be a reference or model for the implementation of an efficient, flexible, and scalable cloud-based reporting system. In addition, this study also adds to the literature on the adaptation of simple digital technology as an alternative solution in overcoming the limitations of ERP systems, which are still a challenge in many companies, especially in the logistics and distribution sectors.

Meanwhile, practically, the results of this research are expected to provide real solutions for PT. Putra Kelana Makmur in improving the efficiency and transparency of reporting incoming goods in the warehouse. The designed system is expected to be able to facilitate real-time, cross-departmental data access, and through various devices, including mobile. This will not only speed up the flow of information and decision-making, but also improve coordination between teams and reduce reliance on ERP systems. More broadly, the implementation of this system can also be used as an example or inspiration for other companies that face similar problems in managing logistics and distribution of goods.

Thus, this study aims to design and implement a daily reporting system for incoming goods based on *Google Spreadsheet* at PT. Putra Kelana Makmur with *a Six Sigma* (DMAIC) approach. It is hoped that the resulting solution will not only speed up and simplify incoming reporting, but also encourage information transparency across departments, improve operational efficiency, and support better data-driven decision-making processes. In addition, the results of this research are expected to be a reference for other companies that face similar challenges in managing logistics and distribution of goods.

2 Literature Review

2.1 Google Sheets

Google Sheets is a web-based application from Google that allows users to create, edit, and collaborate on managing worksheets online [6] The app is part of the Google Workspace service and can be accessed through a variety of internet-connected devices. Several studies and practical applications have shown the benefits of *Google Sheets* in a variety of data management and reporting contexts:

- Stock and Inventory Management

Google Sheets can be used to manage material stock digitally, help in monitoring materials, and increase employee understanding of stock management [1, 7]. Specifically highlights the importance of goods administration for inventory management, including record-keeping, sales recaps, and checking goods.

- Record-Keeping Efficiency and Accessibility

The switch from manual systems to Google Sheets-based note-taking can improve efficiency, reduce data search time, and allow data access through various devices such as mobile phones as data is stored on the drive [8].

- Team Collaboration and Performance Effectiveness

Google Sheets is designed to make it easier for teams to collaborate. Research by [2] shows that *the Google Sheets* application partially affects the effectiveness of employee performance, although some obstacles in its use can still be encountered.

- Supporting Features

Features such as real-time collaboration capabilities, revision history, ease of sharing, and integration with other Google services make *Google Sheets* a flexible tool for daily reporting and data management

In this study, *Google Sheets* will be designed and implemented as the main tool to create a more structured, efficient, and accessible daily reporting system for incoming goods at PT. Putra Kelana Makmur.

2.2 Six Sigma

Six Sigma is a process improvement methodology that is structured, disciplined, and data-driven, with a main orientation on meeting customer needs. The fundamental goal of *Six Sigma* is to achieve significant quality improvement through the reduction of variability in operational processes and the elimination of defects or errors to close to zero. This is statistically defined as an effort to achieve no more than 3.4 defects per million opportunities (DPMO). This approach, as indicated in research by [4, 5], focus not only on the identification and elimination of defects, but also on an in-depth understanding of the needs and improvement of the overall efficiency of the process. Some literature, as discussed by [4, 5] also integrates *Six Sigma* with Lean principles, resulting in a comprehensive approach known as Lean *Six Sigma*, which aims to reduce waste as well as variation to achieve operational excellence.

The implementation of *Six Sigma* is based on a set of fundamental principles that collectively direct improvement efforts in the organization. The main principle is customer focus, where a deep understanding of customer needs and expectations is the cornerstone of every initiative. Furthermore, *Six Sigma* emphasizes data- and fact-based decision-making, which requires the use of statistical analysis for objectivity, not assumptions. A focus on the process is also at the core, where improvement of results is achieved through understanding, management, and optimization of the process itself. This approach is complemented by proactive management aimed at preventing defects before they occur, as well as cross-functional team collaboration to ensure a comprehensive solution. Finally, *Six Sigma* encourages a culture of effort towards perfection and continuous improvement, as highlighted by [5] regarding the importance of Continuous Improvement, which recognizes that learning from each stage is an integral part of the evolution towards higher quality.

Successful implementation *of Six Sigma* can provide a range of significant benefits to organizations, as indicated by the focus on improving efficiency and reducing defects in the literature [4, 5]. Key benefits include improved product and service quality, which directly impacts increased customer satisfaction and loyalty. In addition, through the elimination of waste and reduction of rework, *Six Sigma* contributes to a substantial reduction in operational costs. Process efficiency and productivity have also improved, which in turn strengthens the organization's competitiveness in the market. Furthermore, the data-driven decision-making culture instilled by *Six Sigma* allows management to make more informative and effective strategic choices. Employee involvement in improvement projects also often has a positive impact on improving morale and a sense of ownership of the process.

2.3 DMAIC Stages

DMAIC is a core structured, data-driven approach in many *Six Sigma* initiatives, designed to systematically solve problems and improve processes. This approach, which is explicitly mentioned and applied in research [9] for process improvement in the warehouse and by [4]in the development of an improvement framework using Lean *Six Sigma*, consists of five interrelated phases: Definite, Measure, Analyze, Improve, and Control. The use of this methodology in the context of the implementation of operational excellence, as explored by Trakulsunti et al., demonstrates its relevance as a fundamental tool for achieving process efficiency and continuous improvement.

- Define

The Define phase lays the foundation for the entire *Six Sigma* project. At this stage, the problems to be overcome are clearly and specifically defined. To get a thorough understanding of the process to be improved, this study will use a tool called SIPOC Diagram. SIPOC Diagrams are tools in process improvement that summarize the inputs and outputs of one or more processes in the form of a table [10] The term SIPOC itself stands for Supplier, Input, Process, Output, Customer.
It was first applied in the field of integrated quality management in the 1980s and has now been widely used in *Six Sigma* methodologies, Lean manufacturing, and other business process improvement strategies. Because of its ability to provide a comprehensive overview of business process flows, SIPOC Diagrams are a critical tool in documenting business processes from start to finish, making it easy to identify areas that need improvement.

- Measure

This phase emphasizes on collecting valid and reliable data to measure the current process performance (baseline performance) and identify specific areas that need optimization. The data collected is then analyzed to identify specific areas in the process that need improvement or optimization. In this study, *the Measure* stage will be focused on the use of Process *Mapping*. Process *Mapping* is a visual representation of a process or several processes combined. Although the research began with a broad perspective on the overall process, the study was then narrowed down to individual steps as the research progressed. Process *Mapping* is used to evaluate the performance of individuals or teams and to validate work procedures. The goal is to visually represent the current state of the process and identify opportunities for improvement to achieve improved product or service quality, as well as customer satisfaction. Process Mapping helps in identifying proper practices and comparing processes to ensure better product sales.

- Analysis

This phase involves a systematic and in-depth analysis of data that has been collected to identify the root cause of the problem and the factors affecting performance [6]. The goal of this stage is to understand the cause-and-effect relationship between the variables in the process and identify critical factors that must be addressed to improve process performance. In this study, the Analyze stage will involve analyzing the Fishbone Diagram to identify the root cause of problems in the goods handling process [6] as well as narrative analysis to interpret the data from interviews and observations.

- Improve

This phase focuses on developing, testing, and implementing solutions to eliminate root causes of problems and measurably improve process performance [6]. The solutions developed must be effective, efficient, and sustainable. This stage involves creativity, innovation, and teamwork to come up with an optimal solution. Solution testing is carried out to ensure that the solution is truly effective in improving process performance before being fully implemented. In this study, the Improve stage will involve a *brainstorming* process to generate improvement ideas, solution feasibility analysis, and development.

- Control

It is the final phase with the aim of maintaining the improvements that have been achieved, preventing *regression* or deterioration of performance, and encouraging continuous improvement [6].

2.4 Management Information System

Management Information System (SIM) is the application of information systems in an organization that aims to meet information needs at all levels of management. SIM serves as a system that provides information that supports various operational activities of the organization. In general, SIM consists of various information subsystems that are integrated with each other. Information is needed by management to support the decision-making process, both from the internal environment of the organization and from external sources. Information systems play a vital role in providing relevant data and information to all managerial levels. In order for the information produced to be truly useful for decision-making, a systems analyst must be able to understand exactly what the information needs of management are.

This research is very relevant to the concept of Management Information Systems because it focuses on designing and implementing information solutions to support warehouse operations at PT. Putra Kelana Makmur. Although PT. Putra Kelana Makmur has used the Enterprise Resource Planning (ERP) system for warehouse management, the system still faces obstacles in the speed of data access and information disclosure between departments, as well as limited access through certain devices. This shows that

existing driver's licenses are not fully effective in supporting efficient decision-making and coordination.

This study proposes *Google Sheets* as an alternative solution for daily reporting of incoming goods. *Google Sheets*, as a cloud-based application that allows real-time collaboration and access from multiple devices, can meet the need for flexible, mobile, and collaborative information systems, which are essential in today's digital age. As such, *Google Sheets* can act as part of a broader SIM, specifically for incoming goods reporting, potentially overcoming existing SIM limitations and improving warehouse operational efficiency.

3 Research Methode

This study uses a case study approach by applying *the Six Sigma* methodology for process improvement. The framework used is DMAIC (Define, Measure, Analyze, Improve, Control), which is a structured and data-driven approach to solving problems, reducing variety, and improving process efficiency. This approach was chosen because it is very relevant to overcome the problem of inefficiencies in the existing reporting system at PT. Putra Kelana Makmur, starting from problem identification to designing measurable solutions. Although *Six Sigma* is data-oriented, this research will utilize simple qualitative and quantitative data collection techniques to understand the context of the problem in depth and measure the improvements achieved.

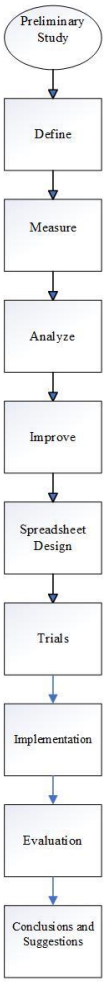


Fig. 4. Research Flow

In accordance with figure 4, this study begins by collecting primary data and literature studies to identify problems related to the design and evaluation of *Google Sheets* in PT. Putra Kelana Makmur. Furthermore, *the Six Sigma* (DMAIC) method is applied to analyze and evaluate existing processes. The Define, Measure, Analyze, and Improve stages in the DMAIC method are followed systematically to design and develop improvement solutions. The resulting solution is then tested and evaluated for effectiveness. If the results of the trial are effective, a thorough evaluation and conclusions are drawn. However, if it is not effective, then the design and development process will be reviewed at the Analyze stage and improved.

1. This research was carried out at PT. Putra Kelana Makmur starts from December 2024 to June 2025. The focus of this research is the reporting of incoming goods in the company's warehouse.

2. The informants in this study are individuals who work at PT. Putra Kelana Makmur and is directly involved in warehouse operational activities, especially in the process of recording and reporting incoming goods. The selection of informants was carried out non-randomly with a purposive sampling technique, which is based on certain considerations relevant to the purpose of the research. The main criteria for informants are to occupy positions directly related to the administrative and operational processes of the warehouse, have at least two years of work experience, and understand the workflow and reporting system used by the company. This criterion is established to ensure that the informant has adequate knowledge and experience, so that the data obtained is valid and accountable. In this study, there were three informants consisting of Warehouse Supervisors, Storemen, and Warehouse Admins, with working periods varying between 2 to 17 years.
3. This study uses a qualitative approach in data collection, which consists of observation and interviews. Participant observations were carried out directly at the warehouse of PT. Putra Kelana Makmur to observe the process of the start of the goods to the making of the incoming goods report. Furthermore, interviews were conducted with the Supervisor, Admin and *Storeman* to dig up in-depth information about perceptions, experiences, and constraints.

Qualitative data analysis from observations, questionnaires, and interviews is focused on three main stages according to Sugiyono (2018): data reduction, data presentation, and conclusion drawn, which are then systematically integrated into the DMAIC *Six Sigma framework*.

- Data Reduction

The process of filtering and summarizing data from interview transcripts (key quotes) and observations (field notes, photographs, representative videos) to make them more focused.

- Data Presentation

Reduced data is presented systematically using diagrams (including fishbone for root cause analysis), informative narratives, and visualizations such as new process flowcharts for recommendations for *brainstorming improvements*

- DMAIC Six Sigma Stages

Define: Identify and define specific issues in the handling of goods, understand the context, stakeholders, and goals of improvement, with the help of SIPOC diagrams.

Measure: Perform *process mapping* to understand flows, identify bottlenecks, and find opportunities to improve efficiency.

Analyze: Analyze data to identify the root cause of problems using *fishbone diagrams* and qualitative data narrative analysis.

Improve: Formulate and implement improvement recommendations based on the results of the analysis, through *a brainstorming* process.

Conclusion Drawn: Carried out after the analysis and implementation of recommendations, conclusions are drawn based on holistic interpretation of data and evaluation of the impact of improvement, to answer the formulation of problems and research objectives related to improving the operational efficiency of goods in the warehouse of PT. Putra Kelana Makmur

4 Result and Discussion

4.1 Problem Identification

Based on document analysis, the main source of problems in the process of reporting incoming goods at PT. Putra Kelana Makmur does not come from the weakness of the ERP (Sunfish) system itself, but rather from the human factors involved in the workflow. Although the existing ERP system is considered to be qualified, specific challenges still arise in the reporting process

- Six Sigma (DMAIC)

1. Define

This SIPOC diagram illustrates the flow of business processes in the receipt and reporting of incoming goods in the company. The process starts from the vendor as a supplier who delivers physical goods along with supporting documents in the form of a Delivery Order (DO) to the company. These physical goods and documents are the main inputs that are then processed through two important stages, namely the receipt of goods and documents, and the preparation of incoming goods reports. At the receiving stage, the goods and DO are inspected to ensure conformity with the order and the condition of the goods. After the verification process is completed, incoming goods reports are compiled, one of which is by using *Google Sheets* to record information on a daily basis. The output of this process is in the form of incoming goods report information that serves as an important document to support cross-departmental performance. The report is then distributed to several related units, namely the *Procurement* Department to match goods with purchase orders, the Shipping Department to plan shipments or dis-

tributions, and the Operations Department for inventory management and internal process follow-up. Through this SIPOC model, companies can clearly map processes, ensure data transparency, and improve operational efficiency.

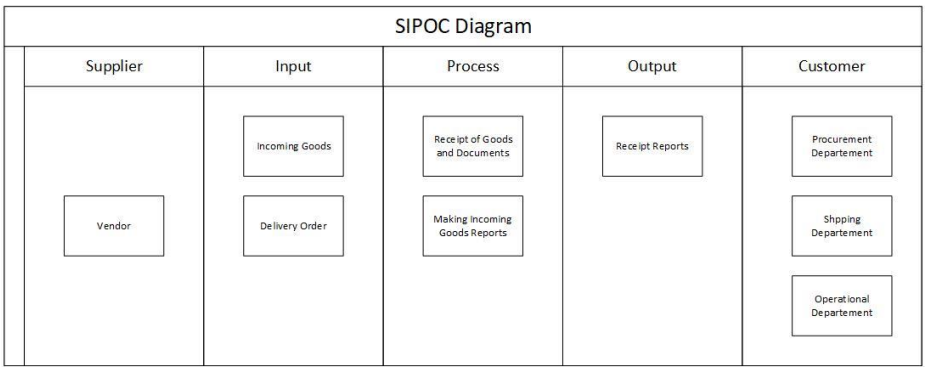


Fig. 5. SIPOC Diagram

2. Measure

- Incoming Goods Receipt Flow

This flowchart illustrates the operational process of receiving goods in the company's warehouse. The process begins when the goods come from the vendor, then the storeman is in charge of receiving the goods. After initial acceptance, the storeman will calculate the quantity of the goods and match their physical specifications with the Delivery Order (DO) document that accompanied the shipment. If the inspection results show that the goods are in accordance with the DO, then the process is continued by the supervisor who conducts documentation in the form of photos as proof that the goods have been received properly. After that, the goods are officially declared to have been received and the process is completed. However, if there is a discrepancy between the goods and the DO—both in terms of quantity, specifications, and conditions—then the supervisor must immediately report the problem to the purchasing staff for follow-up. Despite the problem, documentation in the form of photos is still carried out to record the condition of the goods at the time of receipt. This flow ensures quality control and transparency in the process of receiving goods, as well as minimizing the risk of recording errors or loss of important information.

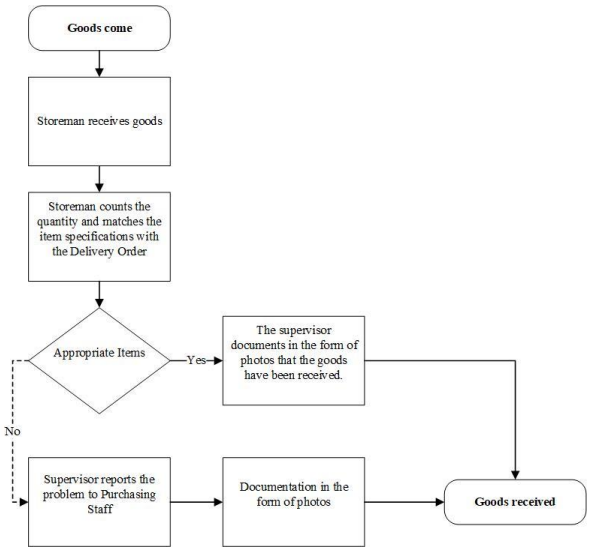


Fig. 6. Goods Receipt Flow

- Incoming Goods Report Creation Flow

This diagram describes the flow of the incoming goods reporting process through the ERP system. The process starts from the goods receipt activity, where the officer will first open the company's ERP website. After that, the user logs in to the system using a registered account. The next stage is to manually input incoming goods data based on the information listed in the Delivery Order document. After the data is successfully inputted, the system will automatically send a notification to the supervisor that there is a report of incoming goods that needs to be approved for the approval process. The supervisor will then run the verification process and approve the report. After the approval stage is completed, the report is considered valid and the administrative process of receiving goods is declared complete. This procedure demonstrates the importance of using an ERP system in ensuring that the entire reporting process is carried out digitally, structured, and has a clear audit trail through the phased approval stage.

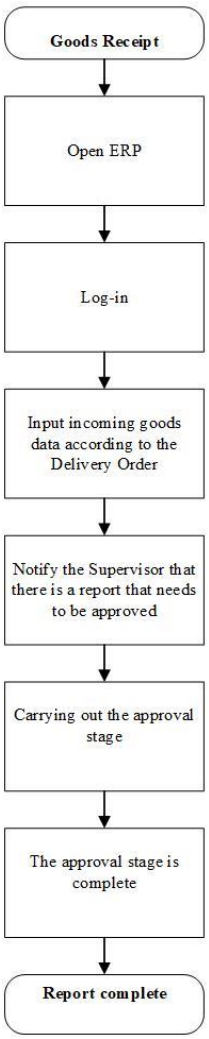


Fig. 7. Report Creation Flow

This reporting duration, which takes an average of 1-2 days (or 2,160 minutes), indicates a significant waste of time *(non-value added activities*) in process. Similar challenges in warehouse efficiency are also the focus of the evaluation of Lean practices, as analyzed by [11] in Brazilian warehouses. This shows that the time inefficiency that we identified at PT. Putra Kelana Makmur is not an isolated problem, but a reflection of the operational challenges that are often encountered in warehousing management

3. Analyze

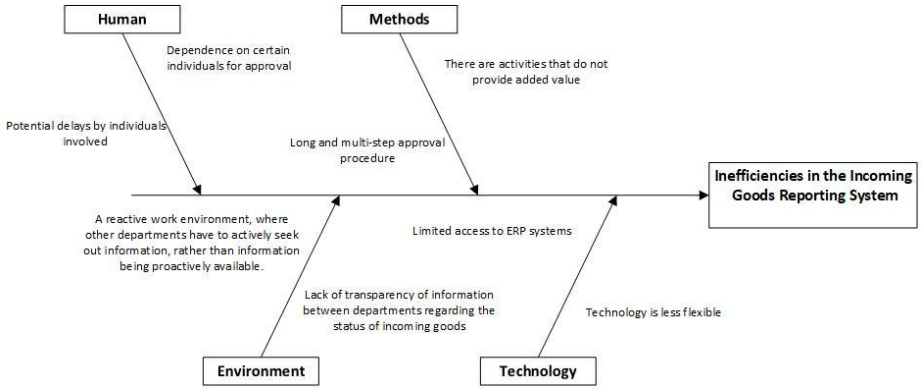


Fig. 8. Fishbone Diagram

Identifying the root of the problem through the analysis of this Fishbone Diagram is a crucial step in the DMAIC methodology. This systematic approach has proven effective in revealing the root causes of inefficiency, as has also been successfully done by [12] that develops a framework for improving the warehouse process using the *Lean Six Sigma*. Similarly [13] shows how *Lean Six Sigma* Effective in analyzing and improving warehouse business processes by eliminating waste, which is in line with our efforts to address bottlenecks in incoming goods reporting.

Based on the analysis of *fishbone* diagrams, inefficiencies in the incoming goods reporting system can be identified from four main factors, namely human factors, methods, environment, and technology. From the human aspect, the reporting process is highly dependent on certain individuals, especially in the approval process, so if the individual concerned experiences delays or is unresponsive, this can hinder the entire reporting process. In addition, potential delays caused by internal actors are a source of uncertainty in the flow of information.

Furthermore, in the method factor, it was found that the approval procedure applied was long and multi-staged, which had implications for a longer process time and caused activities that did not provide added value such as waiting for the *approval* process which was time-consuming. This is contrary to *the principle of lean process* which emphasizes efficiency and the elimination of waste in the workflow.

Work environment factors are also a significant cause. A reactive work environment, where individual departments have to manually search for information in the absence of a proactive notification system, decreases the effectiveness of inter-departmental coordination. The lack of disclosure of information or lack of transparency in the status of incoming goods between departments also magnifies the potential for miscommunication and delays in decision-making.

Meanwhile, in the technological aspect, the limitation in access to the ERP system and the lack of flexibility in the technology used cause the reporting process to not be carried out optimally. An unintegrated and less *user-friendly* system also extends the time needed to complete incoming reporting.

Thus, these four factors are interrelated and contribute collectively to the low efficiency of the incoming goods reporting system. These findings indicate the need for systemic interventions that include improving procedures, strengthening human resource competencies, improving technology integration, and developing a collaborative and proactive work culture.

4. *Improve*

Entering the Improve phase, the focus is shifted to designing and implementing solutions to address the root of the inefficiencies that have been identified in the Analyze phase. Based on findings regarding weaknesses in human, method, environmental, and technological factors, the solution developed is to design a daily reporting dashboard of incoming goods using *Google* Sheets. The system is designed through *a brainstorming process*

To create a structured, transparent, and efficient tool, with the primary goal of providing real-time, mobile, and flexible reporting. The dashboard has a systematic table format with essential columns such as item name (Item), quantity (Qty), unit (UOM), *Purchase Order* number (PO), and business unit (BU), which aims to standardize recording and improve accountability across divisions.

To ensure its feasibility and effectiveness, the design was implemented and tested in the period from April 8, 2025 to June 30, 2025. These tests cover a variety of scenarios, including ease of data input, access

4.2 Google Spreadsheet Dashboard Planning

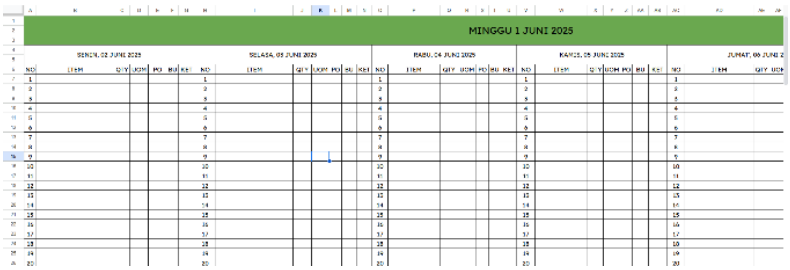


Fig. 9. Google Spreadsheet Dashboard

Dashboard design *Google Sheets* It is specifically designed to address real-time accessibility and collaboration issues that were major constraints in the system previously.

Ability *Google Sheets* to facilitate online collaboration and access from multiple mobile devices, as described by [14] in the development of the church inventory system and [15] in the MSME financial statements, is the main foundation for the success of this solution. This proves that *Google Sheets* is an innovative solution that is flexible and adaptable for a wide range of reporting and management needs, as highlighted by [16] as an innovative solution for the improvement of storage processes.

The image above is a display of the incoming goods daily report template designed to document the receipt of goods in the environment of PT. Putra Kelana Makmur. The reporting format is arranged horizontally by day and structured in vertical columns that represent various important information relevant to the process of receiving goods.

The table structure starts with the "No" column which is used to record the sequence number of entries on each day as a marker of the identity of the data in the report. Furthermore, the "Item" column serves to record the name of the goods or commodities received, which is the main object in the recording process. The "Qty" (Quantity) column is used to indicate the quantity or quantity of incoming goods, while the "UOM" (Unit of Measurement) column describes the unit of measurement of the goods, such as units, cartons, liters, kilograms, and so on, which aims to standardize recording.

Furthermore, the "PO" column refers to the *Purchase Order number*, which is an official order document that is a reference that the goods are the result of a valid procurement process. This information is crucial for the purpose of auditing and validating data between divisions, especially the procurement and warehouse divisions. The "BU" (*Business Unit*) column is an indicator of the business unit or subsidiary that is the owner or user of the goods received. This is important considering that PT. Putra Kelana Makmur is a group corporate entity that has several business units under its auspices. With the inclusion of BU information, this report can support the need to track the distribution and responsibility of assets across divisions.

Finally, the "Description" field is used to record additional information such as the purpose of using the goods, related projects or activities, as well as the parties or personnel who will use the goods. This column is descriptive and complements the quantitative data that has been presented in the previous columns.

Overall, the format of this report is designed to improve transparency, accountability, and efficiency in the process of documenting incoming goods. With a systematic structure, this spreadsheet not only serves as an operational tool, but also as a supporting instrument in the managerial decision-making process as well as administrative accountability between departments within the company.

4.3 Feasibility Trials and Implementation

The results of the design are then carried out a feasibility test to ensure that the design that has been made can be implemented. The test will be carried out from April 8, 2025 to June 30, 2025. There are six scenarios in conducting the tests carried out in this study, which can be seen in the following table:

Table 1. Trial Table

Scenario	Method	Result	Note
New Incoming Goods Data Input	Admin/Storeman opens the *Google Sheets link*. Fill in the data of newly arrived goods according to the available columns (No, Item, Qty, UOM, PO, BU, Description)	Data is successfully input by the Storeman and Admin. All fields are filled in completely. Data is automatically saved and appears in new rows without any problems.	The input process is easy to do, especially when using a laptop. However, it is necessary to ensure that the format of the columns remains consistent so that there are no misreadings.
Real-time Data Access by Other Departments	After the Admin inputs the data, a representative from another department (e.g. Operations) opens the Sheets link from their device.	Representatives from the Operations department can view new data within seconds of being input by the Admin. There is no significant delay.	Real-time updates are helpful for interdepartmental coordination. It is recommended that each department keep the link shortcut on their respective devices.
Access and Use Through Mobile Devices	All participants tried to open and view the	Data can be accessed well through the Google Sheets	Data input from your phone requires more scrolling. We

	report through the Google Sheets app on their phones. The Admin/Storeman tries to do simple data input through the phone.	application on Android/iPhone. The column display is a bit small but still readable. Input was also successfully carried out.	recommend using a more concise template for the mobile version or enable split view.
Multi-User *Collaboration*	Two or more people (for example: Admin and Supervisor) open a Sheets file at the same time. One person does data input, while the other just looks.	When an admin inputs, the supervisor can see the changes directly. The cursor of another user is visible on the screen. There are no conflicts during updates.	The system strongly supports direct collaboration. However, it needs an internal agreement not to edit the same column at the same time to avoid clutter.
Search and Data Filter	The supervisor tries to search for a specific item using the "Find" feature (Ctrl+F). Supervisor tries to filter data to see incoming items for a spe-	The supervisor managed to find the item data with the "Find" feature and filtered it by specific BU. The process is fast and accurate.	Filters are helpful when the data is already starting to get a lot. It is necessary to provide a simple filter guide for new users.

	cific *Business Unit* (BU)		
Ease of Understanding	After the trial, ask all participants about how easy it is to understand the structure of the report and how to use it.	All participants stated that this report was not easy to understand. Simple view, clear columns, and intuitive workflow.	It is necessary to provide a one-page usage guide for new users. Overall, the system greatly supports the efficient operation of the warehouse.

Table 2. Comparison Table

Elements of Comparison	**Before Implementation**	**After Implementation**
Process	The reporting process relies on the ERP system and multi-stage approvals, taking up to 1–2 days.	The reporting process is carried out directly without the need for tiered approvals, data is recorded in real-time and can be accessed across departments.
Person	High dependence on certain personnel to carry out input and approval. If the person is not present, the process stops.	Anyone with access can input and view data as they see it. The process becomes more flexible and does not depend on one person.
Milieu	A reactive, inter-departmental work	Work culture is starting to shift to proactive, all parties can

	culture requires asking each other about the status of goods manually or via internal chat.	directly view data independently through online spreadsheets.
Method	Formal recording method, but rigid and centered on ERP. Input errors or approval delays slow down the entire reporting process.	Recording methods are more flexible, easy to use, and can be modified as needed. Errors can be corrected immediately without waiting for approval.
Time Efficiency	Average inbound goods report completion time: 2,160 minutes (1-2 Days)	Reports can be completed in less than 1 minute Efficiency of: 99.95%
Technology	Web-based ERP with limited access (can only be opened on certain office devices), less flexible and not mobile-friendly.	Cloud-based spreadsheets that can be accessed from any device (laptop, tablet, phone), support work flexibility and real-time collaboration.

Table 3. Control Table

Activity	**Person in Charge**	**Frequency**	**Purpose**

Make sure *Google Sheets templates* don't change format	Warehouse Admin	Downloads	Maintain data consistency and prevent input errors
Perform random daily data fill checks	Warehouse Supervisor	Every day	Ensure that the data is filled in completely and correctly
Locking certain columns (structures) so that they cannot be changed by all users	Warehouse Admin	At the beginning of implementation	Avoid unauthorized modifications by other users
Provides brief training on the use of spreadsheets for new users	Supervisor	Every time there is a new user	Improve the understanding and skills of new users
Evaluate and document user feedback	Supervisor & Evaluation Team	Monthly	Identify problems or opportunities for continuous improvement
Periodically back up spreadsheet data to your local/server Google Drive	Supervisor	Downloads	Avoid data loss in the event of a technical breakdown

Compile a weekly recapitulation and share it with the relevant managers	Warehouse Admin	Weekly (every Friday)	Facilitate monitoring and managerial decision-making
Check your data change history via Google Sheets' "Version History" feature	Admin Supervisor	Downloads	Ensure no manipulation or undetected errors

Table 4. Quiz Table

Dimention	Question
Ease Of Use	This new reporting system is easy for me to understand and use.
	The report display on the spreadsheet is clear and informative.
	I do not experience difficulties when viewing or searching for the data I need.
Efficiency and Speed	This new system significantly speeds up the incoming goods reporting process.
	I can access incoming goods information instantly (real-time) after it is inputted.
	This system reduces my waiting time to get operational information.
Accessibility and Flexibility	I can easily access this report from various devices (e.g., phone, tablet).
	This system supports me to work more flexibly, including from outside the office.
Collaboration and Transparency	The new system increases the transparency of incoming goods information between departments.
	Coordination with other departments becomes easier with this system.
	This system reduces dependence on certain individuals to obtain information.
Satisfaction and Effectiveness	Overall, I feel this new reporting system is much more effective than the previous system.
	I recommend that this system continue to be used and developed in the future.

The data analysis method in this study is in line with the study by [17], which also applies a percentage index formula to measure the feasibility of the system based on a Likert scale questionnaire. In the study, the total score obtained from the respondents was divided by the ideal maximum score to produce a quantitative feasibility score of

79.5%. The use of these identical methods validates our approach to measuring user acceptance rates.

Rating Scale

To convert the results of the questionnaire into quantitative data in the form of percentages, each answer option is given a weighted value as follows:

- Strongly Disagree = 1
- Disagree = 2
- Agree= 3
- Strongly Agree = 4

Furthermore, the total score percentage can be calculated using the Percentage Index formula:

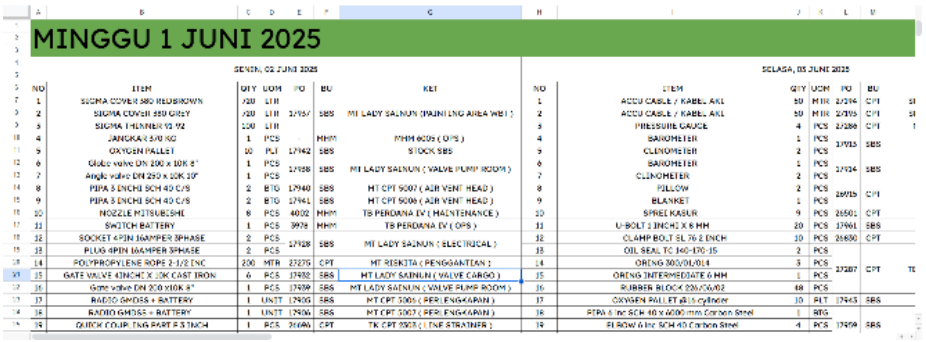
Formula

Index Percentage = (Total Score Obtained / Ideal Maximum Score) x 100%

Information:

- Total Score Obtained: The total sum of the total scores of all respondents' answers.
- Ideal Maximum Score: The highest score that can be achieved. It is calculated by: (Highest score [4]) x (Number of questions [13]) x (Number of respondents).

Report Result View



MINGGU 1 JUNI 2025

SENIN, 02 JUNI 2025

NO	ITEM	QTY	UOM	PO	BU	KET
1	SIGMA COVER 580 RED/BROWN	720	LTR			
2	SIGMA COVER 580 GREY	720	LTR	17457	SBS	MT LADY SAENUN (PAINTING AREA WET)
3	SIGMA THINNER 93 92	120	LTR			
4	JANGKAR 570 KG	1	PCS		MHM	MHM 6035 (OPS)
5	OXYGEN PALLET	10	PLT	17462	SBS	STOCK SBS
6	Globe valve DN 200 x 10K 8"	1	PCS			
7	Angle valve DN 250 x 10K 10"	1	PCS	17458	SBS	MT LADY SAENUN (VALVE PUMP ROOM)
8	PIPA 3 INCHI SCH 40 C/S	2	BTG	17440	SBS	MT CPT 5007 (AIR VENT HEAD)
9	PIPA 3 INCHI SCH 40 C/S	2	BTG	17441	SBS	MT CPT 5006 (AIR VENT HEAD)
10	NOZZLE MITSUBISHI	8	PCS	4002	MHM	TB PERDANA IV (MAINTENANCE)
11	SWITCH BATTERY	1	PCS	3978	MHM	TB PERDANA IV (OPS)
12	SOCKET 4PIN MAMPER 3PHASE	2	PCS			
13	PLUG 4PIN MAMPER 3PHASE	2	PCS	17428	SBS	MT LADY SAENUN (ELECTRICAL)
14	POLYPROPYLENE ROPE 2-1/2 INC	200	MTR	23275	CPT	MT RISKITA (PENGGANTIAN)
15	GATE VALVE 4INCHI X 10K CAST IRON	6	PCS	17432	SBS	MT LADY SAENUN (VALVE CARGO)
16	Gate valve DN 200 x10K 8"	1	PCS	17439	SBS	MT LADY SAENUN (VALVE PUMP ROOM)
17	RADIO GMDSS + BATTERY	1	UNIT	17403	SBS	MT CPT 5005 (PERLENGKAPAN)
18	RADIO GMDSS + BATTERY	1	UNIT	17404	SBS	MT CPT 5007 (PERLENGKAPAN)
19	QUICK COUPLING PART P 3 INCH	1	PCS	21694	CPT	TK CPT 9908 (LINE STRAINER)

SELASA, 03 JUNE 2025

NO	ITEM	QTY	UOM	PO	BU	
1	ACCU CABLE / KABEL AKI	50	MTR	23174	CPT	SI
2	ACCU CABLE / KABEL AKI	50	MTR	23703	CPT	SI
3	PRESSURE GAUGE	4	PCS	23280	CPT	T
4	BAROMETER	1	PCS			
5	CLINOMETER	2	PCS	17415	SBS	
6	BAROMETER	1	PCS			
7	CLINOMETER	2	PCS	17424	SBS	
8	PILLOW	2	PCS			
9	BLANKET	1	PCS	28715	CPT	
10	SPREI KASUR	9	PCS	26501	CPT	
11	U-BOLT 2 INCHI X 6 MM	20	PCS	17401	SBS	
12	CLAMP BOLT SL 76 2 ENCH	10	PCS	26530	CPT	
13	OIL SEAL TC 140-170-15	2	PCS			
14	ORENG 300/01/014	3	PCS			
15	ORENG INTERMEDIATE 6 MM	1	PCS	27187	CPT	TE
16	RUBBER BLOCK 20X20X02	48	PCS			
17	OXYGEN PALLET ø15 cylinder	10	PLT	17443	SBS	
18	PIPA 6 Inc SCH 40 x 6000 mm Carbon Steel	1	BTG			
19	ELBOW 6 Inc SCH 40 Carbon Steel	4	PCS	17459	SBS	

Fig. 10. Report Result in PC/Laptop

NO	ITEM	QTY	UOM	PO	BU	
1	BAN DAPRA(UKURAN 1000)	1	PCS	27344	CPT	MT I
2	BAN DAPRA(UKURAN 1000)	6	PCS	2735	CPT	OB CAH/
3	BOLT NUT M10 X 40 mm Carbon Steel	60	PCS	18037	SBS	KMP NIA
4	REMES PACKING 8MM	5	ROLL	4006	MHM	
5	REMES PACKING 10MM	5	ROLL			
6	BOLT CACING M22 X 160 MM S/S	20	PCS	4012	MHM	TB
7	CAP SCREW TWELVE POINT 3/4 -16 X 4 INCHI	6	PCS	27337	CPT	
8	BOLT NUT M19 X 95 MM C/S	10	PCS			
9	TRIPLEK 4MM	8	LBR	27351	CPT	
10	FLANGE 4 INC PN 16	4	PCS	18051	SBS	M
11	FLANGE 6 INCHI x 5K	6	PCS	18050	SBS	KMP NIA
12	FLANGE 1 inchi X 5K	25	PCS			
13	ELBOW 1 inc 90 Drajat SCH 40 C/S	10	PCS	18048	SBS	KMP NIA
14	FLANGE 2 1/2 inc x 5 K	10	PCS			
15	BOLT NUT M10 X 40 mm Carbon Steel	60	PCS	18037	SBS	KMP NIA
16	COTTON GLOVE	480	PSG	18044	SBS	S
17	SPRAY WD 40	96	BTL			
18	CABLE LUG 70 - 12MM	200	PCS			
19	CLAMP 1/2 INCHI S/S	300	PCS			
20	SPRAY WD 40	4	BTL	18045	SBS	S
21	REFLECTIVE TAPE LIFE BUOY	3	ROLL	27328	CPT	M
22	LIFE JACKET SOLAS	2	PCS	27348	CPT	OB CAH/
23	REFLECTIVE TAPE LIFE BUOY	1	ROLL	27328	CPT	
24	U-BOLT 1 INCHI X 6MM	15	PCS	18049	SBS	KMP NIA
25	LAMPU UFO 24 WATT 220V	1	PCS			
26	FITTING LAMPU	1	PCS	4798	PKM	RO
27	FITTING LAMPU FLEXIBLE E27 20CM	1	PCS			
28	Socket W T 3Pin	2	PCS	18047	SBS	MT
29	PETA NO 42	1	LBR	27295	CPT	MT I
30	PETA NO 40	1	LBR			
31	PETA NO 347	1	LBR	27363	CPT	MT I
32	PETA NO 349	1	LBR			
33	LAMPU LED 11W 6500K SNI E27 A60	6	PCS	27359	CPT	OB CAH/
34	KLINGRIT PACKING	1	LBR	27340	CPT	MT LAD
35	POMPA SIPUT PC 100 DIA 2INCH	2	UNIT	4013	MHM	
36	WIRE BRUSH / SIKAT KAWAT	12	PCS	27372	CPT	OB CAH/
37	WIRE BRUSH / SIKAT KAWAT	5	PCS	27374	CPT	TK
38	PILOX HITAM	2	PCS	27375	CPT	TB PERD.
39	PILOX PUTIH	2	PCS			
40	PILOX MERAH	2	PCS			
41	PILOX KUNING	2	PCS			
42	STUD BOLT 21,02 X 110 MM	18	SET	17997	SBS	M
43	STUD BOLT 21,02 X 110 MM	17	SET	17996		M

Fig. 11. Report Result in Mobile Phone

Results and Discussion

The results of the implementation of Google Spreadsheet in the daily reporting of incoming goods at PT. Putra Kelana Makmur showed significant improvements in the effectiveness and efficiency of the work process in the warehouse. These changes are validated through an evaluation of user perceptions using a questionnaire that measures various dimensions such as ease of use, efficiency, accessibility, and collaboration. Based on the analysis with the Percentage Index method, this new system managed to achieve a score of 87.18%, which indicates a very high level of acceptance and satisfaction from users.

This score was obtained from a questionnaire using a 4-point Likert scale and filled in by respondents who were directly involved in the process. The achievement of a score of 87.18% is clear evidence of the positive impact of this implementation. These results strongly support the findings of Rosandhy Pasa & Tsabit (2024) who show that the

Google Sheets application has a significant influence on the effectiveness of employee performance. This consistency shows that the use of Google Sheets not only increases productivity but also provides a practical solution to operational problems that previously relied on less responsive systems.

This analysis was carried out based on data from 3 respondents who answered 13 questionnaire questions. According to the specified quantitative method, each answer is scored (Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1). The calculation of the Percentage Index is carried out as follows:

Total Scores Obtained: The scores of all respondents' answers are summed up.

- Answers 1: 46
- Respondents 2: 43
- 3 Answers: 47
- Total = 136

Ideal Maximum Score: The highest score that can be achieved is calculated by multiplying the highest score (4) by the number of questions (13) and the number of respondents (3).

Ideal Maximum Score = 4 x 13 x 3 = 156

Percentage Index Calculation: The Percentage Index formula is applied to get the final result.

Percentage of Index = (136 / 156) x 100% = 87.18%

The figure of 87.18% shows that in general respondents gave a very positive response to the new reporting system. This high approval rate indicates that the system is considered easy to use, effective, and has a positive impact on the work process.

Although at first glance it seems that there is a "sacrifice" in the form of manual data input into a spreadsheet that seems like a double work, this activity is actually the key to improving the process. This manual input activity to spreadsheet is very effective because it manages to exchange a very long wait time for a short activity that provides great added value in the form of speed, transparency, and real-time collaboration.

On the technology side, the shift from a web-based ERP system that is limited to a specific device to a cloud-based *Google Sheets* platform brings new flexibility. The system can be accessed anytime and anywhere through a variety of devices, including smartphones. This addresses previous challenges that limited mobility and quick access to operational data. This advantage also supports a more proactive work culture, as all departments can now access incoming goods information in real-time without having to wait for manual communication or confirmation from certain parties.

In addition, the *Google Sheets* to support the data analysis function, as indicated by [18] in designing an inventory analysis system, providing potential added value for PT. Putra Kelana Makmur in the future. Incoming goods data that is now structured and easily accessible can be the basis for trend analysis or further inventory optimization.

These findings are also consistent with research [18] who applies *Google Sheets* for inventory management with a 288% increase in turnover. However, the unique contribution of this study lies in the speed of reporting and automation *Template*, which has not been widely studied in previous studies. With proper training, as also demonstrated by [14], spreadsheet users are able to adopt this system with a high acceptance rate.

This is a solid foundation that spreadsheet-based digital reporting systems can be widely adopted in the logistics sector without relying on complex ERPs.
The implementation of *Google Sheets* also has a positive impact on the work culture and organizational structure. Prior to the change, reporting was highly dependent on specific personnel and less supportive of collaboration. Now, with the collaborative features and multi-user capabilities that *Google Sheets* has, all users who have access can be actively involved in data filling and monitoring. This creates a more collaborative, open, and accountable work environment. The systematically designed table structure with important columns such as items, amounts, units, PO numbers, business units, and descriptions also helps to standardize the recording process, making it easier to audit and accountability.

To ensure this multi-user collaborative system runs effectively and safely, three key strategies are implemented that support each other.
First, to define access rights and prevent overlap, user roles are divided strictly. Employees in the warehouse division, such as Supervisors, Admins and Storemen, who are directly responsible for the recording of goods, are granted access rights as *Editors*. Meanwhile, personnel from other departments such as Procurement, Operations or Shipping, who only need data for monitoring, are granted access rights as *Viewers*. This sharing ensures that only authorized parties can alter the data, while others can still get information in real-time without the risk of accidentally changing its contents.
Second, the data security aspect is guaranteed through several layers of control. Access to spreadsheet documents is restricted to invited users only, not to the public. Furthermore, to protect the integrity of the report, important columns and template structures are locked so that they cannot be changed by other users. Any change activity can also be monitored and audited through *the Version History* feature in Google Sheets, so any data modifications can be tracked. As a preventive measure against data loss, supervisors also perform *periodic data* backups.

Third, to ensure that there is no redundant data or incorrect input, a control mechanism is created in the daily routine. In accordance with the designed control table, the Warehouse Supervisor is responsible for checking the daily data inputted. This verification activity aims to ensure that all data is filled in completely, accurately, and there is no duplication of entries, thereby maintaining the quality and reliability of the report data.
The implementation of a multi-user collaborative system requires strict access rights arrangements to prevent overlap and ensure data security. Role division as *Editor* and *Viewer*, important column locking, and feature usage *Version History* at *Google Sheets* is the main mechanism in maintaining data integrity and reliability. In addition, daily verification procedures by Supervisors are important in maintaining quality and preventing duplicate data or input errors, as recommended in the literature on access control and data control mechanisms in system-based systems *Cloud* [19, 20]
Furthermore, the tests conducted show that this system is not only efficient, but also easy to understand and use. All participants stated that the simple and intuitive view of the spreadsheet made it easy to enter and search for data, even through mobile devices. This convenience has a real impact in improving cross-departmental coordination and

accelerating decision-making. While there are minor challenges such as display size on mobile devices and potential clutter when multi-users edit simultaneously, these can be addressed through internal training and structured usage policies.
In addition, the DMAIC approach used in this study also strengthened the success of the system, in line with [13] who used a similar method in improving warehouse flows at PT XYZ and recorded an increase in the sigma level from 3.85 to 4.09, However, this study provides innovation with the application of DMAIC in a cloud-based reporting system that not only reduces operational waste, but also increased transparency across departments.
Thus, the implementation of *Google Sheets* not only solves the problem of inefficient reporting of incoming goods, but also becomes a catalyst for organizational culture change towards a more modern, transparent, and adaptive work system. This approach proves that simple digital technologies such as *Google Sheets* can be a strategic solution in improving logistics performance and warehouse management, especially in companies that face the limitations of existing ERP systems.

5 Conclusion

This study proves that the design and implementation of the daily reporting system for incoming goods based on Google Spreadsheet at PT. Putra Kelana Makmur is able to increase the efficiency, transparency, and flexibility of the reporting process compared to the ERP system used previously. The results of the analysis show that the main problem does not lie in the weaknesses of Sunfish's ERP system, but in the human factors involved in the workflow. The lengthy and tiered approval process, as well as the reliance on specific individuals, leads to delays in the flow of information and limited transparency between departments. This shows that the obstacles that occur are more caused by work patterns and coordination of human resources that are not optimal.

The results of the questionnaire support these findings, with the user acceptance rate of the new system reaching 87.18%, which indicates very high satisfaction. Respondents assessed that the Google Sheets-based system provided significant improvements in terms of time efficiency, real-time ease of access, information transparency, and collaboration between departments. With this new system, the reporting process that previously took 1–2 days (±2,160 minutes) can be completed in less than 1 minute. This change proves that while it still requires manual input, the benefits of speed, openness, and real-time collaboration are far greater than the previous system.

Google Sheets' role as a practical, low-cost digital solution is also consistent with the literature. Research [21] highlights how Google Sheets integrates with *Stuttgart* able to increase the bookkeeping efficiency of MSMEs by up to 30% compared to manual methods. The high user satisfaction and acceptance rate of 87.18% in this study was supported by the findings [14], which reports that the Google Sheets-based inventory system is well received by users, with an average approval rate of above 75% due to its ease of use. In addition, the ability to *Google Sheets* to perform more complex analyses

validated by [18], which implements the ABC method inventory analysis system using *Google Sheets* and successfully increased inventory turnover by 288% and reduced order cycle time by 29%.

It's important to emphasize that Google Sheets is designed as an alternative tool, not to replace the Sunfish ERP system that has become the backbone of the company's operations. This system is here to complement ERP by providing faster, flexible, and collaborative data access, especially for the daily reporting of incoming goods. Thus, Google Sheets serves as a practical, low-cost solution that is able to answer the limitations of existing systems without compromising the strategic functions of ERP. Theoretically, these findings contribute to the development of logistics management science and cloud-based information systems, and can serve as a reference for other companies facing similar problems in improving operational efficiency and transparency.

With the success of this implementation, *Google Sheets* can be positioned as a flexible, efficient, and low-cost information technology alternative, particularly in the context of warehouse management and logistics in similar industrial sectors. The results of this study also confirm that the implementation of simple digital solutions combined with process improvement approaches such as *Six Sigma* can be an effective strategy in overcoming operational inefficiencies, without having to make large investments in complex ERP systems.

This research is expected to be a reference for other companies facing similar problems, as well as make a theoretical contribution to the development of logistics management science and cloud-based management information systems.

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