

Automation of Technical Workshop at PT. AAA Using Unified Modeling Language Method

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Abstract—The prospect of the palm oil sector has a very good opportunity because the growth of world vegetable oil consumption has increased between 2% -2.5%. This increase in productivity is very important considering that other vegetable oil producing plants are competitors. The strategy taken is increasing productivity and implementing cost efficiency on an ongoing basis. In addition, companies must find innovation and automation in carrying out production activities so that they can increase palm oil yields and reduce cost efficiency. Innovation is meant by automating the technical workshop administration system, because the existing system only uses manual tools and uses Excel, so that many processes are still run manually and are not integrated with each other. These conditions have an impact on the administrative process, the data and information obtained are often irrelevant and inaccurate. This problem is the topic of discussion. This study uses grounded methods, is a fact-based study using comparative analysis by holding empirical generalizations, establishing concepts, developing theories, collecting and analyzing data at the same time. The conclusion obtained from this study is the use of the UML modeling language in software development, successfully applied by the Technical Department of PT. AAA by producing a Workshop Automation application, so that it simplifies and speeds up the request process from the requestor, including the attendance process, overtime calculation, and service requests.

Keywords— Automation of Technical Workshop, UML Method.

I. INTRODUCTION

Indonesia's Crude Palm Oil (CPO) industry in recent years (2016-2018) has become one of the issues that has attracted the attention of the world community because of its rapid development, changing the global competitive landscape of vegetable oil maps and the existence of various social, economic and environmental issues related to the palm oil industry. Indonesian oil palm plantations increased from around 300 thousand hectares in 1980 to 11.6 million hectares in 2016. While CPO production increased from around 700 thousand tons in 1980 to 35.57 million tons in 2016. In 2017, the palm oil industry Indonesia recorded a good performance. Based on data processed by GAPKI, CPO production in 2017 reached 38.17 million tons and PKO by 3.05 million tons so that the total production of Indonesian palm oil was 41.98 million tons. This Drawing shows an increase in production of 18% compared to the production in 2016, which was 35.57 million tons consisting of 32.52 million tons of CPO and 3.05 million tons of PKO. Meanwhile the Indonesian palm oil stock at the end of 2017 is 4.02 million tons. The average CPO price for 2017 was recorded at US \$ 714.3 per metric ton or an increase of 2% compared to the average price in 2016 of US \$ 700.4 per metric ton (GAPKI, 2018). The prospect of 2018 Indonesian palm oil industry entrepreneurs, especially

GAPKI, remains optimistic, in 2018 the Indonesian palm oil industry still has good prospects. This is supported by Indonesia's improving economic growth. In accordance with Government policies to increase investment, to increase exports especially to non-traditional markets, to increase national productivity and to reduce poverty and economic disparity, the 2018 work program will be focused on: 1. To maintain the traditional export market and promotion of Indonesian palm oil in new export markets. 2. To improve partnership programs with independent smallholders to replant and increase productivity. 3. To strengthen and accelerate the implementation of sustainability/ISPO. 4. To handle trade barriers including negative issues such as anti-dumping from Indonesia by America. 5. To handle domestic issues such as handling peat issues and preventing land and forest fires (GAPKI, 2018). Along with the development of the Indonesian palm oil industry, PT. AAA and its subsidiaries, as one of the largest oil palm plantation company, are planning to focus more on intensifying land and partnerships to increase production. In reality, the company's production of fresh palm fruit bunches in 2017 reached 5.22 million tons, up from the previous year which was only 4.87 million tons. Thus, the company's crude palm oil production also increased in 2017 to 1.63 million tons from 1.54 million tons in 2016. In addition to CPO, palm kernel production also rose 6.0% from 336.4 thousand tons in 2016 to 356.6 thousand tons in 2017 from 290,961 hectares spread across Sumatra, Kalimantan and Sulawesi islands. Of this area, 224,617 hectares or 77.2% are core plantations and 66,344 hectares or around 22.8% are Plasma plantations. If viewed from the total land area, most of the oil palm plantations managed by the company are in Kalimantan region with a proportion of 45.6% or 132,823 hectares. While in Sumatra island, the Company manages a plantation area of 106,183 hectares 36.5% and the remaining 17.9% or an area of 51,955 hectares located in Sulawesi island (AAL, 2017).

In the long term, the prospect of the palm oil sector has very good opportunities. The growth of world vegetable oil consumption between 2% -2.5% is a very big opportunity. Increased productivity is a very important factor considering that other vegetable oil producing plants that are competitors are seasonal crops. The strategy that can be taken is increasing productivity and implementing cost efficiency on an ongoing basis. In doing this increase in productivity and cost efficiency, companies must be able to find innovation and automation in carrying out production activities so that innovation and automation are expected to increase palm oil yields and reduce cost efficiency. One of the innovations that

can be applied in the field of Information Systems and Information Technology in the corporate environment is to automate the administration system of technical workshops. The existing system only uses manual tools and is recapitulated using Excel. Many processes are still run manually and are not integrated into one process with another. Even the time needed to process data and information in the form of reports, the process of recapitulation of the daily report system, reports on the use of tools and employee payroll reports still depend on a technical clerk (the officer recording the staff administration process). This has an impact on the administrative process, where data and information in the form of reports obtained are sometimes irrelevant, inaccurate and inconsistent. Processing data that is not running efficiently and effectively also does not reach an indicator of the accuracy of the calculation of premiums per person and the cost of using spare parts. Achieving efficiency in organizing inputs and production facilities is more directed at optimizing the use of various resources so that maximum output can be produced with minimum costs. In farming, organizing inputs and production facilities becomes a determinant in achieving optimality of the allocation of production resources (Soekartawi, 2001). Therefore, one way to make efficiency and increase productivity is to automate administration with the use of Information and Information Technology Systems. Easily, administrative automation can be interpreted as a telecommunication-based information system that collects, processes, stores and distributes messages, documents and other electronic communications between individuals, work groups and organizations (O'Brien, 1996). The function of this Information System is administrative automation, including office automation (OA) which includes all formal and non-formal electronic systems, especially those relating to communicating information to and from people inside and outside the company (McLeod, 2004), especially automation administration of workshops at PT. AAA. There are several applications of information systems in the field of payroll that have been carried out by several previous researchers. The research is by identifying the use of computer payroll systems between SMEs and the relationship between the characteristics of SME managers with Perceived Usefulness and Perceived Ease of Use based on the Technology Acceptance Model (TAM) (Abdulah et al., 2013). Another study that produced a computerized employee payroll information system was organized by PT. Aditya Buana Inter, previously still using a manual system. The results to be achieved from this study is that with the application of a computerized payroll information system that can provide convenience in service and presentation of information, improve performance and processing data to be better, precise, fast and accurate and accelerate in making employee salary reports (Mayasari, 2015).

Subsequent research on payroll automation for calculating college employee income is done by desktop-based applications for a college that was developed on Vb.net as a front end and Microsoft Access 2007 with SQL Server 2008 as a back end. This system manages the details of faculty personnel, pay bands, allowances, deductions and many other

details (Singh et al., 2016). Other research on the payroll automation process for payroll management system services is provided as a solution. Therefore, if this process is automatic, it will be very useful because it will require less time to calculate employee salaries (Mahajan et al., 2015). Next is research that discusses the design and implementation of the MVC-based Human Resource Information System on vocational education in Iraq. This research is a case study where software systems have been developed using the Requirement Engineering approach into account (Tariq et al., 2016). Research on payroll automation in Jakarta was conducted by PT Sari Gaperi Jaya Harmoni Jakarta. The purpose of this study is to develop a payroll system model for employees of PT Sari Gaperi Jaya Harmoni Jakarta and facilitate the processing of data and employee salaries that are appropriate, fast, and accurate (Sulistyo & Syamsudin, 2012). Research on payroll automation in higher education is conducted at the University of Jos in particular the Busary Department. The aim is to streamline the University's payroll process and integrate the functions of Human Resources into the system (Namicit & Oyerinde, 2016). In this study, researchers will submit research on the design of Technical Workshop Administration System Automation at PT. AAA. The system that is built is expected to provide solutions to optimize the utilization of information systems and information technology so that they can be aligned with the company's strategy, vision and mission, especially in the technical department and to develop previous business processes which are designed to automate technical administration workshops. The Workshop system is a supporting system of maintenance including building and maintaining infrastructure and transportation equipment.

II. FORMULATION OF PROBLEMS AND RESEARCH PURPOSES

A. Formulation of problem in this study, namely:

1. By this automation system, can the calculation of attendance be done correctly and effectively?
2. Can the costs analysis process incurred in the workshop environment be accurately calculated and predicted for the future?
3. Can payroll calculations be made by combining the attendance results and costs incurred in the workshop environment?

B. The aims of this study:

1. To perform efficiency and effectiveness of the workshop administration automation process in PT. AAA.
2. Monitoring workshop activities.
3. Development of business strategies to improve competitive advantage.
4. Minimizing manual processes.
5. Contributions to the development of theory in Indonesia related to the application of technical information.
6. To be a reference material for further research studies with different fields

III. DEFINITIONS AND RESEARCH METHOD

Definition of Automation.

Automation in English has the equivalent meaning with the word of mechanization and computerization (Lernout & Hauspie Speech Products N.V., 1993). Automation has two meanings, namely:

1. The use of automatic equipment to save mental and manual labor, and
2. The automatic control of the manufacture of a product through its successive stages.

Mechanization from the word of mechanize has the meaning of giving a mechanical character to (applying a mechanical system), and computerization from the word of computerize containing meaning (AND Complex for Windows, 1993):

1. Equip with a computer, install a computer in (using a computer) and
2. Store, perform, or produce by computer (save, execute, or produce with a computer).

Based on the Big Indonesian Dictionary, automation is the replacement of human power with mechanical power which automatically performs and regulates the works so that it does not require human supervision anymore. Office automation as a telecommunication-based information system that collects, processes, stores and distributes messages, documents and other electronic communications between individuals, work groups and organizations (O'Brien, 1996). The era of office automation began simultaneously with the development of information technology, with the use of computer devices for office needs (Waluyo, 2000). The origin of office automation in the early 1960s, when IBM coined the term word processing to explain the activities of its electric typewriter division. The real evident in 1964's, when IBM marketed a machine called Magnetic Tape/Electric Typewriter, a typewriter that could type words that had been recorded in magnetic tape automatically. Office technology is how the process of recording, collecting, processing, reproducing, sending and storing information materials efficiently by using machines Office automation has general objectives, including the following (Endang R, 2015):

1. Combining the work execution process in the office,
2. Updating the work execution process in the office,
3. Increasing work productivity and effectiveness,
4. Increased communication can produce better and faster decisions.

While the specific objectives of office automation for the present, are as follows:

1. Higher income versus cost avoidance,
2. Problem solving for groups or teams,
3. Can be used as a complement, not a substitute,
4. The way of office automation may contribute to communication to and from managers makes it very suitable for solving group problems.

UML (Unified Modeling Language)

UML is a visual language for modeling and communication about a system using diagrams and supporting

texts (Rosa & Salahuddin, 2016). Based on the definition that only one model is not enough to describe the system as a whole, it requires many models that relate to one another to provide an understanding of the basis of the system.

1. Use case diagram: Use case or use case diagram is a model for information system behavior that will be created. The use case describes an interaction between

one or more actors with the information system that will be created. Roughly speaking, the use case is used to find out what functions are in an information system and who has the right to use those functions (Rosa & Salahuddin, 2016).

The Use case diagram has the following modeling (Whitten et al., 2004):

a. Use case: Use case is a sequence of steps which are related each other in a scenario, both automatically and manually.

b. Actors: Actors are all things that need to interact with the system for information exchange.

c. Relationship: Relationship is described as a line between two symbols. The meaning of relationships varies depending on how the line is drawn up and what type of symbol is used to connect the line.

The following is the difference between the relationships that exist in the use case diagram:

1) Association Relationship between actors and use cases where interactions occur between them

2) Extends Use cases that consist of steps extracted from more complex use cases to simplify problems and therefore expand functions.

3) Uses (includes) The uses relationship illustrates that a single use case includes the functionality of another use case.

4) Depends on Use cases that have dependence on other use cases that aim to determine the order in the use case development.

5) Inheritance Inheritance occurs when two or more actors use the same use case.

2. Collaboration Diagram: The UML collaboration diagram is used to model how the objects involved in the scenario interact, with each object giving a particular class in the system. Objects are connected by links (links), each link represents an instance of the association between each class involved. The link shows the message sent between objects, and the type of message that was passed.

3. Communication Diagram: Communication diagram on UML version 2.x is a simplification of collaboration diagrams on UML version 1.x. Communication diagram describes the interaction between objects/parts in the form of the order of the sender. Communication diagrams represent information obtained from class diagrams, sequence diagrams, and use case diagrams to describe the combination of static structures and dynamic behavior of a system (Rosa & Salahuddin, 2016).

4. Class Diagram: Class diagrams describe the structure of the system in terms of defining the classes that will be created to build the system. Classes have what are called attributes and methods or operations. Attributes are variables that are owned by a class. Operations or methods are functions that are owned

by a class (Rosa & Salahuddin, 2016).

Advantages of UML UML generally has the following advantages (Nugroho, 2005):

- a. Uniformity. Developers simply use one methodology from the analysis to design stage. UML also allows the development of user interface components together with software design as well as database design.
- b. Understandability. The resulting code can be organized into classes that are related to the real problem so that it is easier for anyone to understand.
- c. Stability. The program code is relatively stable all the time because it is very close to the real problem.
- d. Reusability UML allows reuse of code, so that in turn will greatly accelerate the time of software development.

The research method conducted by researchers in this study is grounded research method, which is a research method based on facts and uses comparative analysis with the aim of holding empirical generalizations, establishing concepts, proving theories, developing theories, collecting and analyzing data at the same time (Glasser & Strauss, 1967). After collecting the data, the researcher continues the research process in accordance with the main steps used in this method, namely determining the problem to be investigated, collecting data or information in the field, analyzing and explaining the problems found and making research report. The main research data from this study is the standard procedure of the system that runs on the Technical Department of PT. AAA, both the employee attendance system and the system that applies to the Department of Technical, especially in the workshop section to calculate employee costs in the use of spare parts and costs for maintaining infrastructure and transportation equipment. For the system development method proposed by researchers to develop the system administration automation system workshop technique is to use the waterfall method, which is a systematic and sequential system development model. The researcher proposes this method because it has stages that are easy to understand and efficient in the process. In the waterfall method it is necessary to work on it step by step, if the first step is not done or not finished then it cannot proceed to the second step, if the second step has not been done then the third step cannot be done, and so on.

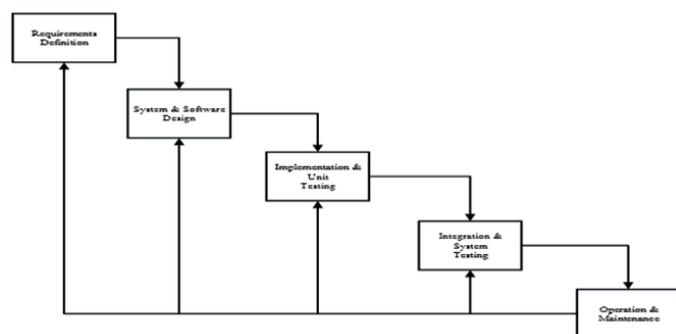


Fig. 1. Waterfall method (Sommerville, 2012)

The stages of Waterfall method are as follows:

1. Requirements analysis and design. System services,

constraints, and objectives are determined by the results of consultations with users which are then defined in detail and function as system specifications. The specification of system requirements at this stage needs to be documented, in terms of the analysis carried out by analyzing the documents in the request for coverage, info graphics and so on.

2. System and software design: System design stages allocate system requirements both hardware and software by forming the overall architecture. Software design involves identifying and describing the basic system abstraction of software and its relationships. At this stage, the researcher uses UML for an overview of the workflow and system operation that is built, the navigation structure to display all page shifts that the user does and the system display design.

3. Implementation and unit testing: At this stage, software design is realized as a series of programs or program units. The test involves verification that each unit meets its specifications. At this stage, the system is made using PHP version 4.

4. Integration and system testing: The individual units of the program are combined and tested as a complete system to ascertain whether or not it matches the software requirements. Tests focus on logic and functional software to ensure that all parts have been tested. This is done to minimize errors (errors) and ensure that the output is as desired. The test in this study used the Black-Box test by a tester. After testing, software can be sent to the user.

5. Operation and maintenance: Usually (although not always), this stage is the longest stage. The system is installed and used in a real way. Maintenance involves repairing errors that are not found in the previous stages, increasing the implementation of the system unit, and improving system services as new requirements.

Based on the research method and system development method that the researcher proposes, the researcher carries out the stages of the activity by following the activity plan contained in the General Chart of Research.

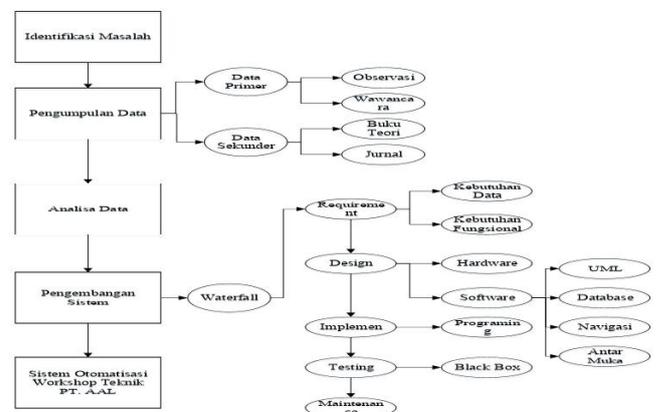


Fig. 2. General Chart of Research

To achieve a system of automation of technical works, researchers divided into 4 stages. The first stage is the identification of problems where broadly there is no software system that supports the automation of technical works in PT.

AAA. The second stage, researchers conducted data collection on the identification of problems found and used as research material. Continued with the third stage of the analysis of the problems found, then the researchers carried out system development in accordance with the System Development Life Cycle (SDLC) with the waterfall method, and development tools used by UML, and the final stage was the implementation and development of the technical workshop systems at PT. AAA.

IV. DISCUSSION

The following is a discussion of several problem formulations, including:

1. Application of Automation System in Calculating Time Attendance takes place properly and effectively. In the framework of implementing a workshop automation system that took place at PT. AAA, the company uses 2 (two) processes, namely the attendance process and application service equipment process. Attendance process starts from when employees tap on attendance machines using RFID cards. After the attendance is received it will be saved into the attendance database. The results of this attendance will be data for payroll calculations whose components have been determined in the PIMS system. At the end the employee will receive a pay slip as proof that his income has been paid. The process will continue continuously as seen in the drawing below.

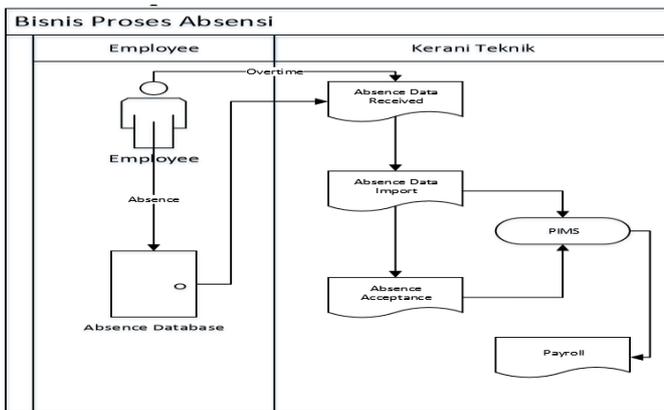


Fig. 3. Proposed Attendance Business Process

Furthermore, the second process is the process of requesting equipment services. This process starts from when the requestor requests the service, if the request is approved by Mechanic 1 (Overseer) then the Overseer will appoint one or several teams to work on the request. After the request is completed, the designated team will make a status change to be submitted to the quality control (Overseer). If the status is approved by the quality control or the Overseer, then it will be forwarded to the requestor for the final verification process related to the conformity of the final result with the requestor's request. If there is a discrepancy, the requestor can make a request for revision to the request in question and forward it to the team to be done again and then the quality control checks again and so on. This process is illustrated in

the drawing below.

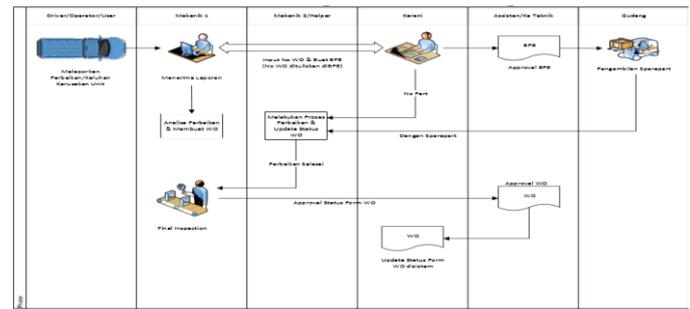


Fig. 4. Business Process of Proposed Service Request Process

2. Cost Analysis Issued in the Workshop for the Future With regard to the analysis of costs incurred by the company, especially in the future workshop environment, it can be seen the cost efficiency starting from the login page (the main page that does not make any transactions), the main menu, and finally change the password.

1) Login page: In accordance with the design of the login page and main page, the implementation of the design is applied part by part. To start using the workshop automation application shown in Drawing 5 which is the implementation of the login page. The login address can be accessed from <http://pis.aaa.com/index.php> the user login by writing down the username and password of each user.

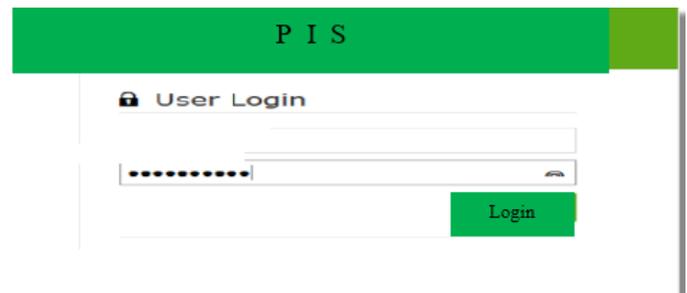


Fig. 5. Implementation of Login Page

2) Main menu: When a user successfully enters the login page, the user will be faced with a main menu page containing the main menus that will guide the user to the desired transactions according to the position or job of the user. The main page for workshop automation is shown in Drawing 6. The main page has 4 main menus and 1 setting menu, Utilities, Settings, Transactions and Reports, the settings menu is represented by an iron gear icon.



Fig. 6. Implementation of the Main Page

3) Change password: When a user wants to change the password to improve security from outside parties, users can change passwords periodically by using the settings menu symbolized by the iron gear icon. The implementation sequence changes the password implemented in drawing 7 below.



Fig. 7. Implementation of Change Password Page

To change the password, the user must enter the old password first followed by entering a new password twice and ending by pressing the save button to save the changes.

3. Payroll Calculation Mechanism by Combining Attendance Results and Issued Costs in the Workshop environment. The payroll calculation mechanism is carried out through the following implementations:

a. Implementation of Input Design: The implementation of the input design displays the actual display of the input forms to make the transaction. After entering the main page and displaying 4 main menu categories. Users just choose, what menu will be used and directed to the function that will be done. The function to be explained first is a function of the attendance business process. For more details, the implementation includes the implementation of the Add New Employee Form; implementation of Maintain Attendance Form; implementation of the Daily Attendance Report Form; implementation of Daily Member Incentive Forms; implementation of the Premium and Overtime Recap Form; the last is the implementation of the Member Overtime Recap Form by Mechanics 1.

b. Implementation of Output Draft: The implementation of this output displays the results of the implementation of the design output that was previously made. The implementation includes the first, the implementation of the Recap Attendance Report which contains the recap of attendance from the employees of the technical department to see employee attendance on a daily basis. Second, the implementation of the Daily Member Incentive Report, which displays details of incentives obtained per member. Third, the implementation of the Premium and Overtime Recap Report that shows premiums and overtime received by employees. Fourth, the implementation of the Member Overtime Recap Report per Mechanics 1, which displays an overtime recap of mechanic 1 in detail per date.

The mechanism for calculating the costs incurred in the Workshop environment is carried out through the User Acceptance Test, which is after the SIT stage is completed, so that UAT scenario is structured and phased in so that it is easier for users to do UAT. The UAT stages involve all

application users whose results will be recorded in the UAT scenario as a report.

a. UAT Main Page: User acceptance test is done to do testing on the main page starting from the login page, entering the main menu and testing the password changes.

b. UAT Attendance Business Process: This User Acceptance Test is carried out for all inputs and outputs of the attendance business process.

c. UAT Business Process Request Service: This user acceptance test is done through a business process request service. This business process is the main business process in this workshop automation application.

V. CONCLUSION

The final step of this study is the closing which contains some conclusions and suggestions or recommendations, such as the following:

Conclusions

1. The existence of a workshop automation system can simplify and speed up the process of request from the requestor. The convenience is not only felt by the requestor, but also by the employees of the technical department of PT. AAA.
2. The attendance process, overtime calculation, service requests and reports can be done through the system. In addition, the system can also guarantee security in the right of access to information and documents because according to user access rights and the search process the request history can be done easily by all users. The system can also revise and save the process so that each change can be known.

Suggestions

1. The system is still intranet, which means it can only be accessed if it is in the office environment of PT. AAA. In the future, this system will be accessible via the internet so that all employees can make requests from anywhere.
2. The display is still quite simple. Furthermore, the development of the display is more interactive and more elegant.
3. The system can be developed with other business processes that can be used by all employees for the benefit of each work unit.

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