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Design And Construction of a Web-Based Machine Ordering Application Using the Codeigniter Framework

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Abstract - The company PT Engineering is engaged in manufacturing machinery and machine tools, repairing metal products, and repairing electrical equipment. The company was founded with the aim of meeting the needs of industry in terms of providing high-quality equipment. the process of ordering production machines, such as tanks and mixers, which is currently running is still carried out using whatsapp or email media, so it is less effective and can cause various problems such as data recording errors, and less optimal service to customers. The absence of an integrated ordering system also makes it difficult for companies to track order status so that they cannot provide fast and accurate information to customers. The purpose of this research is to facilitate the production department and planners monitoring incoming orders so that orders can be completed on time. This research uses RAD analysis research methods, diagram design using UML, system coding using PHP programming language and Mysql database. This research produces a web-based ordering system that is connected to a database so that order data can be stored properly.

Keywords :
Ordering;
Machine;
Production;
PHP;
Mysql.;

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1. INTRODUCTION

The role of information technology today spans across various sectors, including industry, education, government, banking, and many others. Technological advancements are currently implemented in computers (hardware), applications (software), and artificial intelligence (AI), all designed to facilitate human activities in daily life.

PT Engineering is a company operating in the field of manufacturing machinery and machine tools, metal product repairs, and electrical equipment repairs. The company was established with the aim of meeting industrial needs by providing high-quality equipment.

With increasing competition and the ever-evolving demands of the market, PT Engineering faces challenges in terms of the efficiency of its ordering system. Currently, the ordering process for production machines, such as tanks and mixers, is still conducted via WhatsApp or email. This method is inefficient and may lead to various issues, including data entry errors and suboptimal customer service. The absence of an integrated ordering system also makes it difficult for the company to track order statuses, preventing it from providing customers with timely and accurate information.

The problem, therefore, calls for an information technology-based solution—namely, the design of a web-based production machine ordering system. Such a system is expected to assist PT Engineering in managing the ordering process more efficiently, from price quotations and order placement to monitoring production status. With a web-based system, customers can easily access product information, place orders, and track their order progress in real time. Furthermore, the system enables PT Engineering to expand its marketing reach and enhance the quality of service provided to customers.

Based on the aforementioned issues, the author addresses this topic in the final project research titled **"Design and Development of a Web-Based Machine Ordering Application Using the CodeIgniter Framework."**

2. THEORETICAL FOUNDATION

2.1 General Theory

2.1.1 Definition of Design

According to Al-Bahra in the journal by Nanda Rizqya (2020), "Design is the stage carried out to create a new system as a response to problems within a company in order to achieve improvements."

According to Jogiyanto in the journal by Fitrindha Nurwulan and M. Ibnu Choldun R. (2020: 24), "Design has two purposes: to fulfill the needs of system users and to provide a clear picture to computer programmers and other involved technical experts."

Based on the above definitions, it can be concluded that design is a primary step in developing a new system to solve problems in a company and improve performance.

2.1.2 Definition of Prototype

According to Fergie Joanda Kaunang in the journal by Sudaryono and Efana Rahwanto (2020), "System design is a phase of the system development cycle which can be defined as the stage of defining functional requirements and describing how a system is formed."

According to Stair in the journal by Januar, Handy Permana, Dedeh Supriyanti, and Nita Kurnia (2020), "System design is a system development phase that defines how an information system will be designed to obtain a problem-solving solution."

Based on the definitions above, it can be concluded that system design is a stage in system development that focuses on defining functional requirements and explaining the system structure.

2.1.3 Definition of System

According to Sugiarti in the journal by Januar, Handy Permana, Dedeh Supriyanti, and Nita Kurnia (2020), "A system is a form of integration between one component and another because a system has different objectives for each case that occurs within it."

According to Marshall in the journal by Rizky Putra Fhonna and Marzuki AR (2021), "A system is a series of two or more interrelated and interacting components aimed at achieving a goal. Most systems consist of smaller subsystems that support the larger system."

Based on the above definitions, it can be concluded that a system is a sequence of interconnected and interrelated components aimed at achieving specific goals. Each system has different target objectives for each case it addresses, and typically consists of smaller subsystems that support the overall system.

2.1.4 System Characteristics

According to Mulyano in the journal by Erwan Effendy et al. (2023: 4347), the characteristics of a system include several components that support the system, such as:

1. System components: a group of components that are interrelated and work together to form a unified whole.
2. System boundary: the boundary area between one system and another within the same environment.
3. Environment: systems outside the boundary influenced by the system's operations.
4. Interface: connections between specific subsystems that allow the flow of resources from one subsystem to another.
5. System input: energy that enters the system.
6. System process: each system has a processing part that transforms inputs into outputs.
7. Goals and objectives: guide the direction in which the system operates to achieve its intended outcomes.
8. System output: the result of processed energy, classified as useful output and waste.
9. Control mechanism and feedback: used to control inputs and outputs to ensure the system functions as intended.

2.1.5 Definition of Information

According to Anggaraeni in the journal by Aji Afriansyah and Ari Syaripudin (2022), "Information is a collection of data or facts that are organized or processed in a certain way to have meaning for the recipient."

According to Sutabri in the journal by Nur Azizah, Belsana Butar, and Lupita Sari (2022), "Information can be described as data that has been classified or interpreted to be used in every decision-making process by relevant parties."

Based on the above definitions, it can be concluded that information is a collection of organized data or facts that hold meaning for the recipient. Information can also be interpreted as data that has been structured or analyzed to aid in the decision-making process.

2.1.6 Definition of Data

According to Angga Sulchan Saputra, Bayu Kuncoro Jati, and Sumdoro Fajar Utomo in the journal by Sudaryono and Efana Rahwanto (2020), "Data is the basic material processed into information that is more useful and beneficial to the user to achieve set goals."

According to Nur Zeina Maya Sari in the same journal, "Data is a compound term that refers to facts or parts of factual data that hold meaning, which are linked to reality, symbols, images, numbers, or letters that represent an idea, object, condition, or situation, and so on."

Based on the above definitions, it can be concluded that data is material that is processed to generate information useful for users in achieving specific goals.

2.1.7 Observation

According to Sugiyono in the journal by Syifaul Adhimah (2020), "Observation is research that begins with recording, analyzing, and then concluding the implementation and results of a program, viewed from the presence or absence of business development among learners."

According to Aulia Putri Angel in the journal by Imam Turmudi and Perani Rosyani (2023), "Observation involves monitoring facts, events, or specific behaviors related to work development and outcomes. In addition, observation is raw data that serves as the basis for feedback on effective development behavior."

Based on the above definitions, it can be concluded that observation is a data collection process through direct observation and analysis of facts or behavior to assess the development and outcome of an activity.

2.1.8 Interview

According to Kriyantono in the journal by Imam Turmudi and Perani Rosyani (2023), "An interview is a conversation with a person considered to have important information about an object, aimed at obtaining deeper data."

According to Esterberg in the journal by Hendro Wijoyo (2022), "An interview is a meeting between two people to exchange information and ideas through a question-and-answer session, the results of which can be processed and constructed into a particular topic."

Based on the above definitions, it can be concluded that an interview is a communication process between two people to collect data related to a specific topic.

2.2 Specialized Theory

2.2.1 Ordering

According to Siswantoro in the journal by Effendy and Herry Mulyono (2020), "Ordering is the process of managing orders, which involves preparing orders for shipment and receiving them upon delivery."

According to Rizki D. in the journal by Riyo Adili Syah Putra and Sutarman (2020), "Ordering, in general, is an agreement between two or more parties to reserve a space, which could involve reserving a room, seat, or other facility for a specific time, along with its associated services."

From the above definitions, it can be concluded that ordering is an agreement between two or more parties that includes preparation for shipment and receipt of goods upon delivery.

2.2.2 Production

According to Kumar, Suresh in the journal by Alek Sudarso (2022), "Production is one of the business functions in a company, which is related to transforming inputs into outputs of specific quality. Thus, production is considered a value-added process at every stage."

According to Kasman Kadir in the same journal, "Production is the capability to conduct a conversion process from input to output in order to achieve company goals."

According to Slack et al. in the journal by Olumide Emmanuel Oluyisola et al. (2022), "Production refers to activities such as loading, scheduling, sequencing, monitoring, and controlling the use of resources and materials during the production process."

Based on the above definitions, production is a structured process of transforming inputs into outputs with the goal of adding value at every stage of the process.

2.2.3 Machine

According to Mappi in the journal by Abdul Rozak Maulana and Imam Muhasan (2023), "A machine is a tangible asset used in the process of manufacturing goods, for leasing, and in asset management, with an expected useful life of more than one year."

According to Sofjan Assauri in the journal by Masri ALI and Arhami (2021), "A machine is a piece of equipment powered by a force or energy, used to assist humans in producing products or parts of products."

From these definitions, it can be concluded that a machine is a tool powered by a specific energy source to assist humans in producing specific goods.

2.2.4 Web

According to Solichin in the journal by Amin Hidayat (2022), "A website is a collection of pages displaying information in the form of text, images, animations, audio, video, or a combination of all, either static or dynamic, interconnected through hyperlinks."

According to M. H. Aziz in the journal by Sudaryono and Efana Rahwanto (2020), "A website is a collection of pages used to display information in the form of text, still or moving images, animation, sound, or a combination of all, forming a structured set of interconnected pages."

Based on these definitions, a website is a collection of pages presenting information in various formats—text, images, animations, sound, video—either static or dynamic, and connected through a network of hyperlinks.

2.2.4.1 Types of Web

According to Rina Noviana (2022: 113), websites are categorized by nature into:

Dynamic websites, which provide content that can change at any time.

Static websites, where the content rarely changes and remains the same over time.

2.2.5 PHP

According to E. W. ST, M.Eng and Z. Ali as cited by Abdur Rochman et al. in the journal by Uci Pratiwi, Khana Wijaya, and Fajriyah (2021), "PHP is a scripting programming language initially developed to generate HTML statements. Although developed entirely in PHP, it displays HTML code."

According to the EMS team in the journal by Reza Hermiati, Asnawati, and Indra Kanedi (2021), "PHP is a complementary language to HTML that enables the creation of dynamic applications, allowing data processing and handling."

From these definitions, PHP is a scripting programming language that complements HTML and enables the development of dynamic applications that

involve data processing and handling.

2.2.6 MySQL

According to Rachmat Agusli, Sutarman, and Suhendri in the journal by Sudaryono and Efana Rahwanto (2023: 342), "MySQL is a Relational Database Management System (RDBMS) software capable of managing databases quickly, supporting very large amounts of data, accessible by multiple users (multi-user), and capable of performing processes simultaneously (multi-threaded)."

According to Novendri in the journal by Andi Asvin Mahersayillah Suradi (2022), "MySQL is a relational database management system with faster data operations because data is managed in multiple separate tables."

Based on these definitions, MySQL is a fast relational database management system (RDBMS) that supports multi-user and multi-threaded operations by managing data across separate tables.

2.2.7 Sublime Text

According to Supono and Putratam in the journal by Marthin Yohannes Simanjuntak (2023), "Sublime Text is a text editor software used to create or edit applications. It has additional plugin features that assist programmers."

According to M. Farid in the journal by Suhartono and Ristin Susilawatizahraen (2022), "Sublime Text is a Python-based text editor—elegant, feature-rich, cross-platform, simple, and widely used among developers, writers, and designers. It is commonly used up to version 3."

From these definitions, Sublime Text is a popular Python-based text editor among developers, writers, and designers.

2.2.8 UML

According to Suendri in the journal by Sudaryono and Efana Rahwanto (2020: 340), "UML (Unified Modeling Language) is a standard specification language used to document, specify, and build software."

According to Setiawan et al. in the journal by Lili Andraini and Cinthya Bella (2022), "UML is one of the standard languages widely used in the industry to define requirements, conduct analysis and design, and describe the architecture in object-oriented programming."

From these definitions, UML is a standard specification language used to document, define requirements, and design software architecture in object-oriented programming.

2.2.8.1 Types of UML Diagrams

According to Novi Cholisoh, Junaidi, and Irfa Safitri Sari (2021: 137), there are four common UML diagrams widely used to describe software with an object-oriented programming (OOP) approach:

1. Use Case Diagram: describes the interaction between a system and users or actors.
2. Activity Diagram: describes the workflow of system activities with users or actors.
3. Class Diagram: describes the structure, definitions of classes, packages, objects, and their interactions.
4. Sequence Diagram: describes the sequential interaction between the user and the system.

2.2.9 RAD (Rapid Application Development)

According to Muhammad Arya Rasyid Sikumbang, Roni Habibi, and Syafrial Fachri Pane in the journal by Fanesyah Musvina, Sri Rahmawati, and Hakamsyah Andrianof (2022), "RAD is a software development method using an object-oriented approach for system evolution. It is used because it can shorten the planning, design, and implementation phases compared to traditional methods."

According to Aswati in the same journal, "RAD is a linear sequential development method that emphasizes short development cycles in software development."

Based on these definitions, RAD is a structured, object-oriented method for software development designed to accelerate the development cycle in planning, design, and implementation compared to traditional methods.

2.2.10 PIECES

According to A. R. Dewi in the journal by Rendi Muuliansah and Cahyani Budihartanti (2020), "The PIECES method is an analysis method used to identify more specific core problems. System analysis typically considers aspects such as performance, information, economy, control, efficiency, and service."

According to Kristy Kusuma in the journal by Metisya Darwi et al. (2023), "PIECES is a framework used to categorize problems, opportunities, and directions, forming part of the scope definition for analysis and system structuring."

From these definitions, PIECES is a framework used to analyze system problems by identifying key factors such as performance, information, economy, control, efficiency, and service. It helps classify issues and opportunities and provides direction for defining the scope of analysis and system improvement.

2.2.11 Blackbox Testing

According to Fadhila Cahya Ningrum in the journal by Stevanu Dika Pratama (2023), "Blackbox testing is a test aimed at determining whether a program performs according to its function, without

needing to understand the program's code."

According to Ramadi R. in the journal by Sri Rahayu et al. (2021), "Blackbox testing is the testing of fundamental system aspects without considering the internal logic structure of the software."

Based on the above definitions, Blackbox Testing is an evaluation method focusing on the effectiveness of software based on its outputs without examining its internal code, assessing whether the program meets its specified objectives.

2.2.12 Elicitation

According to I. Sommerville in the journal by Qilbaaini Effendi Muftikhali and Sasmi Hidayatul Yulianing Tyas (2021), "Elicitation is a set of activities aimed at investigating information system requirements through communication with potential system users and stakeholders interested in system development."

According to Muhammad Emil Fauzan Irawan, Denny Sagita Rusdianto, and Edy Santoso (2023), "Elicitation is a set of activities aimed at identifying system needs through communication with users, customers, and other stakeholders involved in the development process."

Based on the above, Elicitation is a series of activities designed to analyze the requirements of an information system by communicating with users, customers, and other stakeholders involved in system development.

2.2.13 Visual Paradigm

According to Windu Grace in the journal by Tarmin Abdulghani and Radityatama Mulia Sembada (2021), "Visual Paradigm is a software application used for designing applications, commonly referred to as software engineering tools."

According to Denny Sagita Rusdianto et al. (2022), "Visual Paradigm is one of the open-source case tools for modeling Unified Modeling Language (UML)."

Based on these definitions, Visual Paradigm is a software tool used to structure and design software. It is known as a UML-based modeling application that is open-source.

2.2.14 XAMPP

According to Cahyanti and Purnama in the journal by Asep Hardiyanto Nugroho and Toyib Rohimi (2020: 5), "XAMPP is a tool that provides a software package in one bundle. Installing XAMPP eliminates the need to manually install and configure Apache, PHP, and MySQL."

According to Adi Baskoro in the journal by Resra Dwi Duta Taruna Dika et al. (2023), "XAMPP is a server software that can run on operating systems such as Windows, Apple, and Linux."

Based on these definitions, XAMPP is a software package that integrates several software components into one bundle, automating installation and configuration.

2.3 Literature Review

According to Zed in the journal by Rodatus Sofian, Suhartono, and Ratna Hidayah (2020), "A literature study is a series of research activities related to methods of collecting literature data, then reading, recording, and processing those research materials."

According to Sugiyono in the same journal, "A literature review involves theoretical study through references related to the values, culture, and norms that develop within the social situation being researched."

Based on the above definitions, it can be concluded that a literature study is a research process involving the collection and processing of information from various sources (reading, note-taking, and analysis of literature materials).

3. METHODOLOGY AND RUNNING SYSTEM ANALYSIS

Research Metodologies

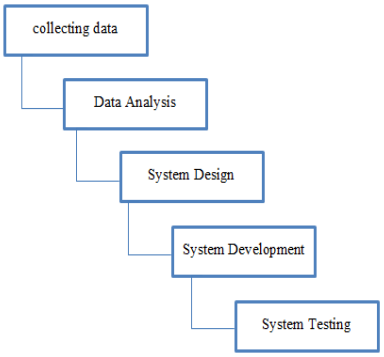


Figure 1. Waterfall Method

This research adopts a web-based information system development approach, incorporating several supporting methods ranging from data collection to system testing. The methodology employed in this study is described as follows:

1. **Data Collection Methods**
   In this study, the data collection methods used to search for and gather the necessary information are as follows:
   - Observation: The author conducted direct observations at PT Engineering. This method was used to gather the required data and information for this final report in accordance with the existing data.
   - Interview: This interview method was

conducted to supplement the necessary data and to gather information regarding the shortcomings of the current system and other needs.

- Literature Review: This data collection method involves searching and reading books and journal references related to the ongoing research.

2. **System Development Method**

The development method used in this research is:

- Rapid Application Development (RAD)
- Requirement Planning
- System Design
- Implementation

3. **System Testing Method**

The testing method used is
Black Box Testing focuses on testing the software's functional requirements without looking at the internal code structure. Black Box testing allows the developer to identify errors in categories such as incorrect or missing functions, interface errors, data structure or external database access errors, and initialization or termination errors.

Running System Analysis

This analysis is conducted to understand the current operational workflow at PT Engineering, identify its weaknesses, and define the requirements for the proposed system.

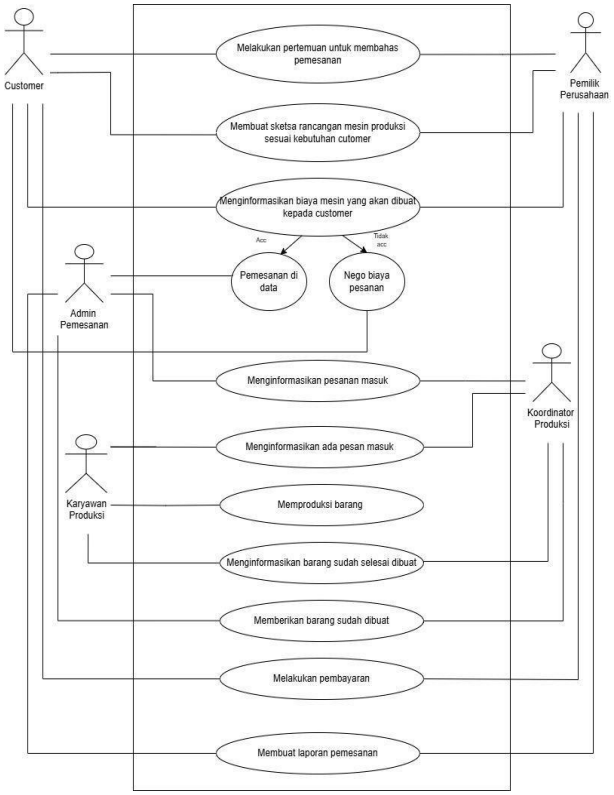


Figure 1. Use Case Diagram of the Running System

The use case diagram involves five actors: Customer, Owner, Ordering Admin, Production Coordinator, and Production Employee. It illustrates the interactions such as discussing the order, creating a design sketch, recording the order, informing relevant departments, producing the goods, making payments, and creating reports .

Activity Diagram of the Running System

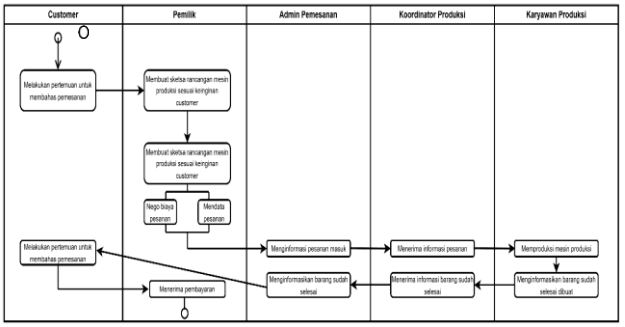


Figure 2. Activity Diagram of the Running System

This diagram illustrates the workflow between all actors. It begins with the customer meeting the owner, followed by the owner creating a design and providing a quote. If accepted, the admin records the order and informs the production coordinator, who then tasks the production employees. After production is complete, the information flows back to the admin. The process concludes with the customer's payment and the admin generating a report.

Sequence Diagram of the Running System

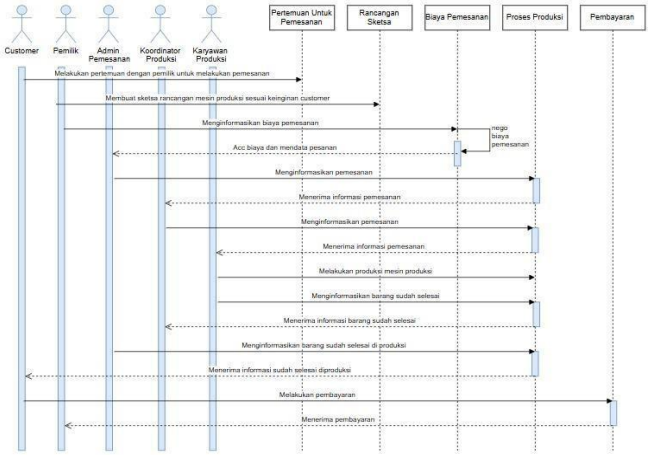
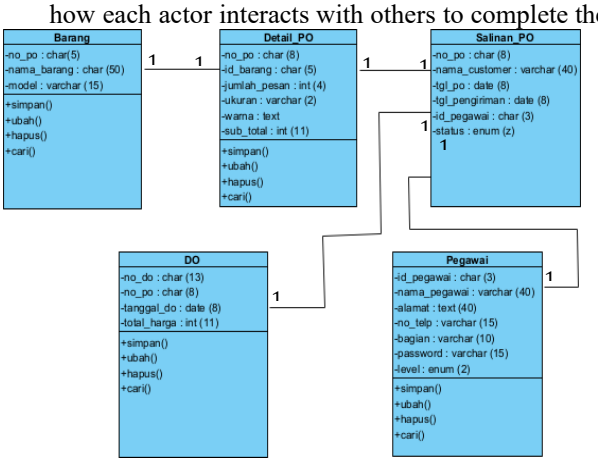


Figure 3. Sequence Diagram of the Running System

This diagram shows the sequence of messages exchanged between the actors over time. It details the step-by-step communication flow from the initial customer inquiry to the final report creation, showing

how each actor interacts with others to complete the



ordering process.

1. Current System Analysis

The analysis phase in a system development process is conducted prior to the design phase. This stage aims to understand the rationale behind the development of the system, formulate the problems and requirements of the system, assist in project scheduling, and minimize potential issues within the system. This helps ensure that the system functions optimally during operation.

The system analysis method used in this research is the PIECES method (Performance, Information, Economy, Control, Efficiency, Services). The following is the Information System Design for the Production Machine Ordering System at PT Berkah Synergi Engineering:

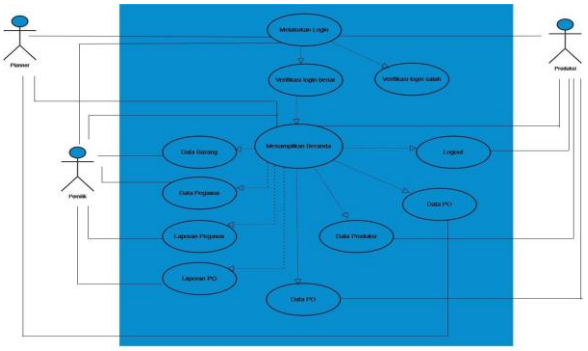
No	Parameter	Sistem Sebelumnya	Sistem Usulan
1	*Performance* (Kinerja)	Pada Sistem sebelumnya masih manggunakan buku PO dan media komunikasi WhatsApp	Pada Sistem yang diusulkan sudah menggunakan sistem pemesanan berbasis Web yaitu customer dapat meninjau pesanan pada sistem yang dibuat
2	*Information* (informasi)	Masih menggunakan Microsoft excel untuk mendata deskripsi pesanan sehingga terjadinya kesalahan saat pendataan	Sudah menggunakan sistem sehingga dapat mengurangi terjadinya kesalahan dalam menginput rincian pesanan.
3	*Economy* (Ekonomi)	Masih memerlukan biaya untuk membeli ATK	Pada sistem yang diusulkan semua data tersimpan di database sehingga dapat meghemat biaya pengeluaran untuk membeli ATK.
4	*Control* (Pengendalian)	Pembuaan laporan di lakukan dengan merekap secara satu persatu rincian data pemesanan yang sudah melakukan pembayaran	Sudah adanya fungsi membuat laporan pesanan yang berfungsi untuk mengetahui rincian data yang sudah melakukan pemesanan.
5	*Efficiency* (Efisiensi)	Melakukan pencarian satu persatu untuk mencari data rincian pemesanan customer	Pada sistem usulan sudah memiliki fitur untuk pencarian data sehingga memudahkan untuk pencarian data.
6	*Service* (Pelayanan)	Laporan pemesana terkadang tidak selesai tepat pada waktunya karena harus mendata transaksi secara satu persatu	Pada sistem yang di usulkan sudah terdapat fitur untuk pembuatan laporan sehingga laporan dapat di selesaikan tepat waktu.

4. RESEARCH RESULTS

After reviewing the current system, a new system was designed to address its weaknesses.

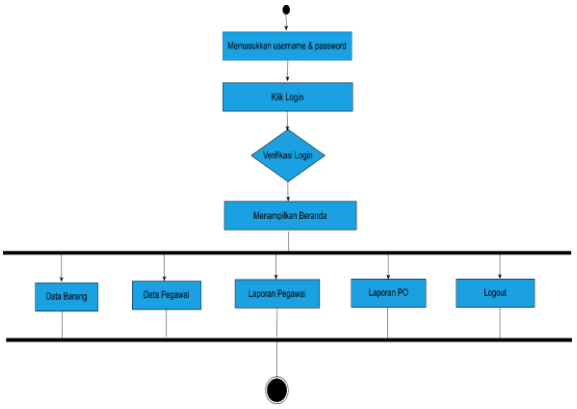
Proposed System Analysis

- Use Case Diagram of the Proposed System



The proposed system involves three actors: Owner, Planner, and Production, who can log in to access features like Goods Data, PO Data, and Reports based on their roles.

- Activity & Sequence Diagrams of the Proposed System



The owner enters their username and password on the login page. After that, the owner selects "Login" to proceed with the process. The system will verify the login credentials to ensure the authenticity of the

provided information. If the verification is successful, the system will display the main dashboard. This dashboard includes several main menus, namely item data, employee data, employee reports, Purchase Order (PO) reports, and a logout option. With this interface, the owner can easily access the necessary information and features to support the company's operational data.

- Class Diagram of the Proposed System

The system consists of 5 main tables: Barang, Detail_PO, Salinan_PO, Pegawai, and DO, which are interconnected.

- Database Specifications

Goods

Barang			
Nama Field	Tipe Data	Panjang	Keterangan
Id_barang	Char	5	Primary Key
Nama_barang	Varchar	50	
model	Varchar	15	

PO_Detail

Detail_PO			
Nama Field	Tipe Data	Panjang	Keterangan
No_PO	Char	8	Primary key
Id_barang	Char	5	
Jumlah_pesan	Int	4	
Ukuran	Varchar	2	
Warna	Text		
Sub_total	Int	11	

PO_Copy

Salinan PO			
Nama Field	Tipe Data	Panjang	Keterangan
No_PO	Char	8	Primary key
Nama_customer	Varchar	40	
Tanggal_PO	Date	8	
Tanggal_pengiriman	Date	8	
Id_pegawai	Char	3	
Status	Enum	z	

Employee

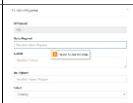
master_pendaftaran			
Nama Field	Tipe Data	Panjang	Keterangan
Id_pegawai	Char	3	Primary key
Nama_pegawai	Varchar	40	
Alamat	Text	40	
No_telp	Varchar	15	
Bagian	Varchar	10	
Password	Varchar	15	
Level	Enum	2	

DO(*Delivery Order*)

master_pendaftaran			
Nama Field	Tipe Data	Panjang	Keterangan
No_DO	Char	13	Primary key
No_PO	Char	8	
Tanggal_DO	Date	8	
Total Harga	Int	11	

- **Black Box Testing**

In this thesis, testing is conducted using the Black Box Testing method, which focuses on the software's requirements. Black Box Testing allows software developers to determine input conditions that will test all functional requirements of a program. This testing method aims to identify errors in several categories, including: incorrect or missing functions, errors in data structures or external database access, display errors, initialization errors, and termination errors.

No.	Skenario Pengujian	Halaman Yang di Uji	Hasil Yang diharapkan	Hasil Pengujian	Hasil
1.	Jika tidak mengisi *username* dan *password*		Sistem akan menampilkan pesan kesalahan		Valid
2.	Jika *username* dan *password* di isi dengan lengkap		Sistem akan menampilkan menu dashboard		Valid
3.	User mengisi data barang tidak dengan lengkap		Sistem tidak dapat menyimpan data		Valid
4.	User mengisi data barang tidak dengan lengkap		Sistem dapat menyimpan data		Valid
5.	User mengisi data pegawai tidak dengan lengkap		Sistem tidak dapat menyimpan data		Valid
6.	User mengisi data pegawai tidak dengan lengkap		Sistem tidak dapat menyimpan data		Valid

Black Box Testing

5. CONCLUSION & RECOMMENDATION

Based on the previous analysis and discussion, the author can conclude that:

The current production machine ordering system still relies on manual methods like WhatsApp and email, which are inefficient.

The current system is prone to data recording errors due to human error, leading to less than optimal customer service.

The proposed web-based machine ordering system for PT Engineering is developed using PHP and a MySQL database, with three user roles: planner, production, and manager.

Recommendation

1. Training should be provided to employees on how to use the new system to ensure it runs well.
2. Additional computer and server infrastructure is required to support the implementation of the system.
3. Regular maintenance is necessary so that the system can be well-controlled.

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