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IMPLEMENTATION OF THE JIT (JUST-IN-TIME) METHOD IN A RESPONSIVE WEB-BASED INVENTORY MANAGEMENT APPLICATION AT PANDAWA 5 FURNITURE JEPARA

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ABSTRACT

Jepara Regency is the highest supplier of furniture in the Central Java region, for that there are many furniture factories or warehouses that produce furniture from home to export. Pandawa 5 Furniture is a medium-sized company that focuses on making home needs that sells products throughout Indonesia and was established in 2020. In the production process, there are advantages Because raw materials accumulate in the warehouse, an application is needed that can solve the problem of raw material inventory and inventory by implementing the JIT (Just In Time) method for raw material inventory planning calculations. The application development method uses the agile Scrum model and whatsapp notifications for order notifications to customers, Through observations, interviews, and literature reviews, information is collected to analyze a subject. The data obtained is then compiled in a Unified Modeling Language (UML) model. By using the model for web applications, it is developed and implemented into useful application forms. The results of this research include the creation of reports and software development with the latest technology with the aim of introducing an inventory management information system using the Just In Time method to support the manufacture of furniture properly because the supply of raw materials is right and in accordance with needs.

1. INTRODUCTION

Jepara Regency, located in Central Java, is known as the leading furniture production center in the region. The area boasts many factories and warehouses that knit furniture products ranging from home-scale to export. In the midst of the glitter of this industry, Pandawa 5 Furniture strengthens its presence as a medium-sized company that prioritizes the needs of high-quality homes. Established in 2020, Pandawa 5 Furniture has become one of the key players in the furniture market in Indonesia, with a sales reach that covers the entire country. With a focus on innovation, quality, and customer satisfaction, the company continues to strive to meet and exceed consumer expectations in this highly competitive market.

The process of inventory management and stock management of Pandawa 5 Furniture's raw materials begins with employees who are in charge of estimating the need for raw materials for the production process. They record the type and amount of raw materials needed. Once all the needs have been recorded, the next step is to place an order for raw materials from suppliers who have been selected based on their quality and reliability evaluation. Once the raw materials are received, Pandawa 5 Furniture's warehouse team is responsible for storing them in the company's warehouse.

Pandawa 5 Furniture has 8 employees, and in per month gets an average of 5 customers with a make to order system whose production period is usually completed within 3-4 weeks, the products of Pandawa 5 Furniture include dining tables, sideboards, patio chairs, dressing tables and others. The raw materials used for furniture production include wood, sandpaper, stainless stell, finishing, marble, foam etc. During the production process, employees take raw materials to the warehouse every day as needed, and if the stock of raw materials runs out, employees only ask warehouse employees for the procurement of the necessary raw materials.

Accuracy in the supply of raw materials is very important because customer requests must be met immediately. Delays in the provision of raw materials will hinder the production process. furniture manufacturing, and also data inaccuracies due to recording errors to information delays due to time-consuming manual processes, the risk of loss or theft of goods, to the difficulty of inventory planning due to the lack of accurate and real-time data, as well as the difficulty of tracking inventory or purchase history. In addition, there are goods that must follow market trends such as upholstery, finishing paint and also goods that have an expiration date and become a buildup of leftover raw materials in the warehouse.

To overcome these problems, the author wants to solve these problems by using an information system that aims to make the process of raw material procurement, inventory

management, sales, monitoring and the use of the Just In time method in inventory management where goods or materials are produced or ordered only when needed to meet customer demand or for the next production process, By applying the Just-In-Time (JIT) method, The company is expected to optimize the purchase of raw materials and manage the purchase time so that it achieves two main goals: reducing the cost of purchasing and using raw materials. With JIT, companies can reduce waste and storage costs as they only order or produce raw materials when needed, and also use the whatssap notification feature to keep up with current web developments.

From the description above, the author made as material for writing a thesis with the title "Implementation of the JIT (Just-In-Time) Method in a Responsive Web-Based Inventory Management Application at Pandawa 5 Furniture Jepara". The results of this report are thesis and web application reports. This application is expected to help Pandawa 5 Furniture in raw material inventory and inventory management that is easily accessible using a responsive website.

2. RESEARCH METHODOLOGY

According to (Afifi, Putra & Pudjiantoro, 2020) PT. Cemara Agung Mandiri is a company engaged in the textile and weaving industry by using yarn as a raw material through a mechanical process to produce the required fabrics. However, there are often irregularities in the inspection of raw materials in ADM warehouses, causing the flow of goods in and out to be inconsistent. As a result, delays in orders from suppliers are frequent, resulting in delays in the production process. To overcome this problem, the company will implement the Just In Time method, which determines the amount of production based on actual demand only, thus ensuring the right adjustment of production to the needs at each stage. This method aims to facilitate smooth coordination and cooperation in the company's supply chain, by generating reports such as orders, purchase orders, and production reports. However, there is no whatshapp notification feature, production monitoring and product catalog from this system.

In a journal written (Sianturi, Siahaan & Sarwosri, 2018). An innovation proposed to increase the competitiveness of companies is the development of applications using the Just In Time method. With this approach, gallon water production will be tailored to consumer demand, allowing businesses to provide responsive and efficient services. As such, these applications can help companies reduce operational costs, increase profitability, and improve the regularity and efficiency of their system management. Through the implementation of four main modules, namely Expenses, Revenue, Sales, and Production, the application will also use forecasting methods to anticipate future customer orders. However, there is no whatshapp notification feature, production monitoring and product catalog from this system.

In a study by (Wanayumini & Iskandar, 2019) CV. AJ Pratama Group, located in Subur Village Dusun III, Air Joman District, is a company that focuses on making organic fertilizers. Currently, data processing still uses manual bookkeeping, which increases the risk of data loss and often leads to delays in production schedules, resulting in a decrease in profits. An integrated system known as a data processing application system combines hardware, software, data, processing procedures, and executors to produce outputs or information that is beneficial to individuals or groups, both inside and outside the company. In this case, the JIT (Just In Time) method is the most commonly used when creating data processing application systems that aim to increase profitability and efficiency by producing only goods according to actual consumer demand. However, there is no whatshapp notification feature, production monitoring and product catalog from this system.

The next research conducted by (Lady Sina & Asmara, 2021) in this journal discusses that a small business that focuses on selling ikat weaving products and their accessories, experiences problems in inefficient inventory management, causing a buildup of unsold and damaged goods. To increase efficiency and profit, Gerai Ranti implements Just In Time (JIT) in inventory management. The implementation of website-based JIT has succeeded in having a positive impact by facilitating the regulation of the availability of goods, reducing the accumulation of goods, and increasing business efficiency. However, there is no whatshapp notification feature, production monitoring and product catalog from this system.

Another study conducted by (Pratama, Ayoe & Nst, 2023) Olympic Furniture, a company engaged in the industry of manufacturing raw materials for furniture and selling furniture products such as cabinets, sofas, tables, and benches, is currently facing challenges in inventory management and production. The production process is carried out without consumer orders and without consideration of production costs, as well as using manual recording which results in the accumulation of product stock.

This study shows that applying the Just In Time Method in managing raw material stock at PT. Olympic Furniture can reduce the manufacture of furniture in a sustainable manner, thereby minimizing the cost waste that occurs due to the purchase of unused raw material stock effectively. However, there is no whatshapp notification feature, production monitoring and product catalog from this system.

In research conducted by (Aqilah, Bustamin & Sultan sahrir, 2023), it is necessary to develop an information technology-based inventory management information system on CV. Makmur Sejahtera, a trading company specializing in the trading of air compressors. At present, the company is still adopting the Inventory Management system manually, which faces a number of problems such as delays, inaccurate stock data, and recording errors. The integration of the Just-in-Time (JIT) Method is planned to address this challenge, where the approach aims to reduce inventory by ordering or producing goods only when needed, thereby reducing storage costs. However, there is no whatshapp notification feature, production monitoring and product catalog from this system.

In the research conducted (Nurlelah, Hasan & Maryani, 2023) Golden Toys, a manufacturing company, felt the need to develop an information system application to manage raw material inventory in the hope of overcoming problems such as stock accumulation, In the midst of difficulties in processing transactions and generating time-consuming reports, the authors designed a web-based information system to manage raw material inventory. The implementation of the Just In Time (JIT) Method in controlling raw material inventory at CV Golden Toys shows significant changes compared to conventional inventory control methods. With the JIT method, the quantity of raw material inventory can be drastically reduced to 3,896 Kg from the previous 70,451 Kg. However, there is no whatshapp notification feature, production monitoring and product catalog from this system.

2.1 Data Collection Methods

Data collection is a technique that ensures the accuracy, relevance, and reliability of the information obtained. Therefore, data collection is carried out through various methods which include:

1. Primary Data Sources
   Primary data is data obtained through observation and recording of research objects directly at the company's location. Primary data sources include:
   a. Observation
      Direct observation is a data collection technique that involves direct observation and monitoring of actions taken by the research subject. Making direct observations helps system analysts understand physical elements such as the inventory process and problems that may arise. The two categories of data collection processes through observation are as follows:
      - Structured observations:
        Structured observation is a type of observation that is carried out in a systematic and detailed manner with the aim of providing a clear picture of the data collection process. In this approach, the observers observe the object or subject of the study by paying attention to pre-established parameters and following a carefully drawn up plan. The structured observation process requires careful planning and precision during observation, so that the results can provide
      - Semi-structured observations:
        Semi-structured observation is an observation method that combines structural elements and flexibility. In this observation, there is a pre-established framework but it is also possible to improvise or adjust during the observation process. Observers use a pre-prepared guide or framework as a basic guideline, but still have the freedom to explore certain aspects that are considered important or interesting spontaneously. This approach allows researchers to obtain structured data, but can also capture the broader nuances and context of the observed situation.
   b. Interview
      In the process of developing an information system, the stage of identifying system needs involves a thorough analysis of the current situation to find problems and identify their sources. The interview method was used in this study. Through interviews, researchers can find problems and understand the way people involved in the situation think and make everyday decisions. Interview techniques can be used as an effective data collection method, but the process can be short depending on the system analyst's ability to use it. If a systems analyst is unfamiliar with the interview process, it's important to remember that interview techniques can be difficult to obtain relevant data. Therefore, a systems analyst must have the ability to adapt and be prepared to deal with different types of people and situations. Interview techniques rely on the ability of system analysts to capitalize on opportunities and resources.
2. Secondary Data Sources
   Information obtained from literature or other sources than the object of research is directly referred to as secondary data. Secondary data sources include:
   a. Doctentation Studies
      The study of documentation involves gathering information from various sources such as literature, documents, and internet media. This data is then analyzed and used as a reference in research.
   b. Literature Studies
      Literature study involves gathering information from books relevant to the research topic in order to gain a deeper understanding. The main goal is to analyze the available literature in order to gain a deeper insight into the research topic being discussed

2.2 System Development Methods

The system development stage is an important phase in the system creation process. In this study, a development approach known as the system development model is used. The Agile development method is a set of approaches in software development that emphasize iteration, structured team collaboration, and adaptation to change. The main focus is on rapid development, gradual software releases, and direct involvement with clients throughout the development process. (Mahendra and Eby Yanto, 2018) in Agile development there is a model *Scrum* So this study uses a model *Scrum* for system development. Method *Scrum* according to (Schwaber and Sutherland, 2020) is an approach in software engineering that adopts Agile principles, with a primary focus on team collaboration, incremental product development, and process iteration to achieve the end goal.

2.3 System Analysis

In this section are actors who describe the users of an application. The actors used in the inventory management application by implementing the JIT method on Pandawa 5 Furniture Jepara are as follows:

1. Manager
2. Production Division
3. Warehouse Division

These actors carry out some of the business processes shown in Table 1.

Table 1. Business processes used in the system

No	Business Process	Actor	Business Use Case
1.	The marketing division sends incoming orders from customers	Production Division	Incoming Orders
2.	Production Division records raw material needs	Production Division	Recording raw material needs
3.	Production Division makes requests for raw materials	Production Division	Making requests for raw materials
4.	The Warehouse Division checks the stock of raw materials in the	Warehouse Division	Checking stock

	storage warehouse		
5.	The warehouse division makes a list of raw material purchases	Warehouse Division	Create a purchase list
6.	The warehouse division submits the purchase list to the manager	Warehouse Division, Manager	Submit a purchase list
7.	The warehouse division applied for the disbursement of funds	Warehouse Division, Manager	Apply for disbursement of funds
8.	The manager receives the request for funds and accepts the application for the purchase of raw materials	Manager	List of acc purchases
9.	Supllier sends raw materials to the warehouse division	Supllier	Sending raw materials
10.	The production division carries out the production process	Production Division, Manager, Customer	Product production
11.	The production division records the list of finished goods and makes deliveries to consumers	Production Division, Customer	List of finished goods
12.	The production division makes a finished goods list report	Production Division	Production report
13.	The warehouse division records the used raw materials from the production report	Warehouse division	Recording used raw materials
14.	The warehouse division records a report on used raw materials	Warehouse division	Used raw material report

3 RESULTS AND DISCUSSION

3.1 System Design

The following image shows a use case system diagram that describes the use case business process. This diagram shows who is involved in the system (Actors) and what the system can do in Figure 1.

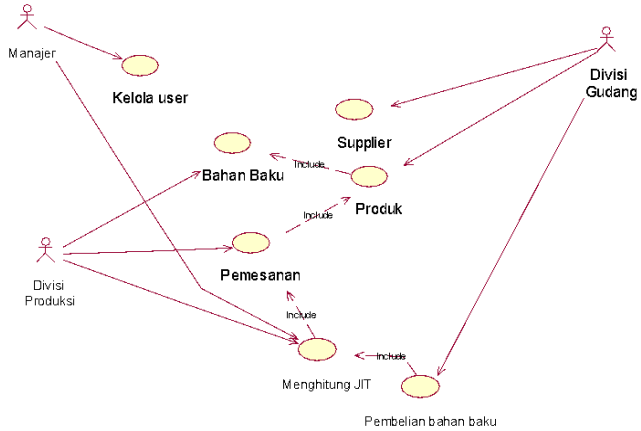

Figure 1. Usecase Implementation of Jit (Just-In-Time) Method in Responsive Web-Based Inventory Management Application at Pandawa 5 Furniture Jepara

Furthermore, some of the resulting class analyses will be correlated into the class diagram to determine the relationship or coupling of each component in Figure 2.

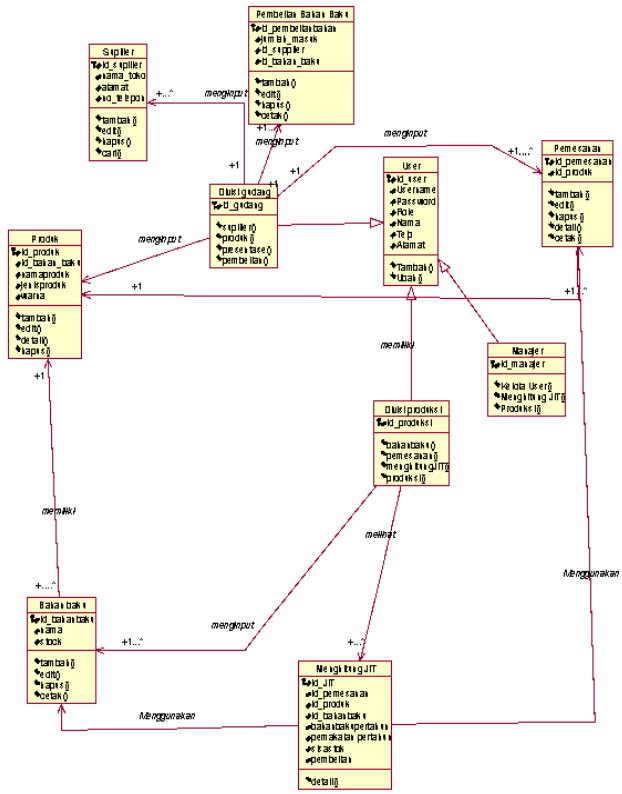

Figure 2. Class diagram of the implementation of the Jit (just-in-time) method in a responsive web-based inventory management application in Pandawa 5 Furniture Jepara

3.2 Database Design

The table relationships formed in the database for the Jit Method Implementation Application (Just-In-Time) in the

Responsive Web-Based Inventory Management Application in Pandawa 5 Furniture Jepara can be seen in Figure 3.

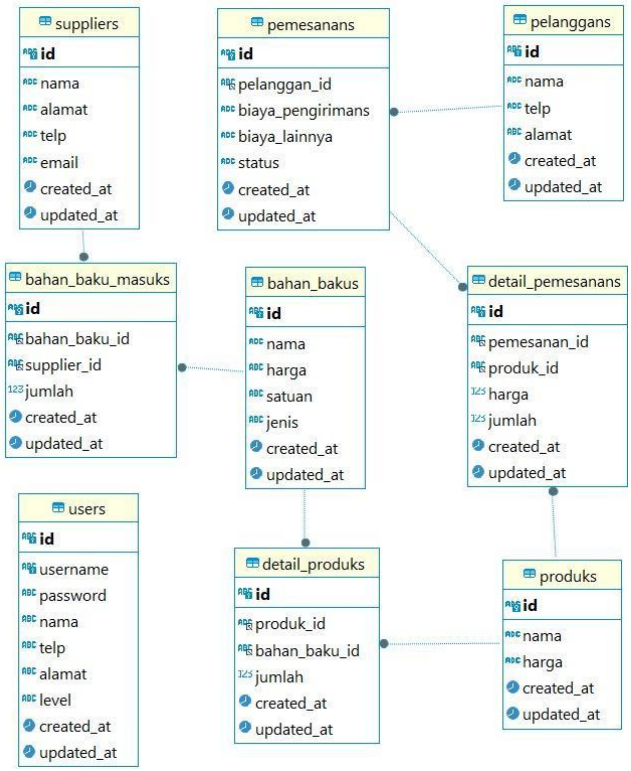

Figure 3. Database Table Relationship Implementation of Jit (Just-In-Time) Method in Responsive Web-Based Inventory Management Application in Pandawa 5 Furniture Jepara

3.3 System Results

The design of the system software interface application Implementation of the Jit Method (Just-In-Time) in the Responsive Web-Based Inventory Management Application in Pandawa 5 Furniture is implemented using the PHP programming language and Laravel framework, supporting software such as Visual Study Code for the system and a web browser to display the system's website.

1) Login Page View

This page is the Login page that can be used to log in to the system. It can be seen in Figure 4.

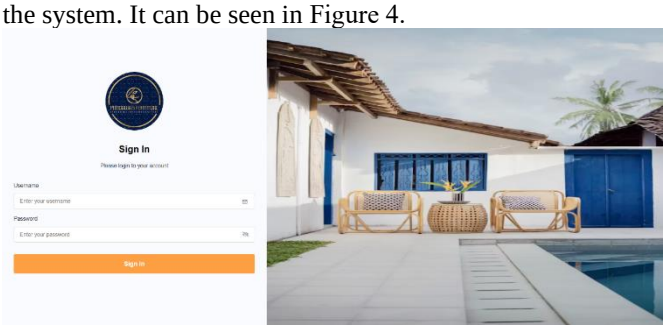

Figure 4. Login Page View

2) User Manager Manager Page View

This page is the Manage users page that can be used to add users to the system within the system. It can be seen in Figure 5.

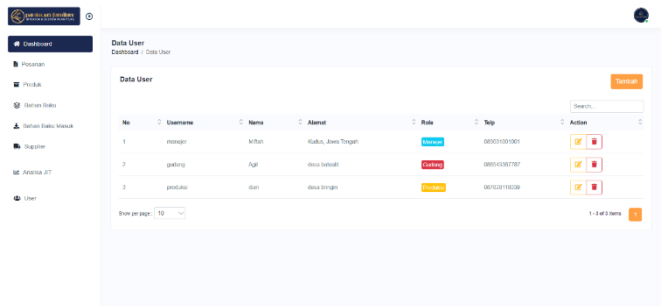

Figure 5. User Manager Page View

3) JIT Calculation Page View

This page is the JIT Calculation page that can be used to view or monitor the JIT calculation analysis process in the system. It can be seen in Figure 6.

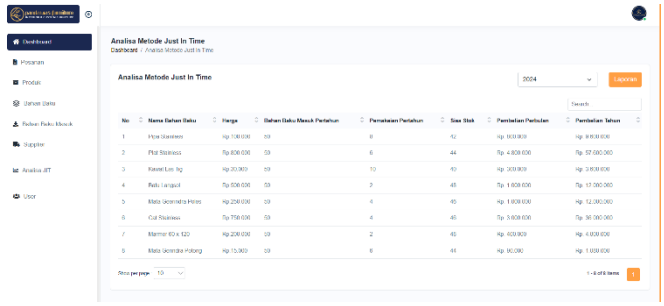

Figure 6. JIT Counting Page View

4) Raw Materials Page View of Production Division

This page is the Raw Materials page of the production division that can be used to add raw materials in the system. It can be seen in Figure 7.

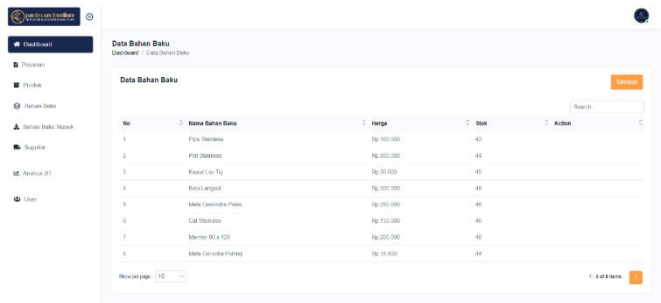

Figure 7. Raw Materials Page View of Production Division

5) Production Division JIT Counting Page View

This page is the Calculate JIT page of the production division that can be used to view the JIT calculations in the system. It can be seen in Figure 8.

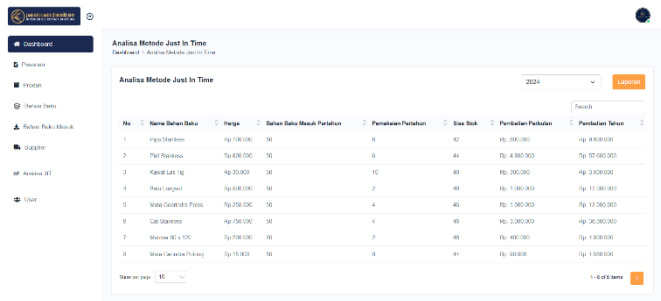

Figure 8. Production Division JIT Counting Page View

3.3 Discussion of the Just In Time Method

Based on the results of this study below, the results of the calculation of the Just In Time method in inventory management on pandawa 5 furniture Jepara with a total sales of 4 dining tables, implemented with the following calculation formula:

a. Searching for Total Raw Materials
   4 x 2 = 8 Sheets
b. Looking for Monthly Purchases
   1 x IDR 677,000 = IDR 677,000
c. Looking for Annual Purchases
   8 x IDR 677,000 = IDR 5,416,000

In the implementation of the Just In Time method, it is necessary to know the details of the raw material needs in 1 product, for an example of one of the detailed raw material needs for one dining table product, including:

Table. Raw material requirements for 1 dining table product

Less	Raw Materials	Price	Sum
1.	2 mm Stainless Plate	IDR 677,000	2
2.	Holo 2x2	IDR 32,000	3
3.	Holo 4x4	IDR 39,000	1
4.	Stainless Paint	IDR 120,000	2
5.	Marble	IDR 1,500,000	2
6.	Argon Welding	IDR 60,000	2
7.	Gerindra eyes polished	IDR 6,500	1
8.	Gerindra's eyes cut	IDR 2,700	2
9.	Velvet fabric	IDR 30,000	0
10.	Tig Welding Wire	IDR 2,400	6
11.	Langsol Stone	IDR 8,000	1
12.	Foam	IDR 30,000	0

The order quantity for the dining table is 4 pieces so below is the calculation result of the Just In Time method:

Less	**Raw Materials**	**Price**	**Raw materials in**	**Annual usage**	**Monthly usage**	**Remaining Stock**	**Monthly purchases**	**Purchase of eryear**
1.	2 mm Stainless Plate	IDR 677,000	200	8	1	192	IDR 677,000	IDR 5,416,000
2.	Holo 2x2	IDR 32,000	200	12	1	188	IDR 32,000	IDR 384,000
3.	Holo 4x4	IDR 39,000	200	4	1	196	IDR 39,000	IDR 156,000
4.	Stainless Paint	IDR 120,000	200	8	1	192	IDR 120,000	IDR 960,000
5.	Marble	IDR 1,500,000	200	8	1	192	IDR 1,500,000	IDR 12,000,000
6.	Argon Welding	IDR 60,000	200	8	1	192	IDR 60,000	IDR 480,000
7.	Gerindra eyes polished	IDR 6,500	200	4	1	196	IDR 6,500	IDR 26,000
8.	Gerindra's eyes cut	IDR 2,700	200	8	1	192	IDR 2,700	IDR 21,600
9.	Velvet fabric	IDR 30,000	200	0	0	200	IDR 0	IDR 0
10.	Tig Welding Wire	IDR 2,400	200	24	2	176	IDR 4,800	IDR 57,600
11.	Langsol Stone	IDR 8,000	200	4	1	196	IDR 8,000	IDR 32,000
12.	Foam	IDR 30,000	200	0	0	200	IDR 0	IDR 0

So to see the data above, the company can make the results of annual and monthly consumption used as a reference for the purchase of raw materials, so that the storage in the

warehouse does not accumulate and the costs incurred are not much, because they buy raw materials according to the needs of the raw materials to be used

4 CONCLUSION

4.1 Conclusion

Based on the results of the analysis and design, as well as the implementation and discussion in the previous chapters, the author can conclude that:

1 This research produced an application (Implementation of the Jit (Just-In-Time) Method in a Responsive Web-Based Inventory Management Application in Pandawa 5 Furniture Jepara), PHP programming language and MySQL database.
2 With an updatable and customizable UML model, system design is easier to adapt to changing needs or requirements.
3 Applications that have a WhatsApp Notification feature in the system are expected to be easier to convey information to system users.
4 The application can help solve the problem of pandawa 5 furniture in arranging raw material purchase planning with a calculation feature with the just in time method with reference to the previous year's stock use

4.2 Advice

Suggestions can be given based on the existence of an Application (Implementation of the Jit (Just-In-Time) Method in a Responsive Web-Based Inventory Management Application in Pandawa 5 Furniture Jepara), for the development of which are:

1. Added a forecasting feature to the application to find out the amount of production in the next period
2. To improve the appearance and performance, it is hoped that a mobile application-based system can be developed.

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