The Development of Enterprise Resource Planning (ERP) using the Rapid Application Development (RAD) Method for the Garment Industry in Indonesia

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Article Information	ABSTRAK
	Salah satu perusahaan Indonesia yang bergerak di bidang Industri Garmen adalah PT Mardohar Catur Tunggal Gaya. Perusahaan ini fokus pada pembuatan garmen, safety clothing, dan industrial work clothing. Berdasarkan analisis terhadap proses yang berjalan di perusahaan ini, proses bisnisnya masih memerlukan integrasi laporan. Beberapa pendekatan solusi kebutuhan bisnis dilakukan dengan observasi, wawancara, dan kajian literatur untuk menjawab kendala tersebut. Hasil wawancara dengan perusahaan mengungkapkan bahwa PT Mardohar Catur Tunggal Gaya perlu menerapkan sistem untuk mengoptimalkan proses bisnisnya. Selanjutnya dari hasil literature review ditemukan bahwa sistem yang tepat untuk mengatasi kendala tersebut adalah Enterprise Resource Planning (ERP). Sistem ERP yang digunakan adalah Oddo, dan pengembangannya akan dilakukan dengan menggunakan metode Rapid Application Development (RAD). Hasil dari penelitian ini adalah sistem Odoo ERP yang telah dimodifikasi dengan penambahan beberapa modul sesuai dengan kebutuhan bisnis. Sistem ERP yang sudah dikembangkan berhasil mendapatkan penilaian yang sesuai dengan kebutuhan pengguna melalui pengujian fungsionalitas dengan metode pengujian User Acceptance Test (UAT).
	ABSTRACT
	One of the Indonesian companies engaged in the Garment Industry is PT Mardohar Catur Tunggal Gaya. This company focuses on manufacturing, safety, and industrial work clothing. Based on an analysis of the processes running in this company, the business processes still require report integration. Several approaches to solving business needs are carried out by observing, interviewing, and reviewing the literature to address these obstacles. The results of interviews with companies revealed that PT Mardohar Catur Tunggal Gaya needed to implement a system to optimize its business processes. Furthermore, the literature review found that the right system to overcome these obstacles was Enterprise Resource Planning (ERP). The ERP system used is Oddo, and its development will be carried out using the Rapid Application Development (RAD) method. The result of this study is the modified Odoo ERP system with the addition of several modules according to business needs. The ERP system that has been developed has succeeded in obtaining an assessment according to user needs through functional testing using the User Acceptance Test (UAT) testing method.

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INTRODUCTION

With the development of technology, a company must integrate technology to remain competitive. Technology integration allows users of information in the company to access the information they need in real-time (Sjödin et al., 2018). Specific information is required for a job; data from various sources must be continuously collected, stored, and analysed. The information must be easy to use and manage to have an impact on a company (Haddara & Constantini, 2020). Business Intelligence (BI) tools can be used independently or as modules in an Enterprise Resource Planning (ERP) system. In the past few years, many ERP vendors have provided BI products and have become an effective solution for a company. ERP is a system consisting of integrated and computerized modules that allow a company to integrate business processes and access information in real-time and in real-time (Ni'mah, 2019). Implementing an ERP system for companies can provide benefits such as increasing effectiveness in production/services, improving product/service quality, and increasing company productivity because ERP systems can provide real-time access to information. Precise and accurate information also positively impacts companies, such as reducing operational and administrative expenses, reducing the number of unnecessary employees, reducing production time, and increasing customer satisfaction (Mesícek et al., 2021).

Based on the ERP definition that has been described, to implement an ERP system, ERP software is needed that can support ERP implementation. At this time, two types of ERP software can assist companies in ERP implementation: proprietary ERP software and open-source ERP software. Odoo software is an example of open-source ERP software that companies can use. By using Odoo software, companies will get benefits such as reduced costs and dependence on an ERP software vendor. Previous studies have discussed the limitations of commercial ERP systems. Evaluation is carried out to discover the problems arising from commercial ERP systems' use by evaluating and understanding the ERP's success level. Based on the evaluation results that have been carried out, it is concluded that development is still needed to meet user needs. With limited access rights to develop commercial ERP, this study will set it on an Open-source ERP platform using Odoo ERP version 15.0, which will be customized. The results of this study show a significant increase in the assessment of system quality, information quality, service quality, and user satisfaction in Odoo's customized ERP following the evaluation recommendations on SAP Business One. In conclusion, Odoo's open-source ERP can be a solution for customization according to company needs (Nurrohmah & Wiratama, 2022). In addition, the User Experience (UX) aspect is a measure of success in implementing an ERP system. Testing the User Experience Questionnaire (UEQ) that has been carried out in previous studies illustrates the importance of UX aspects in using ERP systems. In addition, the ERP system needs to be tested to determine user satisfaction in implementing the ERP system. In addition to the UEQ test, previous research also explained that the User Acceptance Test (UAT) method could measure user satisfaction in implementing an ERP system that has been designed or developed (Ananda & Wiratama, 2022).

PT Mardohar Catur Tunggal Gaya is a company engaged in the garment industry and produces work safety clothing and work clothing for the industry. For more than 3 decades, the company has been committed to producing products that can protect workers in Indonesia from hazardous work environments and are comfortable working during extreme weather. The company has produced a variety of safety clothing and industrial clothing, such as fire-resistant coveralls, wind- and water-resistant workwear, raincoats, hi-vis jackets, chemical-resistant clothing, and safety vests. In addition, this company also provides work safety equipment such as safety helmets, safety glasses, safety boots and other accessories. Based on the results of interviews with company supervisors during the data collection process, several problems occurred in the business process. These obstacles include the inefficient flow of information because miss communication often occurs between teams or departments, as well as the recording of costs incurred for production, which are often not following what is in the field. Based on the literature reviews that have been carried out in several previous studies, similar problems as those experienced by PT Mardohar Catur Tunggal Gaya can be overcome by implementing an ERP system. Therefore, the focus of this research will discuss the implementation of the ERP system so

that this company can carry out a system integration, especially for production, sales and purchasing teams, to minimize the occurrence of miscommunication, especially in financial defects or production costs. This research will be conducted using the Rapid Application Development (RAD) method to develop the Odoo ERP system (open-source ERP) by implementing ERP modules that follow the business processes of PT Mardohar Catur Tunggal Gaya. The purpose and contribution of this research are to produce an Odoo ERP system development that can improve business process performance, information quality and performance in related teams or departments.

RESEARCH METHODOLOGY

This research chose the Rapid Application Development (RAD) method as a system development method. Previous research stated that this method is one of the appropriate system development methods for developing systems quickly (Rahman, 2020). The RAD method is relatively easy to implement because the development of the system focuses on every development need at one time and requires a relatively short time. In addition, the phases in the RAD method are structured and have a short cycle, and the results of the developed system can be known without waiting long (Desanti & Widjaja, 2018). Figure 1 shows the phases in applying the RAD system development method:
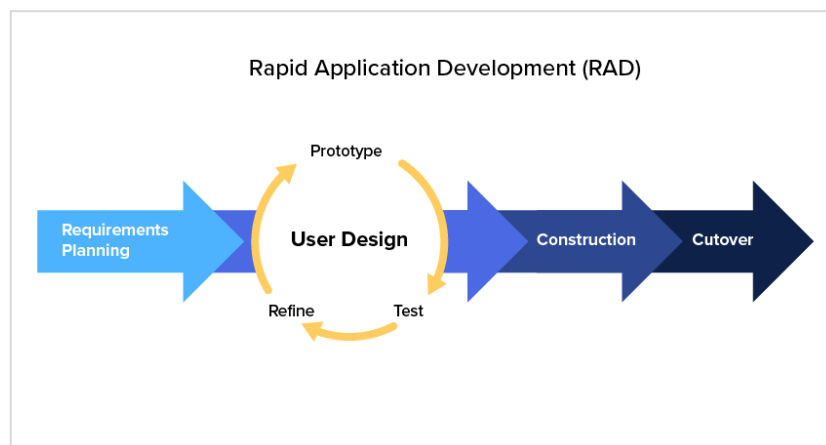

Figure 1. Rapid Application Development method

Figure 1 shows the steps for implementing the RAD method, starting from requirement planning, user design, construction, and Cutover. At the requirements gathering stage, several ways were carried out to collect data, namely interviews to find information on user needs, observing research objects, and conducting system development by adding what was needed by the company. At this stage, system users and researchers will discuss identifying system development goals oriented as solutions to their business problems. After obtaining information related to user needs in the previous phase, the data is analyzed and transformed into a Unified Modeling Language (UML) diagram. The diagram that will be made is a use case diagram that is useful for describing the main functions of system development. Furthermore, the use case diagram will derive into an activity diagram to explain the relationship between system users when using this system (Dennis, Alan; Wixom, Barbara; David; Tegarden, 2020). In the construction phase, the focus is system development using tools and frameworks. In this phase, the user must continue to participate and can propose changes or improvements as the construction phase progresses. The last stage in the RAD method is Cutover. At this stage, a functional test of the system is carried out using the User Acceptance Test (UAT) method (Afrianto et al., 2021). The UAT model used is the Black-box testing model by validating the suitability between the system that has been successfully developed and user needs through several relevant questions.

RESULTS AND DISCUSSION

At this stage, interviews will be conducted with system users involved in business processes: Purchasing Staff, Warehouse Staff, Production Staff, and Sales. After the interviews were conducted, further observations were made to obtain an overview of the processes that occur in the company so that requirements can be collected for implementing the ERP system.
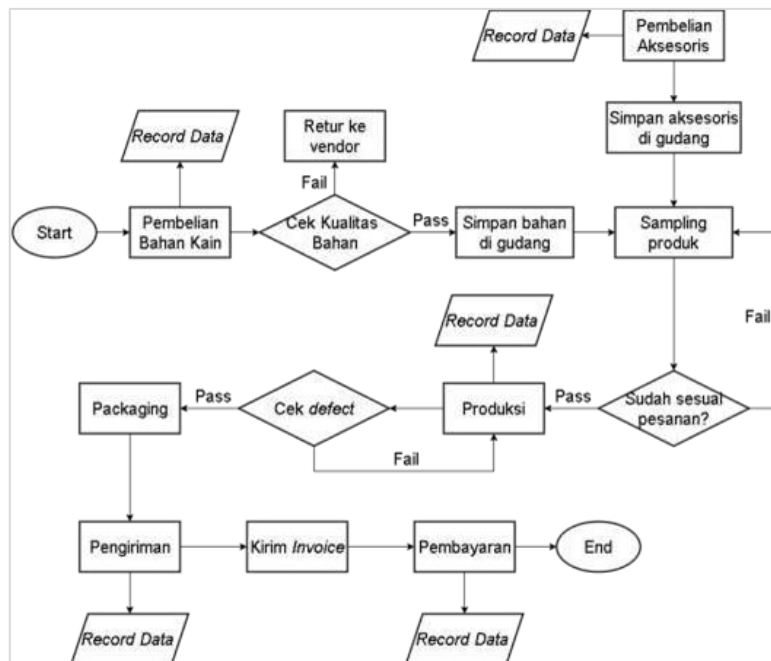

Figure 2. Business Process on cost production tracking

The flowchart in Figure 2 is a business process that runs in the company in purchasing, manufacturing, and sales activities. In the purchasing process, the activities carried out are the purchase of fabrics and accessories from suppliers. Then the manufacturing process is to make samples and continue production. In the sampling process, the company produces samples of products to determine the suitability of the quality to client needs. In the production process, it carries out mass production according to the number of client orders after the product samples have met the client's needs. Furthermore, the sales process involves selling, paying, and sending products to clients. There are two non-functional requirements, the first one is system can track the production costs and whole process integrated into ERP.

Table 1. Functional Requirements

| No	Users	Function
1	System Administrator	a. Create and Manager user's account.
		b. Grant and revoke user's role.
		c. Manage user's role.
2	Purchasing Staff	a. Create quotation and purchase order.
		b. Provide the report of purchasing.
3	Warehouse Staff	a. Provide receipt data of product and quality control.
		b. Create manufacturing orders.
		c. Provide the packing data and delivery order.
4	Production Staff	a. Manufacturing products.
		b. Packing the products
5	Sales Marketing	a. Make a sales order.
		b. Send invoices and payment report.
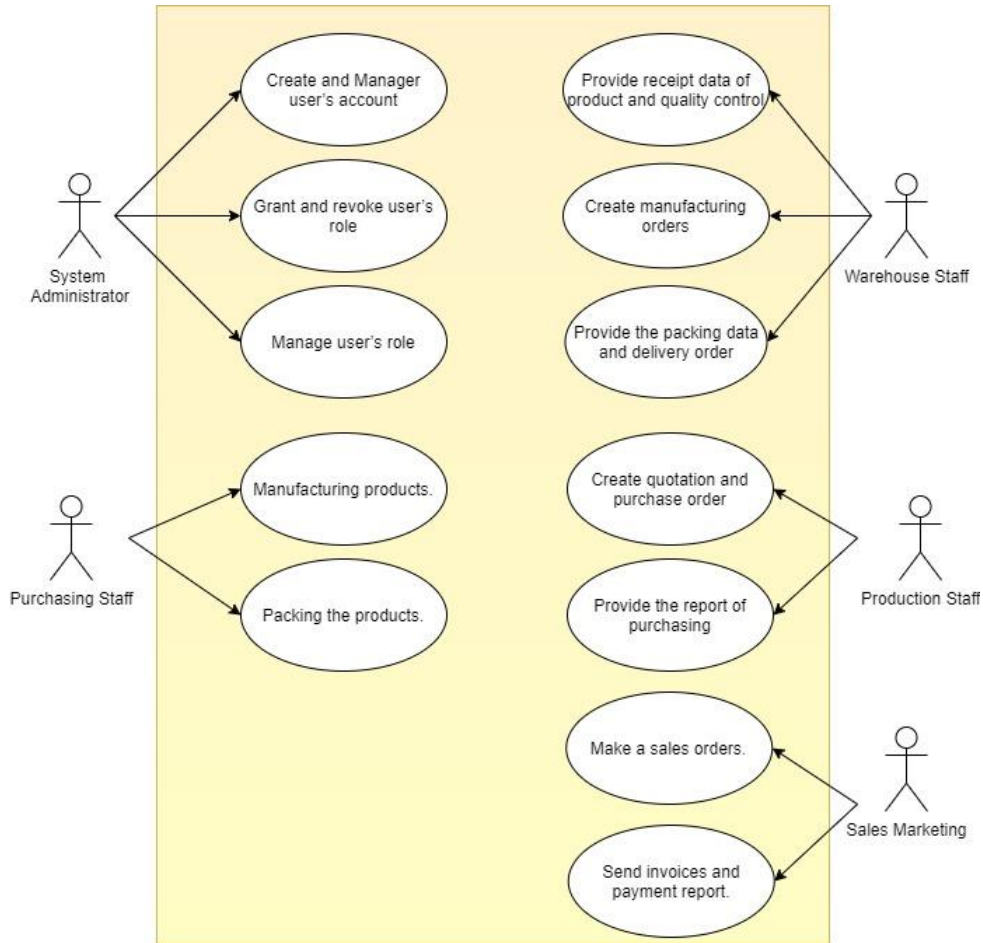
Figure 3. Use Case Diagram

Figure 3 is a use case diagram that explains each actor's primary function in using the system. Use case diagrams are created based on user requirements and provide an overview of the ERP system that will be developed using Odoo. In the picture, there are 5 actors, namely: System Administrator, Purchasing Staff, Warehouse Staff, Production Staff, and Sales Marketing. Each actor has a different function, as described in the use case diagram. Configuring the Inventory module is the first step in implementing the Odoo ERP module in PT Mardohar Catur Tunggal Gaya. Configuring this module could help the company track stock and integrate it with other modules such as the Purchase module, Manufacturing module, and Sales module.
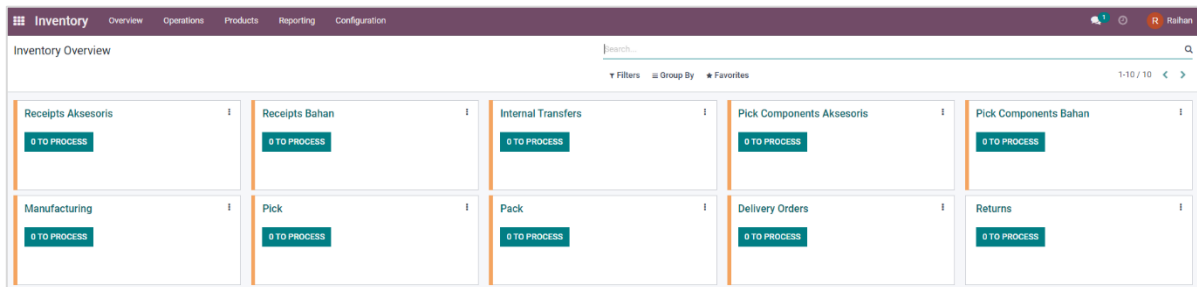
Figure 4. Inventory module menu

Then the next step is setting up the products, which consists of the finished product, semi-finished products, and raw materials. With the products already set up, users can easily create purchase orders, manufacturing orders, and sales orders.
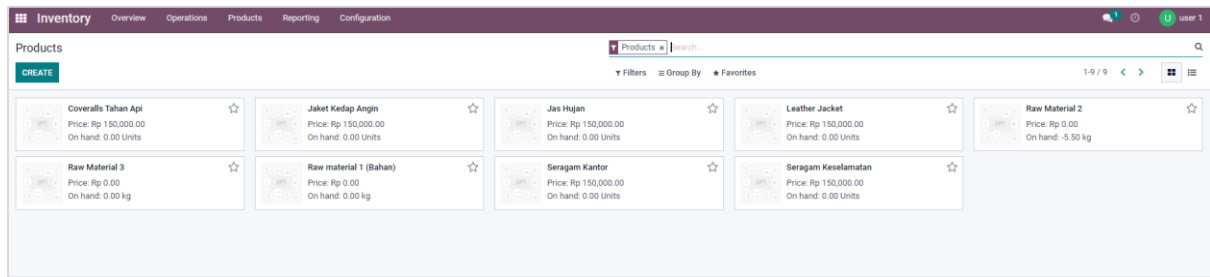
Figure 5. The Products of Inventory module

After the products are set up, the next step is setting up contacts to help the user manage vendors and customers. By setting up contacts, users can choose where the company wants to buy the material and send the invoices, and the company can also choose where to deliver the products and send the bill to customers.
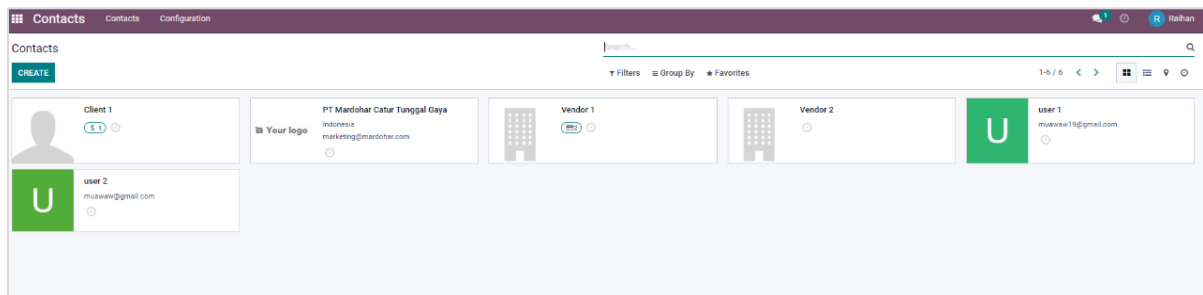

Figure 6. Contacts of representative vendor and users

After the configuration step, users can create the document the company needs, such as purchase orders, manufacturing orders, and sales orders. Other than that, the user also can display the financial statement by accessing the accounting module.
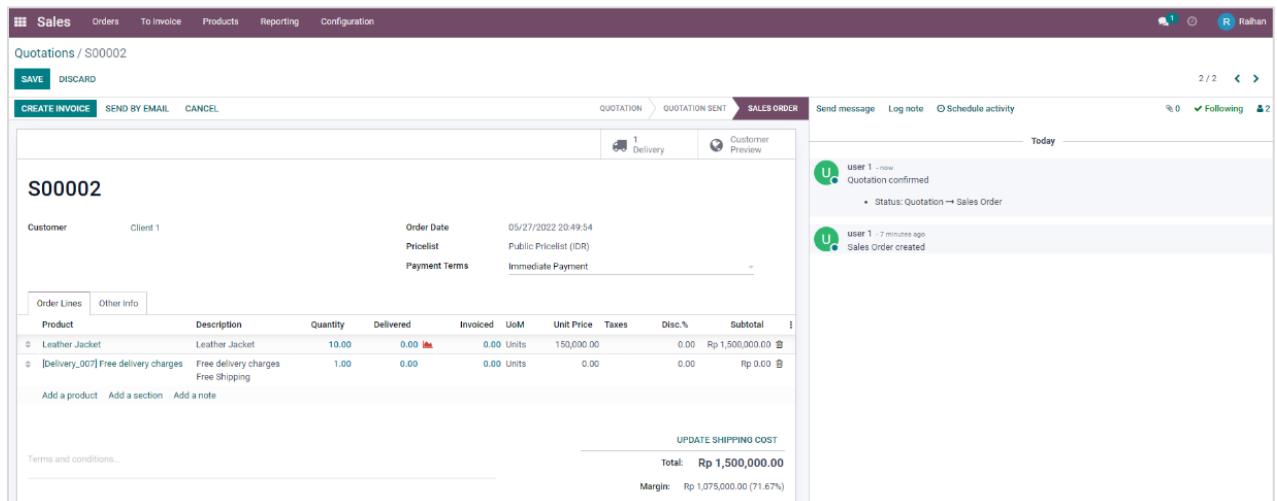

Figure 7. Purchase Order

Figure 8. Manufacture Order

Figure 9. Financial statement (Balancing sheet)

The last stage in this research is application testing, which uses the User Acceptance Test method. At this UAT testing stage, it is carried out with company representatives as users of the ERP that has been developed. The following are the results of the UAT (User Acceptance Test), which can be concluded based on table 2. There are 12 test cases tested, namely: create Purchase Order, print RFQ, print Purchase Order, check current stock, create Manufacturing Order, print Manufacturing Order, check current stock, create Sales Order, print Sales Order, create Bill/Invoice, Register Payment, print Bill/Invoice. These test cases produce output per the expected results and answer user needs.

Table 2. User Acceptance Test (UAT) results

No	Description	Input data	Expected results	Actual results	Status (Success/failed)
1	Create Purchase Order (PO)	Vendor: Vendor 1	PO Created	P00001 Created	Success
		Vendor Reference: -			
		Order Deadline: 06/13/2022			
		Receipt Date: 06/13/2022			
		Deliver To: Warehouse			
		Receipt: Accessories			
		Product: Raw Material 1			
2	Print Request for Quotation (RFQ)	RFQ Number: P00001	Completed	Completed	Success
3	Print PO	PO Number: P00001	Completed	Completed	Success
4	Check Current Stock	Products: Raw Material 1	Completed	Completed	Success
		Location: Warehouse			
5	Create Manufactured Order (MO)	MO Number: RP/MO/00001	MO Created	MO00001 created	Success
		Scheduled Date: 06/13/2022.			
		Responsible: User			
		Products: Safety uniform			
6	Print Manufactured Order	MO Number: RP/MO/00001	Completed	Completed	Success
		Products: Safety uniform			
		Document Date: 06/13/2022			
7	Check Current Stock	Products: Safety uniform	Completed	Completed	Success
		Location: Warehouse			
8	Create Sales Order	Customer: Client 1	Sales Order Created	S00001	Sales Order Created
		Expiration: 06/13/2022			
		Currency: IDR			
		Payment Terms: End of following month			
		Products: Safety uniform			
9	Print Sales Order	Sales Order Number: S00001	Completed	Completed	Success
10	Create Invoice	Bill No: BILL/2022/06/0001	Bill Created	BILL/2022	Bill Created
		Bill Date: 06/13/2022			
		Bill Reference: -			
		Due Date: End of following month			
		Journal: Vendor Bills			
		Products: Safety uniform			
11	Register Payment	Payment Method: Manual	Payment posted	Payment for BILL/2022/06/0001 posted	
		(Bank) Amount: Rp. 50.000			
		Payment Date: 06/13/20222			
		Memo: BILL/2022/06/0001			
12	Print Invoice	Bill No: BILL/2022/06/0001	Completed	Completed	Success
		Invoice Date: 06/13/2022			

CONCLUSION AND RECOMMENDATION

Conclusion

Based on the results and discussions in this research, the Rapid Application Development (RAD) method has proven appropriate for developing ERP systems in a relatively short time. ERP system development using Odoo produces 5 modules, namely: Accounting Module, Sales Module, Purchasing Module, Inventory Module, and Manufacturing Module, which can be integrated. The process of tracking production costs can be done through these modules. This research also proves that ERP system development is possible in open-source ERP systems such as Odoo than commercial ERP systems. The ERP system that has been developed has been tested using the User Acceptance Test (UAT) method with results that match the needs of users at PT Mardohar Catur Tunggal Gaya Company.

Recommendation

For further development, it is hoped that the company can carry out regular outreach and training to users so that they can better understand the use of ERP to expedite the company's business processes. Other researchers interested in implementing ERP in a company can use ERP Odoo to get results similar to commercial ERP.

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