

## IMPLEMENTATION OF ENTERPRISE RESOURCE PLANNING (ERP) IN THE WAREHOUSE DIVISION

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**Abstract:** Enterprise Resources Planning (ERP) is an integrated system that covers all business functions contained in a company and is driven by several integrated software modules to support the company's internal business processes. PT Z, an F&B company, intends to implement an ERP system in its warehouse division to support its business activities. The purpose of this research is to design an ERP system in the company's warehouse division. The research begins with business process data and historical data collection. A system analysis is then carried out to identify and model the warehouse division's business processes. From the business process model created, use case diagrams and class diagrams are then made to compile the contextual framework of the ERP system. The ERP system was then developed with Odoo 16's inventory module. The ERP system designed and implemented is in accordance with the results of the analysis and can be used according to existing business processes.

**Keywords:** Enterprise Resource Planning, Odoo, warehouse, business process, F&B company

## INTRODUCTION

Enterprise Resources Planning (ERP) is a company system that covers all functions within a company which is driven by several integrated software modules to support the company's internal business processes (O'Brien and Marakas 2010). ERP systems have the potential to help companies improve their operations and develop competitive advantages (Alomari et al., 2018). An ERP system integrates best practices, management capabilities, reporting real-time, and data analysis to improve value creation and efficiency in organizations. Additionally, in today's business environment, ERP systems enable organizations to manage all aspects of their operations comprehensively (Ullah et al., 2018).

The ERP system is designed by carrying out a system analysis process to model the company's business processes. The relevant company business functions are identified in all their components starting from activities, data used, input and output, needs, to the units/members of the organization involved. Apart from being able to model the company's business processes, this system analysis process can also reveal several deficiencies that might be corrected before ERP is implemented. The results of system analysis are in the form of architecture enterprise or business process model is then poured into a program to be implemented by the relevant team. Implementing an ERP system requires commitment and cooperation from all related parties as well as adequate infrastructure. All system requirements must be met properly so that the ERP system is successfully implemented and has a positive impact on the company.

PT Z is a company that operates in the oriental F&B sector and has 149 restaurant branches spread across Indonesia. This company offers a variety of typical oriental menus with high quality and authentic raw materials. Food and beverage products are produced fresh every day to maintain taste and quality. Because

PT YYY uses a variety of raw materials coming from many suppliers, the company's business activities are supported by its warehouse. The center handles various kinds of business processes carried out by the company.

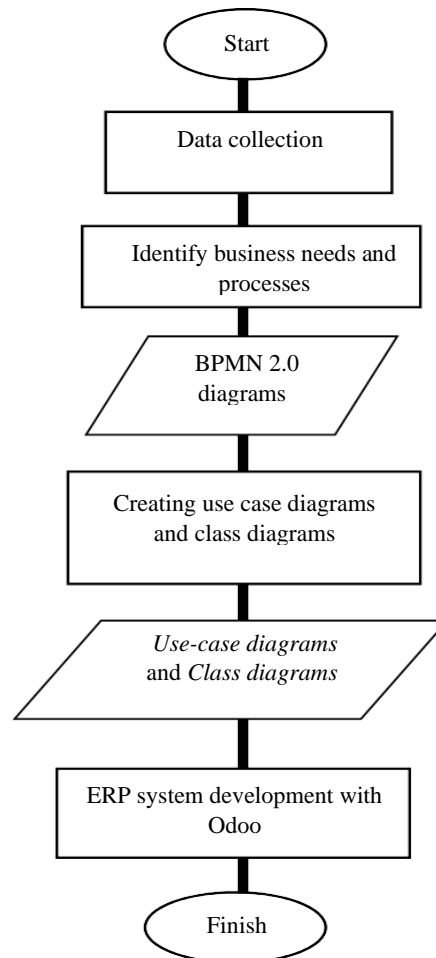
In running his business, warehouse PT Z's center serves almost all of the company's restaurant branches. Warehousing and storage activities are carried out centrally at warehouse. Apart from that, several other activities such as quality control & inspection and SFG (Semi Finished Goods) production is also carried out at warehouse PT Z. So, business activities carried out at warehouse. This is quite a lot and requires high precision, because it involves several departments within the company and high standards must be adhered to in the F&B business.

Streamlining its activities, PT Z plans to implement an ERP system in its division warehouse. In F&B companies, the advantages of ERP systems are related to data analysis real-time will be very useful, especially because of the nature of food ingredients which are easily damaged and sensitive to changes/disruptions from the environment. With an ERP system, every activity involving food or non-food ingredients can be monitored properly so that quality is maintained and standards are met. It is also hoped that the ERP system that will be implemented can help warehouse companies in managing and carrying out their business processes so that they run well, accurately and faster, and achieve competitive advantage. Thus, this research aims to design an ERP system for the division warehouse PT Z.

## 2. METHODOLOGY

This research consists of two stages. The first stage is the system analysis stage which consists of the data collection process as well as the identification process and ERP system design needs, which is carried out by modeling divisional business processes warehouse PT Z. Business process modeling was carried out using the BPMN 2.0 diagram. Before proceeding to the next stage, the results of the business process modeling are then created using *use case* diagrams and *class diagram* to create a contextual model that is the basis of the ERP system. The second stage is developing an ERP system using Odoo software. Odoo is a suite of business applications *open source* which covers all company needs starting from CRM, eCommerce, accounting, inventory, *point of sales*, project management, etc. Odoo was chosen because it is suitable for large or small companies, and is *open source*. Odoo has an easy-to-understand interface, and the program is actively maintained by many developers who are constantly trying to meet the growing needs of customers.

The version used is Odoo 16. Detailed research stages can be seen in the following image.



**Figure 1.** Research Flow Diagram

Data collection is carried out before the identification process begins. The data used is primary data and secondary data. Primary data is in the form of information about the division's business processes *warehouse PT Z* and its ins and outs were obtained through interviews *stakeholder* related as well as observations in *warehouse PT Z* center. Secondary data used includes historical inventory data, goods receipts, *QC inspection*, and distribution. From the primary data obtained, a divisional business process model is then created *warehouse PT Z* by using BPMN (*Business Process Modelling Notation*). *Business process modelling* created to provide a better understanding of business processes in organizations (Recker 2010). The result of business process modeling is a process model, which consists of a set of activity models and the execution constraints between them (Weske 2007). Typically the model is illustrated with activities and events related to the control flow. The process can be modeled with different languages for process modeling, which are also known as techniques or notations.

BPMN is an ISO certified standard (ISO/IEC 19510:2013) used to describe the semantics of business processes, because BPMN notation is generally easy to understand by business and technical personnel. BPMN is also known to have high expressiveness which allows many extensions to different areas such as security, business events, and costs involved in business processes (Kocbek *et al*, 2015).

After the system requirements have been identified and the business processes have been modeled, they are then created *use-case diagram* and *class diagram* as a contextual basis for the ERP system to be developed. *Use-case diagram* describes the expected function of a system. This diagram aims to present the interaction between actors and the system. An actor is a human entity that interacts with a system to carry out certain work (Rahmatuloh and Revanda, 2022). *Class diagram* is a collection of several classes and their relations (Andhika *et al*, 2022). *Class* or class is identical to the entity represented in the system along with its attributes and *method* which it contains.

These two diagrams are the basis for developing an ERP system using Odoo. After the two diagrams have been created, developing an ERP system using Odoo can then be carried out by paying attention to the results of the identification that has been carried out previously.

## RESULT AND DISCUSSION

### Data collection

Primary data was obtained by conducting interviews with parastakeholder divisionwarehouse and observing activities inwarehouse PT Z center. The primary data obtained is in the form of information about the division's business processeswarehouse PT Z and its ins and outs. Secondary data is in the form of historical data related to inventory, goods receipt, QCinspection, and distributions obtained from division archiveswarehouse PT Z with permissionstakeholder related. Examples of secondary data obtained can be seen in the following tables.

**Table 1.** On Hand Inventory Data

No.	Product	Stock
1	BSS	500 pack
2	Sauce SK	10 pack @2 kg
3	Powder SK Beef	5 sack @2kg
4	Corn Syrup	300 jerry cans @5 l
5	Creamer ND	200 pack @500 ml
6	TTL chicken	36321 kg
7	Ayam TK	27800 kg
8	SF Meatballs (2kg)	1082 kg
9	TPG Roti R (10kg)	1214 kg
10	TPG Roti K (10kg)	2318 kg
11	M Paper Cup	12319 pcs
12	L Paper Cup	10031 pcs
13	L Paper Bowl	7987 pcs
...		
30	Close the M Cup	12001 pcs

**Table 2.** Goods Receipt Data

N	Product	Vendor	Qty	Queue
1	Spn Veg fresh	PT AKS	100 Kg	01
2	Crt Veg fresh	PT AKS	100 Kg	02
3	KSHKR Rc	PT TPF	10000 kg	03
4	RJLK Rc	PT TPF	5000 kg	04
5	I am willow KMN	PT KMNA	1000 liter	05
6	Swt Soy Sc KMN	PT KMNA	1000 liter	06
7	Box Krts Syr M	PT KPM	50 carton	07

8	Box Krts Syr L	PT KPN	40 carton	08
9	M Paper Cup	PT AJK	4000 pcs	09
10	L Paper Cup	PT AJK	3000 pcs	10

**Table 3.** QC Inspection Data

N	Product	Vendor	Qty/Batch	Date	Status
1	Crt Veg fresh	PT AKS	100 Kg	10/02/23	OK
2	Lbk Veg fresh	PT AKS	100 Kg	10/02/23	RJ
3	TTL chicken	PT CFP	7000 kg	10/02/23	OK
4	Ayam TK	PT CFP	5000 kg	10/02/23	OK
5	Mayo SC	PT LFL	100 liter	10/02/23	OK
6	Chili SC	PT LFL	100 liter	10/02/23	OK
7	M Base Paper	PT HKP	50 carton	10/02/23	OK
8	L Backing Paper	PT HKP	40 carton	10/02/23	OK
9	Beef SL	PT DSGP	5000 kg	10/02/23	OK
10	Crn Veg fresh	PT CAL	100 Kg	10/02/23	OK

**Business Process Modeling**

From the results of interviews and observations carried out, data was obtained about the division's business processes warehouse PT Z. The data is contained in the following table.

**Table 4.** Warehouse Division Business Process

N	Process	Stakeholder 1	Stakeholder 2
1	Receiving & Sampling QC	QC	Warehouse
2	Transfer Item to Area	Warehouse	-
3	Receive SFG from Production	Production	Warehouse
4	Preparing store order	Warehouse	-
5	Loading item to Distribution	Warehouse	Distribution
6	Distribution to store	Distribution	Warehouse
7	Daily/Weekly/Monthly Stock keeping	Warehouse	-
8	Destruction of dmg goods	Warehouse	-

Next, the business process will be modeled into a BPMN diagram using PMN 2.0. The diagram can be seen in the following image.

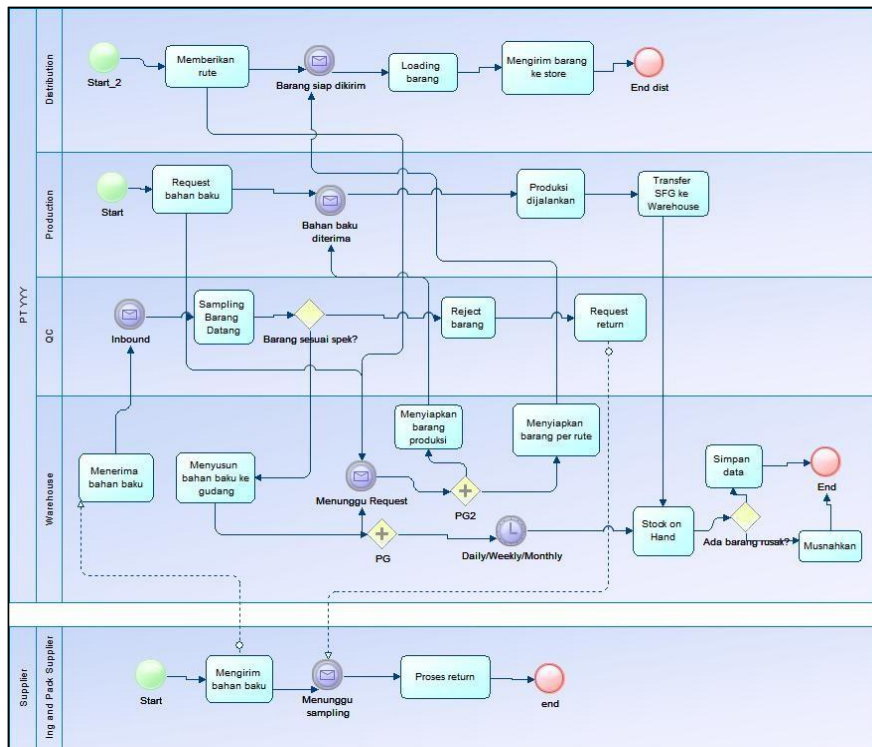


Figure 2. Warehouse Division BPMN diagram

From the BPMN diagram created, it can be seen that there are 4 stakeholder internal employees involved in the division's business processes warehouse PT Z. Meanwhile 1 stakeholder those outside PT Z are suppliers of raw materials/packaging. Stakeholder These internals will later become actors involved in the ERP system. Interrelationships stakeholder can be seen in Table 5 above.

### Use Case Diagram and Class Diagram

After the business process is modeled in a BPMN diagram, the interactions between actors in the system will be depicted in use case diagram. With use case diagram, it can be seen that the functions and interactions carried out by the actors will be described in each use case to make it easier to understand. Use case The diagram can be seen in the following image.

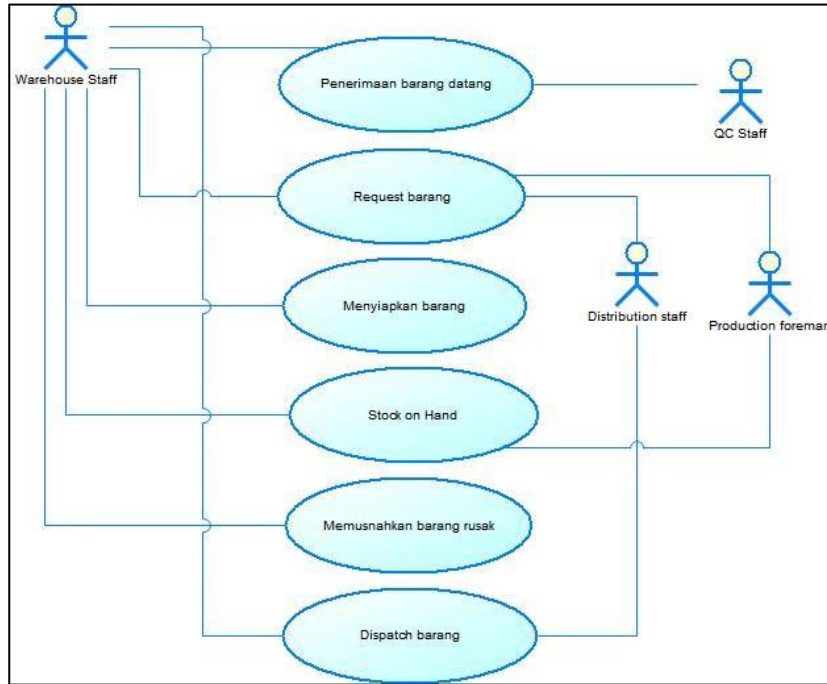


Figure 3. Use case diagram

On use case diagram above, it can be concluded that there are 6 use cases which can be accessed by 4 existing actors. Based on this, it can be prepared class diagram which will describe classes that have certain functions which will later be used as a basis for developing ERP system features that will be implemented. Each class has attributes and method or individual functions that can be used with each other in a modular manner. Class diagram can be seen in the following picture.

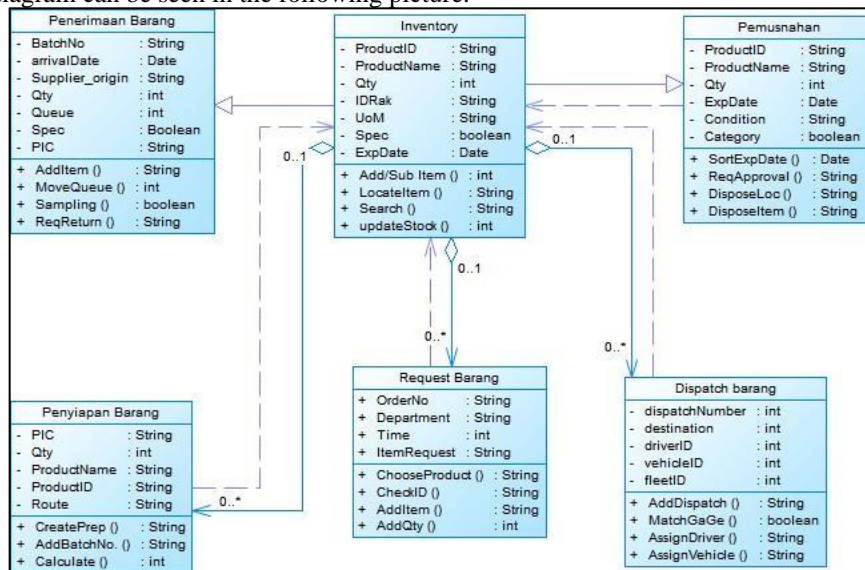


Figure 4. Class diagram

### ERP implementation with Odoo

The Inventory module in Odoo is useful for managing inventory warehouse company. In this module, the flow of goods can be managed and monitored from entry, storage, to distribution of goods. Product data is automatically synchronized with the system database because it is integrated in the implemented ERP system.

### Inventory

On this menu there is a list of items stored inwarehouse. In this menu, data related to the number of items, description of the item, and location of the item can be manipulated for your needsstock keeping. The appearance of this menu can be seen in the image below.

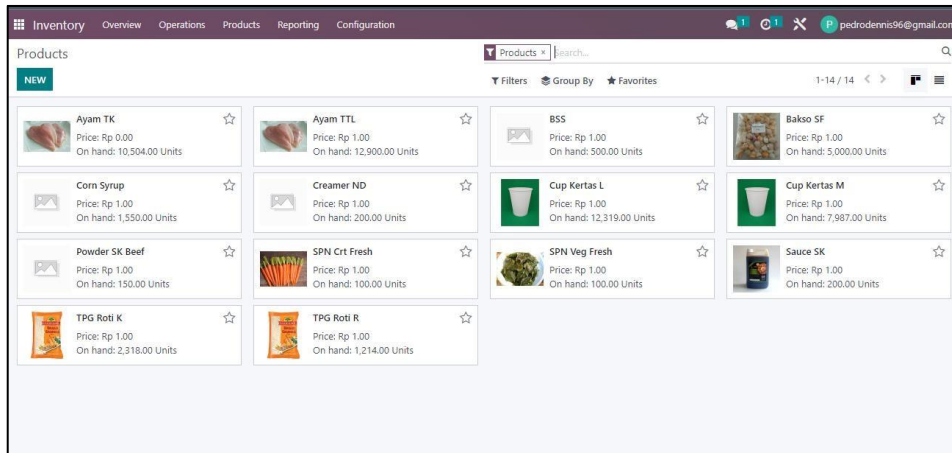


Figure 5. Inventory Main Menu Display in Odoo ERP

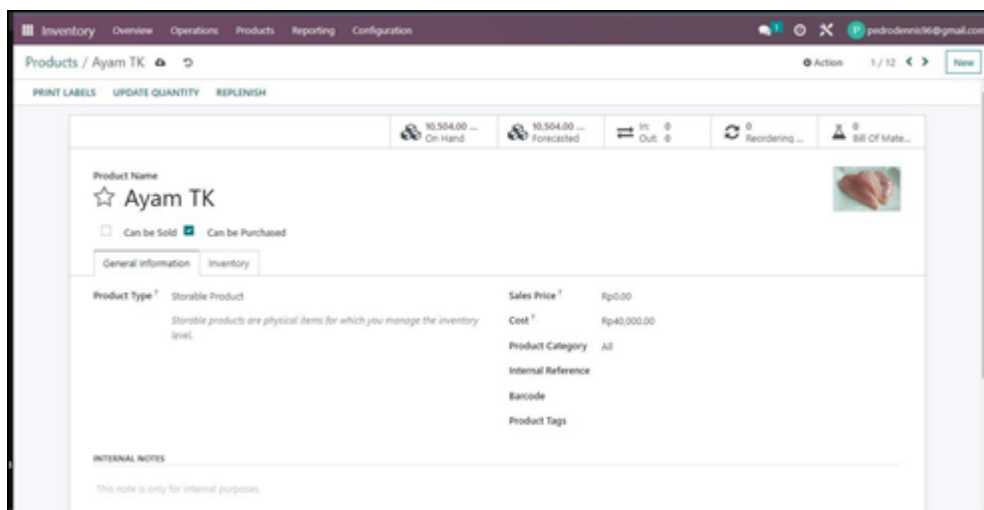


Figure 6. Product Inventory Detail Display



Product	On Hand	Free to Use	Incoming	Outgoing
Ayam TK	10,504.00	10,504.00	0.00	0.00
Ayam TTL	12,900.00	12,900.00	0.00	0.00
BES	500.00	500.00	0.00	0.00
Bakso SK	5,000.00	5,000.00	0.00	0.00
Com Syrup	1,350.00	1,350.00	0.00	0.00
Creamer HD	200.00	200.00	0.00	0.00
Cup Kertas L	12,318.00	12,318.00	0.00	0.00
Cup Kertas M	7,987.00	7,987.00	0.00	0.00
Powder SK Beef	150.00	150.00	0.00	0.00
SPN Crt Fresh	100.00	100.00	0.00	0.00
SPN Veg Fresh	100.00	100.00	0.00	0.00
Sauce SK	200.00	200.00	0.00	0.00
TRG Roti K	2,318.00	2,318.00	0.00	0.00
TRG Roti R	1,214.00	1,214.00	0.00	0.00

Figure 7. Inventory Stock Display in Odoo ERP

**Goods receipt**

The Goods Receipt or Receipt menu functions to record the arrival of goods from suppliers. In this menu, there is a data display in the form of the type of goods received, date of receipt, order number and quantity of goods. The appearance of this menu can be seen in the following image.

Product	Date Scheduled	Done
Ayam TK	02/22/2023 20:50:54	500.00
Sauce SK	02/22/2023 20:50:54	50.00
SPN Veg Fresh	02/22/2023 20:50:54	50.00
SPN Crt Fresh	02/22/2023 20:50:54	50.00
Cup Kertas M	02/22/2023 20:50:54	200.00

Figure 8. Goods Receipt Menu Display

The goods that arrive are then sampled by QC Staff. If the goods do not meet the standards, the goods can be immediately reject and QC Staff can request goods for deliveryreturn to suppliers. The display of returning goods can be seen in the following image.

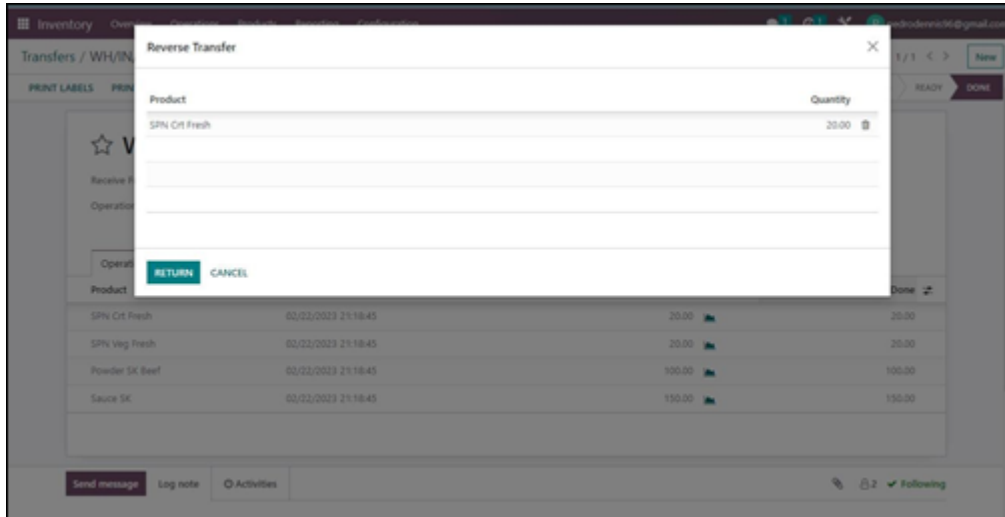


Figure 9. Display of Rejected Goods Return

### Raw Material Preparation

This menu is used to prepare items that will be used for the production of SFG goods. The type of SFG product can be selected directly, then the ERP system will immediately read the list of raw materials needed and the quantity. The production date is set first before the goods are transferred to the production department. The display of this menu can be seen in the following image.

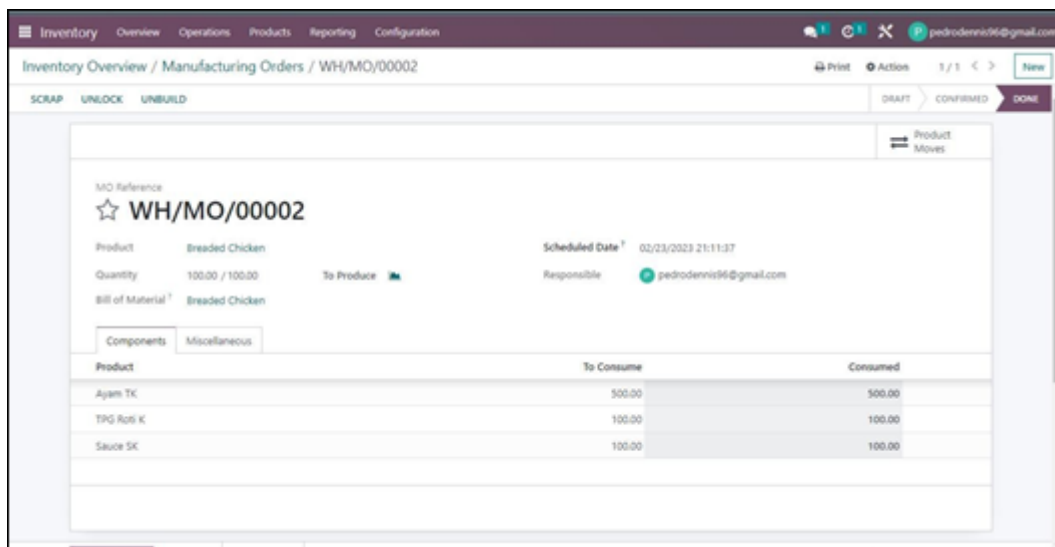
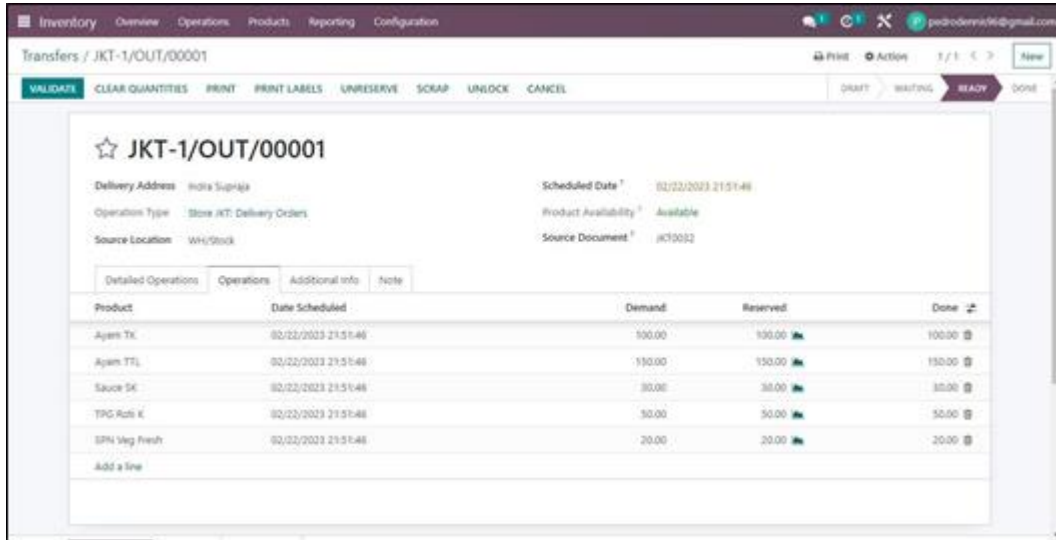


Figure 10. Display of Production Material Preparation

### Distribution of Goods

This menu functions to manage orders for goods and their quantities that will be distributed to store belongs to PT Z. This menu can also be adjusted driver and distribution destination routes. The menu display can be seen in the following image.



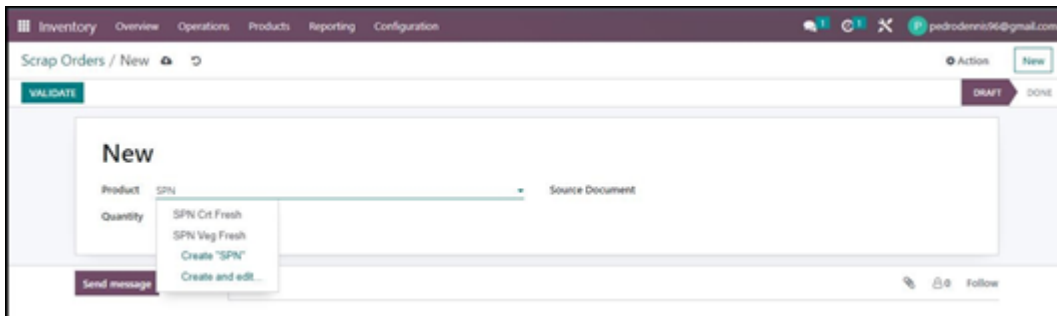
The screenshot displays the 'Transfers / JKT-1/OUT/00001' interface. It includes a header with navigation tabs (Inventory, Overview, Operations, Products, Reporting, Configuration) and a user profile (pedrodennis96@gmail.com). Below the header, there are action buttons: VALIDATE, CLEAR QUANTITIES, PRINT, PRINT LABELS, UNRESERVE, SCRAP, UNLOCK, CANCEL, DRAFT, WAITING, READY, and DONE. The main content area shows details for the transfer, including Delivery Address (Indra Suprija), Operation Type (Store JKT Delivery Orders), Source Location (WH/Stock), Scheduled Date (02/22/2023 21:51:48), Product Availability (Available), and Source Document (JKT0002). A table below lists the goods distribution:

Product	Date Scheduled	Demand	Reserved	Done
Ayam TKL	02/22/2023 21:51:48	100.00	100.00	100.00
Ayam TTL	02/22/2023 21:51:48	130.00	130.00	130.00
Sauce SK	02/22/2023 21:51:48	30.00	30.00	30.00
TPG Acti K	02/22/2023 21:51:48	50.00	50.00	50.00
SPN Veg Fresh	02/22/2023 21:51:48	20.00	20.00	20.00
Add a line				

Figure 11. Goods Distribution Display

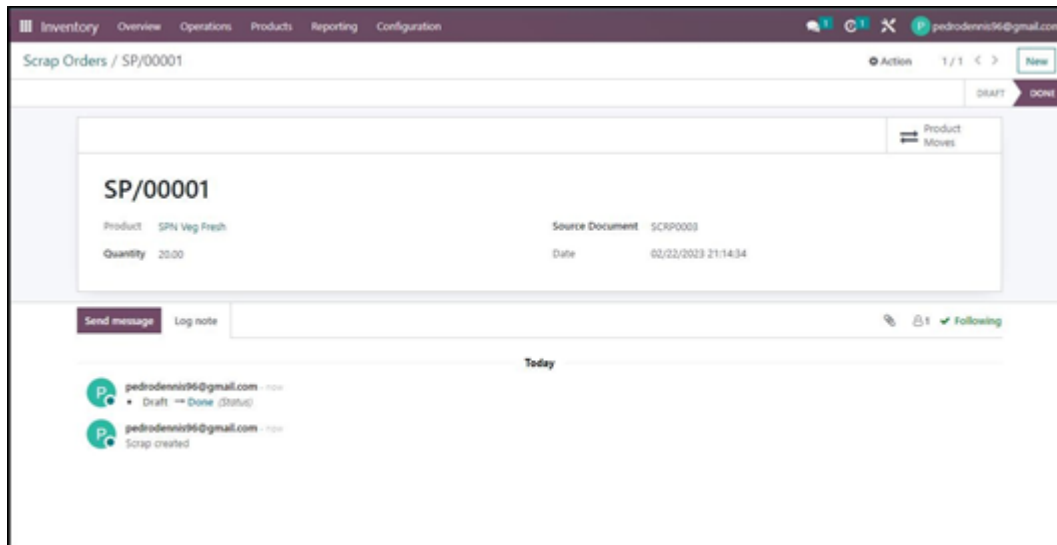
### Destruction of Goods

This menu serves to arrange which items will be destroyed (scrapped). Goods need to be destroyed because they are damaged or expired and can no longer be used. In this menu you can set the type of goods and quantity as well as the date of destruction. The menu display can be seen in the following image.



The screenshot displays the 'Scrap Orders / New' interface. It includes a header with navigation tabs (Inventory, Overview, Operations, Products, Reporting, Configuration) and a user profile (pedrodennis96@gmail.com). Below the header, there are action buttons: VALIDATE, DRAFT, and DONE. The main content area shows a form for creating a new scrap order. The form has a 'Product' dropdown menu with 'SPN' selected, a 'Quantity' input field, and a 'Source Document' input field. A dropdown menu is open below the 'Product' field, showing options: 'SPN Crt Fresh', 'SPN Veg Fresh', 'Create "SPN"', and 'Create and edit...'. There is also a 'Send message' button at the bottom left.

Figure 12. Item Destruction Menu Display



**Figure 13.** Item Destruction Menu Display

## CONCLUSION

Based on the results of the analysis and implementation, it can be concluded that the results of the system analysis which is the basis for the ERP system design are in accordance with the existing business processes in the division warehouse. In the ERP implementation, the Odoo Inventory module was used to develop the ERP system for PT Z's Warehouse division. Functions developed into the ERP system include inventory, goods receipt, QC and distribution functions. The ERP system runs as designed.

This research is limited to ERP implementation in divisions warehouse only, so it does not cover the entire company. Therefore, it is recommended that further research be conducted to examine the level of user acceptance of the ERP system that has been implemented as well as evaluate and improve it.

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