Designing odoo's enterprise resource planning (ERP) in micro, small and medium enterprises (MSMEs)

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Abstract. To promote Micro, Small and Medium Enterprises (MSMEs) in Indonesia, especially within the scope of Sidoarjo Regency. Odoo ERP is the right choice with complete and open source modules that allow users to customize modules as needed and do not require a lot of capital to apply to MSMEs. Designing ERP for Odoo Sinar Mentari that uses make to stock strategy can overcome the problems faced, namely the flow of information that has not been integrated between lines as well as in purchasing activities, these MSMEs cannot control the amount of material to be purchased and stock in stock also often accumulates or lacks material that results in a high total cost that has an impact on the benefits of MSMEs. This problem solving in Sinar Mentari in Terik Village is by designing Odoo ERP system using Sales module,
Purchases Manufacturing, Contacts Directory, and Employees by first calculating the next period demand forecasting using moving average method and making production master schedule using POM-QM software system design research results in an Odoo-based ERP system that has many advantages, namely being able to access information on business activities such as inventory, improve work processes, efficiency, reduce paper use, improve system control and automation that greatly impact business income.

1. Introduction

Enterprise Resource Planning (ERP) is a business management application that consists of modules that can be customized according to the needs of the company to facilitate integrated business management. Today the company takes into account ERP as the primary need of an organization. With the ERP company can integrate various information systems [1]–[5]. Sinar Mentari's UMKM is a MSME business that has been established since 2012 with its main production, namely manggar crackers. This dredging business is located in Tarik Village, Krian Sub-district, Sidoarjo Regency, East Java. The completion of the cracker UMKM work uses the make to stock strategy. The cause of the ERP system is due to the problems that arise in the cracker business, one of which is that the information flow has not been well integrated resulting in frequent inter-line communication miss [6]. Material to be purchased, stocks in stock often accumulate or lack of material which results in high total costs and thus have an impact on the profitability of these crackers UMKM. This solution to Sinar Mentari MSMEs in Terik Village is by designing an Odoo ERP system using Sales modules, Purchases Manufacturing, Contacts Directory, and Employees by first calculating demand forecasting for the next period using the moving average method using POM-QM software [3]–[5], [7]–[11]. Then there will be many benefits including being able to access information on business activities such as stock items, master production schedules and improve work processes, efficiency, and reduce paper use, and improve system control and automation. With the implementation of ERP the biggest positive impact is on business income.

2. Methods

The research was conducted to find out the general description of the company, the problems contained in the company and about the description of the research to be carried out related to the problems that exist, especially in manufacturing management. The type of data used is primary data and secondary data that appear in the table below.

| Table 1. Data Requirement |
|---------------------------|
| **Primary Data** | **Secondary Data** |
| Production Data | Demand Data |
| Raw Material Data | Raw Material Inventory Data |
| Machine Owned Data | |
| Working Hours Data | |

Data collection on Sinar Mentari MSMEs is taken directly from the production input data. The technique used for data collection is observing the state of production operations, company documentation and interviews with relevant parties in the production line. To overcome the existing problems, the company must do a forecasting system, master production schedule planning and then planning the module is an ERP implementation. Data processing techniques Plotting historical data using MS Excel software to determine the pattern of the data. Then forecasting uses moving average method with POM for Windows software. Lot sizing technique uses lot for lot method with POM for windows software. Analyze the selection of ERP modules to adjust to the needs of MSMEs. Design business processes and adjust information system modules that will be used to solve problems. Implementing ERP, integrating the module used into Sinar Mentari MSMEs then testing the program, if there is an error the debugging process is carried out until the program can be used smoothly.

3. Result and Discussion
3.1. Forecasting

Historical data in the following table is sales data on Sinar Mentari UMKM with manggar cracker products. Manggar cracker sales use pack units, where the manggar cracker pack is equal to 5kg. Manggar cracker sales data for 12 weeks are presented in the following table.

Table 2. Manggar cracker forecasting data

| Month | Period | Total Demand per-pack | Month | Period | Moving Averages | Tracking Signal Manggar Cracker |
|-------|--------|------------------------|-------|--------|-----------------|--------------------------------|
| Mar-18 | Week-1 | 1224 | Jun-18 | Week-1 | 1132 | -1 |
|       | Week-2 | 1257 |        | Week-2 | 1071 | -2 |
|       | Week-3 | 988 |        | Week-3 | 995 | -3 |
|       | Week-4 | 1056 |        | Week-4 | 993 | -3,16 |
| Apr-18 | Week-1 | 980 | Jul-18 | Week-1 | 986 | -7 |
|       | Week-2 | 957 |        | Week-2 | 1032 | -1,2 |
|       | Week-3 | 979 |        | Week-3 | 1041 | -1,99 |
|       | Week-4 | 1026 |        | Week-4 | 1041 | -3,25 |
| May-18 | Week-1 | 1164 | | | | |
|       | Week-2 | 995 | | | | |
|       | Week-3 | 979 | | | | |
|       | Week-4 | 919 | | | | |

Source: Moving Average Using POM-QM

This study resulted in a forecasting period of only two months because the forecast period that was too long resulted in less accurate and tends to deviate far from the actual. Forecasting methods using moving averages with the help of POM QM for Windows software. The next stage after forecasting is testing the validity of the forecasting made. Validity test can be known by counting tracking signals. According to Stevenson (2009: 101), control limits for tracking signals from ± 4 or ± 5. Data tracking signal of manggar cracker products can be seen in the table above.

3.2. Master Production Schedule

Table 3. Master Production Scheduling at June 2018

| Product          | Period   | Total |
|------------------|----------|-------|
| Manggar Cracker  | Week-1   | 1132  |
|                  | Week-2   | 1071  |
|                  | Week-3   | 996   |
|                  | Week-4   | 993   |
|                  |          | 4192  |

Table 4. Master Production Scheduling at July 2018

| Product          | Period   | Total |
|------------------|----------|-------|
| Manggar Cracker  | Week-1   | 986   |
|                  | Week-2   | 1032  |
|                  | Week-3   | 1041  |
|                  | Week-4   | 1041  |
|                  |          | 4100  |

3.3. Proposed System Design
After analyzing the Sinar Mentari SMEs system, the next step is to improve the system with Odoo's proposed system. Below is the business process of the finished products of Sinar Mentari SMEs.

![Proposed business process product handling system](image1)

**Figure 1.** Proposed business process product handling system

The proposed business process is in the finished product planning section to be sent to the warehouse, then receive a report on product stock. In the marketing department when receiving an order, the check in the warehouse, if it is available then it is sent to the customer, if it is not available then the PPIC section will make a production plan. ERP Odoo integrates all departments into one system using sales, manufacturing, purchases, contact directory and employees modules.

![Flowchart of MRP](image2)

**Figure 2.** Flowchart of MRP

Based on the flow chart data above, it is known that the input for the MRP process is BOM, inventory data and production order and the MRP process will check whether raw materials are available and ready for production or material not available and order material.

3.4. ERP System Design

- Odoo Software Installation.
  The ERP Odoo installation is very easy to do just by preparing the Odoo Installation file that is already bundled with PostgreSQL as the database.

- Planning Module Used
  The modules used in Odoo ERP implementation are integrated with each other using the following modules:

| Department UMKM Sinar Mentari | Module ERP Odoo |
|-------------------------------|-----------------|
| 1 Marketing                   | Sales           |
| 2 Raw Material Procurement    | Purchases       |
3.5. ERP Implementation Using Odoo

- Making New Products Using Manufacturing Modules.

After Odoo ERP installation, configuration and module customization is complete, the next step is to make products in manufacturing modules with the following steps:

### Table 6. Step of using manufacturing module

| No | Penggunaan Modul | Display |
|----|------------------|---------|
| 1. | Add a new product, namely manggar crackers by selecting the Manufacturing module - Master Data – Products. |
| 2. | Then do an update on hand inventory if there is a stock that is the existing product in the warehouse at this time by selecting Update Qty On Hand. After updating on hand inventory, apply it by clicking Apply. |
| 3. | Then a manufacturing order can be made from the manggar cracker product. UMKM Sinar Mentari will produce 800 packs of manggar crackers with 120kg of raw salt, 4000kg of tapioca flour, 100kg of flavoring, 200kg of grago, 4kg of food coloring. |
| 4. | Production Order for manggar cracker. |

- Adding BOM
The next step after adding the product is the addition of the product structure commonly known as Bill of Materials shown in the figure below:

**Table 7. Adding Bill of Materials**

| No | Module Usage | Display |
|----|--------------|---------|
| 1. | Bill of materials | ![Image](image1.png) |
| 2. | The structure of the cracker product is manggar with supporting ingredients consisting of Salt, Tapioca Flour, Flavoring, Grago and Food Coloring. BOM itself consists of BOM Structure and BOM Cost. | ![Image](image2.png) |
| 3. | It is known that every raw material for cracker makers requires the quantity and price that can make the manggar cracker product, it is known that each pack of crackers requires about 0.15 kg of salt with a total cost of IDR 90, while tapioca flour requires as much as 5kg with a total cost of IDR 20.000, flavoring requires 0.125kg with a total cost of IDR 2.750, grago requires as much as 0.25kg with a total cost of IDR 2.000 and food coloring as much as 0.005kg with a total cost of IDR 37.50. The total cost of the whole material is IDR 24.977.50 to make 1 pack of manggar crackers. | ![Image](image3.png) |

- Employee Data Input Using the Employees Module
- Supplier and Vendor Data
- Purchases Module
- Sales Module

4. Conclusions
Differences in the business flow of Sinar Mentari MSMEs that previously did not have a system, which later made a proposed integrated system using sales, purchases, manufacturing modules, contacts directory and employees. In the manufacturing module begins with making a production order which then checks the availability of raw materials in the inventory by calculating the net requirement, BOM and lead time of products that did not yet exist. Then the process of purchasing raw materials that have been calculated based on the production schedule. The Sinar Mentari MSMEs research implementation, there was a master production schedule that did not exist before and an online and integrated system was created using ERP Odoo for Sinar Mentari MSMEs. In conducting further research, demand forecasting should use a variety of forecasting methods to create the most efficient forecasting and further research should also apply other modules in order to have a better system.

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