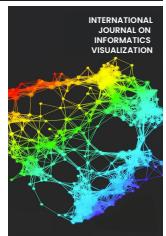




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## Designing and ERP System: A Sustainability Approach

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**Abstract**— Technology has grown up massively, which is numerous aspects. Whether the system is limited or open source, had to adapt to certain circumstances. For instance, decades ago, people mainly used to have a paper to work on reporting or to make notes. These days, people started to migrate the work stuff into digitalization. Furthermore, environmental pollution has been triggered by emissions from vehicles. Moreover, due to a lack of knowledge and resources to solve this issue, the manufacturing process does not apply the sustainability process. This matter has led to an impenetrable environmental issue in the manufacturing area for years. Therefore, developing a sales module dashboard system that is configured on Sales Order (SO) transactions and customer data could assist the problem-solving process. The reason for this matter is to highlight the Key Performance Indicator (KPI) at the sustainability that has been added by the open-source Enterprise Resources Planning (ERP) System and display the indicator of data visualization application. Furthermore, the development of the ERP system is aligned with the purpose of the Quickstart methodology that was applied in this research. To sum up, the sales module dashboard system is designed to assist the new user in this implementation in classifying the material, process, or products that require consideration to be maintained. Moreover, to reduce the number of raw materials or shipment processes that did not apply the eco-friendliness.

**Keywords**— Sales; dashboard; enterprise resources planning; sustainability; indicator.

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### I. INTRODUCTION

The Ministry of Industry of the Republic of Indonesia mentioned that the textiles industry and products are included in strategic industries and national priorities in 2020. Furthermore, this sector is becoming a big foreign exchange earner, about \$12.9 billion in 2019. Meanwhile, the workforce in this sector is about 3.73 million people [1]. Additionally, the value of export in 2017 has increased by around 6 percent to \$12.58 billion compared to 2016. Likewise, the export value has climbed to around \$13.7 billion in 2018 [2].

Besides, Garut city in Indonesia is recognized as the central leather raw and product. On the contrary, these activities created pollution to a river, due to the lack of sustainable processes in sewage [3]. Following the Ministry of Environment and Forestry of the Republic of Indonesia, most of this industry in the Sukarelang area has about 377 small and medium-sized industries (SMEs) and around 23 medium-to-large industries. However, the domestic wastewater management installation had a shortage for years due to the expensive cost of operational [4].

The Indonesian Government has released a regulation through Government Regulation No. 41 of 2015 on Industrial Resource Development in Article 19 No. 1, which stated: "Industrial Companies and Industrial Estate Companies shall utilize Natural Resources efficiently, environmentally, and sustainability." Additionally, this Article is further clarified in Article 21 No. 2, which states "The use of natural resources in an environmentally friendly and sustainable manner as referred to in Article 19 can be proceeded by: a. reduction of waste; b. reuse; c. reprocessing and/ or d. recovery" [5].

Afterward, this research focuses on developing the involvement of Sustainable Supply Chain Management (S-SCM), which is aligned with the pillars of Sustainable Development Goals (SDGs) No. 11 about sustainable cities and communities and No. 13 about climate change [6]. Furthermore, the development is aimed to display an indicator of the KPI of the organization. Other than that, the focuses on sales processes to climb up the transaction on products such as garments and gloves. Moreover, the process is the SO, customer invoice (INV), and shipping [7].

Furthermore, the relevance between the open-source system that is prepared for MSME (Micro, Small, and

Medium-sized Enterprise) scale businesses [8]. Moreover, the system is designed to implement Quickstart methodology [9]. Additionally, the improvement process would reduce the production pollution in the area. Meanwhile, the transaction is monitored on the dashboard to reduce the faulty sales transaction data and the sustainability KPI [10].

## II. MATERIAL AND METHOD

### A. Enterprise Resources Planning

ERP has an objective process, such as centralizing data from multiple zones, system automation, and integration of organization resources [11]. Besides, ERP has been defined as maintaining resources to increase productivity and profits in the configured system at the organization [12]. Additionally, there are four advantages; the first one is the quality and efficiency of the significant increase of number on customer service and distribution. Secondly is the cost reduction by minimizing the transaction price on hardware, software, and staff Information Technology (IT) training for system migration from the existing into a fully integrated ERP. Thirdly, escalate the data exchange between internal workers to improve the decision. Lastly, the limitations that appear on enterprises, such as the strict system access, affect the ability to adapt to enterprise agility, to be competitive, and gradually grow productivity [13].

### B. Sustainable Supply Chain Management

ERP system has several options to be adjustable by the need of organization. Meanwhile, one of them is S-SCM focuses on the sustainability process. Even though the environmental friendlies have proceeded according to the corporate values and goals [14]. On the one hand, the company needs to input sustainable indicators into the process flow, to ensure the impact on the long-term performance [15]. On the other hand, the regular method is not uncomplicated in establishing sustainability implementation. For instance, the migration from an existing to an eco-friendly process needs to be monitored attentively, especially the capability to develop, interact, and modification proficiency of the manpower. As a result, this customization could meet the essential threshold of sustainability processes [16].

### C. Sales

The activity that involves a selling product and rates is classified as the sales scheme. Furthermore, the process directly influences the system, concentrated on profit-oriented by operating in a complicated area. The integration system is also needed to maintain various modules, products, and branches prudently monitored in real-time [17]. Likewise, sales are responsible for distribution and ensuring product availability to grow client interest and demand to purchase. For the most part, the salesperson needs to preserve powerful communication, so the buyer has trust and makes a transaction again later. In this situation, the new shopper comes by referral from a regular purchaser [18].

### D. Open-source ERP Program

The ERP system is known as a complex system with limited user access and is commonly used by Multi-National Companies (MNC). However, the open ERP software

manages multiple modules, namely Accounting, Inventory, and Sales [19]. Meanwhile, the open-source system has an alternative option for users or companies such as MSME, which is interested in applying the ERP solution [20]. Other than that, the software has multiple customized options in the system store that align with the client's need [21].

### E. Quickstart Methodology

Quickstart is one of the methodologies designed for open-source software implementation. Furthermore, the focus of this method is the implementation managed by MSME, especially the organization that is classified as a newcomer in the ERP execution [22].



Fig. 1 The methodology stages

As can be seen in the presented Figure 1 above, there are four phases. For instance, the kick-off Call is the pre-process, while this step aims to determine the need for training that should be prepared for the client. Secondly, an analysis chapter to observe the Business Process (BP) existing as a benchmark for the targeting. Thirdly, the configuration stages have a goal to begin the configuration process, according to the BP to-be and GAP analysis. Lastly, the production part is the ending of the implementation. In addition, the company initiates the application installation and configuration process using a corporation infrastructure [23].

### F. Key Performance Indicator

KPI is mainly known as the parameter to be used to assess the performance or process. Moreover, the indicator is also suitable as a benchmark of the company strategy, which is fully integrated and implemented, ensuring the alignment between the KPI and organization strategy. Secondly, the displayed content should be easily interpreted by the reader. Thirdly, the indicator should be customizable due to the company's performance or relevancies [24]. Likewise, the indicator should be indicative of the baseline determination of the purpose and strategy of the corporation by calculated measure [25].

### G. Dashboard

The dashboard is defined as the computer interface to present the numerous analytic data, namely tables, reports, and visualization stated on the KPI [26]. Furthermore, this tool could utilize the standard to appraise the ongoing or finishing processes referring to the benchmark metrics. As a result, the dashboard has been used to forecast further results from the latest outcome [27]. Besides, the dashboard modeling needs to refer to certain aspects, such as the KPI needs to be aligned with the requirements of the company, and the data need to be solid and purposeful [28].

### H. Business Intelligence

BI is a system that frequently operates to moderately escalate the excellence of the decision-making at the enterprise. Moreover, in certain circumstances, BI is illustrated as a briefing book, report, and query tool [29]. Additionally, the BI application is an analytics tool to analyze

and formulate the raw data, namely the dataset, which consists of various variables and content in CSV format. Furthermore, this tool is available on desktop and mobile versions. The BI is also used to easily transform raw sources into a report and dashboard, to be appraised than the previous format [30].

### I. Conceptual Model

The given illustration depicts information about the conceptual framework of this research (See Figure 2). Furthermore, it presented the flow from the beginning by analyzing the raw idea into a full-scale research design [31].

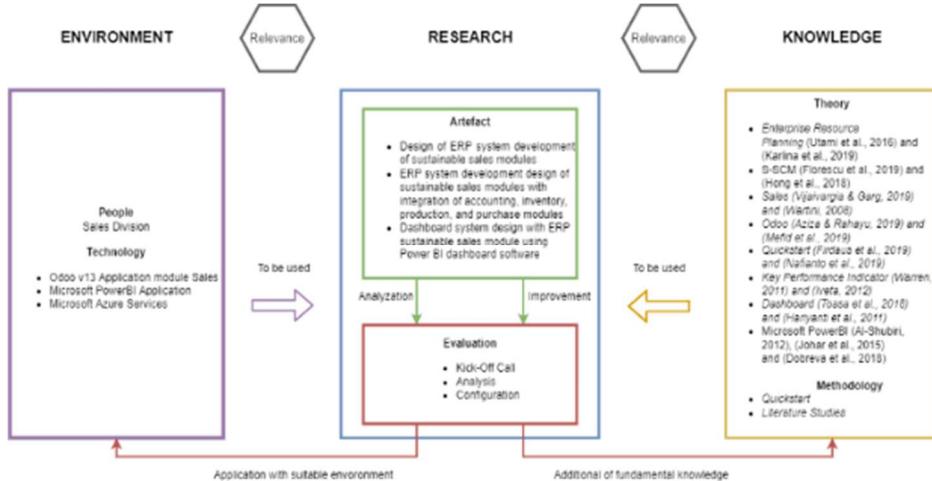


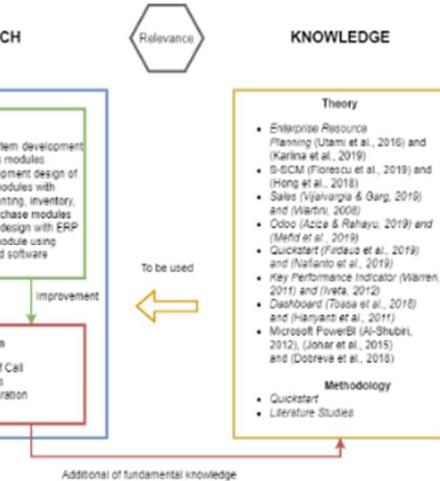
Fig. 2 The Conceptual Model

### J. Systematic Research

The flow chart shown in Figure 3, depicts the difference in each activity. Moreover, this research has four activities, namely strategic planning as the analysis phase of the existing process for benchmarking purposes. Secondly, the business

Besides, the left box consists of the division that manages this project. Besides, the rectangle in the center contains artifacts and evaluations, and the artifact box consists of the expectation.

In general, the ERP system design with sustainable dashboard integration is stated. The below artifact mentioned the evaluation that has been used, such as kick-off call, analysis, and configuration. Finally, the last box on the right side contains the list of theories that have been used. For example, ERP, S-SCM, and Sales. Meanwhile, the method in this research is Quickstart and literature studies.



analysis observes the BP as-is before the improvement begins. Thirdly, the Gap Analysis is to compare the observation between the processes. Lastly is ensuring objective relevancies between the configured system and the organization.

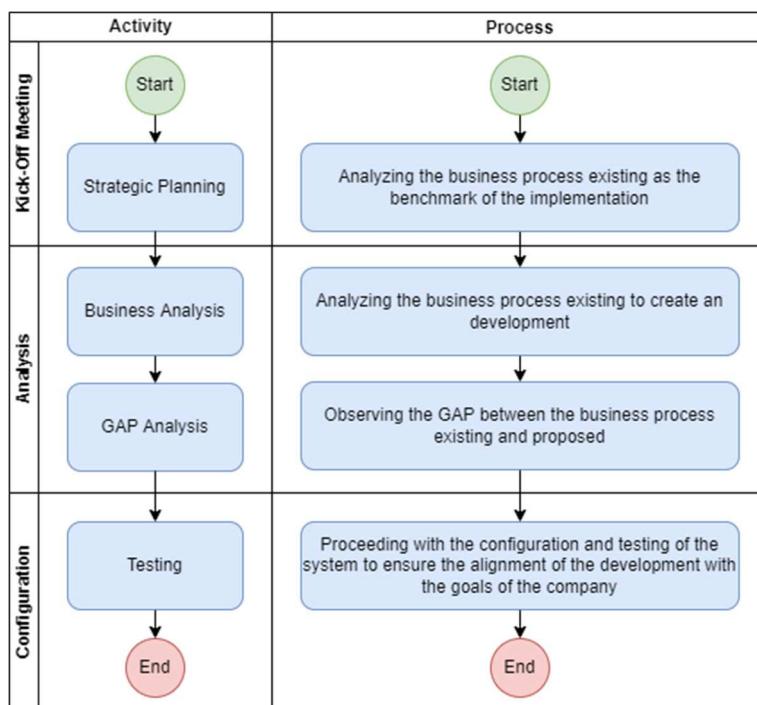


Fig. 3 The Systematic Research

### III. RESULTS AND DISCUSSION

#### A. Strategic Planning

The shown Table I provides data about strategic planning. Currently, the company does not own a sales system for the transaction process. Furthermore, the sales modules have not been integrated with other modules, such as Production, Inventory, and Accounting. Consequently, there are two inventions to develop the system, such as implementing S-SCM with an open-source system for the Sales module.

TABLE I  
STRATEGIC PLANNING

<b>Environmental Research</b>	<b>Development</b>	<b>Basic Knowledge</b>
There is not a system to run the sales process. The processes are run manually and have not been integrated with other modules	<p>The application of S-SCM using ERP system with an open-source application for Sales</p> <p>The application of a sustainable Sales dashboard using data visualization</p>	<p>ERP</p> <p>The design of S-SCM with the Sales system</p> <p>The design of the sales dashboard system</p>

In addition, a sustainable Sales dashboard with data visualization and reporting was developed. However, the development needs a solid foundation of knowledge to proceed with the implementation. For example, ERP is the basic understanding of the ERP process and system. Secondly, the Sales module has a blueprint of S-SCM using the ERP system. Lastly, the BI application was used to display the sustainable indicator on the Sales dashboard.

#### B. Business Need Analysis

The analysis of the existing BP is presented. As a result, the fragility of the current process was observed and illustrated to find the finer outcome by adjusting the irrelevant activity with the latest company goals.

*1) Sales Order:* The provided illustration shows the information about the existing SO flow, as shown in Figure 4. This process is started with the validation of the SO document by sales. Furthermore, Sales would check the availability of the products that have been requested on the SO document. Moreover, the inventory would verify the stock. If the product is unavailable in the Warehouse (WH), then the Manufacturing Order (MO) document would be generated. In contrast, if the product is available, then it would be packaged, and sales would inform the client about the shipment.

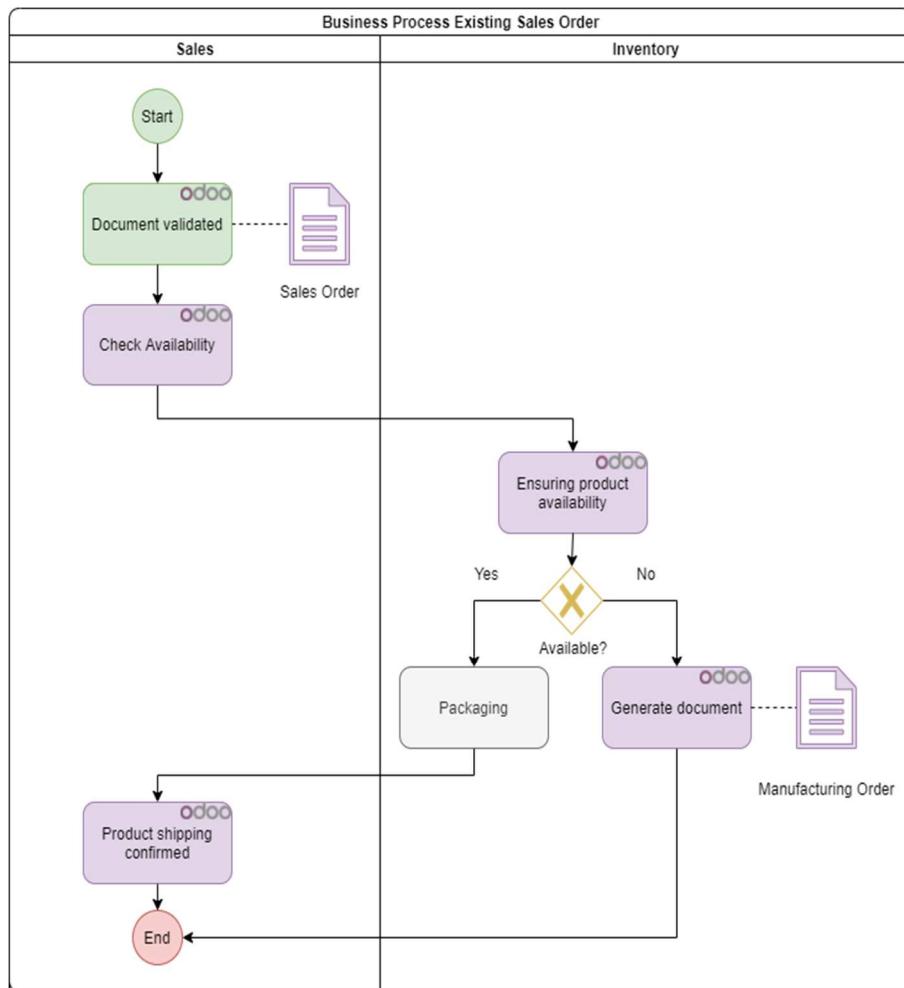


Fig. 4 The Business Process Existing SO

2) *Product Shipping*: The flow chart in Figure 5 demonstrates the changes in the product shipping flows. The INV document validation starts this process on the ERP system. Furthermore, the shipment of product would be proceeded by sales. Moreover, the customer would receive the goods that have been ordered. The buyer would verify the product with the SO been requested. Additionally, after the confirmation, sales would update the product shipment status to the product that has arrived.

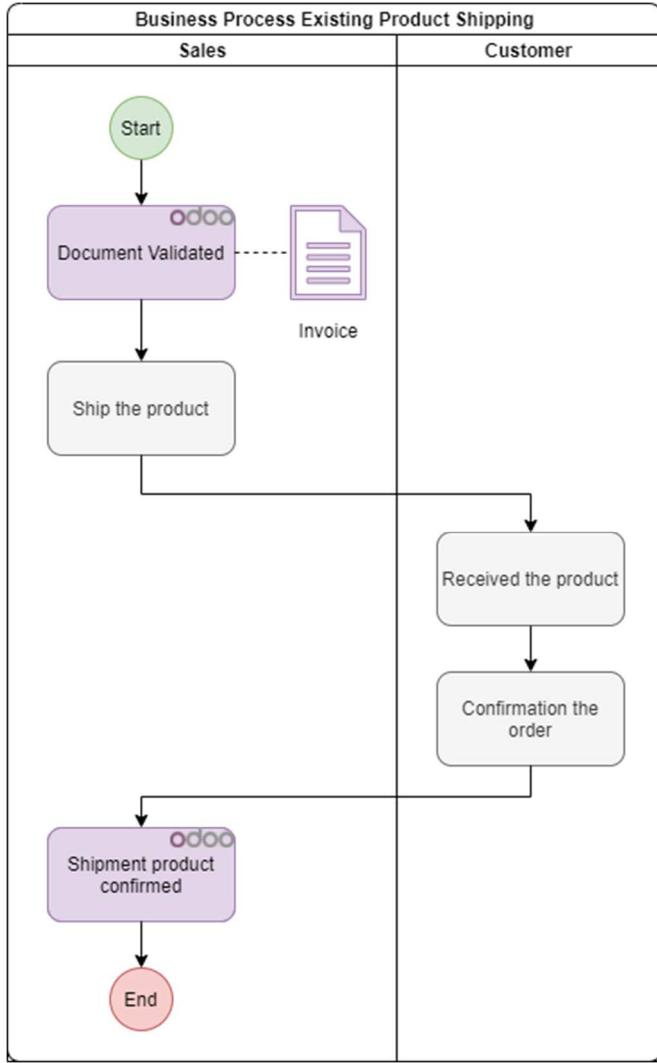


Fig. 5 The Business Process Existing Product Shipping

### C. Fit GAP Analysis

The presented Table II compares the recent process with the targeted BP. This step is required to inspect the difference between the existing BP and the proposed. Also, the evaluation would initiate the solution and action required by the organization and system. There are three differences of fulfillment in the table analysis, namely, the first one is that BP is not available on the company but the ERP system. Secondly, part of the BP of the organization is available on the organization, while the other half is available on an open-source system. Lastly, the BP on the enterprise and ERP system is available and suitable.

TABLE II  
FIT GAP

Business Process	Requirement	Fulfillment			Solution
		N	P	F	
Sales Order	A system that manages sustainable customer data is needed			✓	The supported system with the sustainable sales process to keep the customer data
Product Shipping	The system that possible to automatically check product availability. Sustainable product and packaging		✓		The system that assists the product availability check and oversees the product and packaging classification

1) *Sales Order*: The shown flow chart in Figure 6 indicates the activity that proceeds on the targeted SO. Furthermore, the sustainable SO document is validated by sales. The purpose of this act is to observe the details attached to the document. Furthermore, after the document validation is completed. The next step is an availability check on the ERP system by sales. Moreover, the inventory has received the request of the available stock by the open-source ERP system in the WH. If the product is unavailable, then the inventory would generate a MO document for manufacture. Following this, the manufacturing system would receive a notification about it and produce items according to the MO document. So then, the manufacturer would ensure the raw stock to proceed with the fabrication of the commodity.

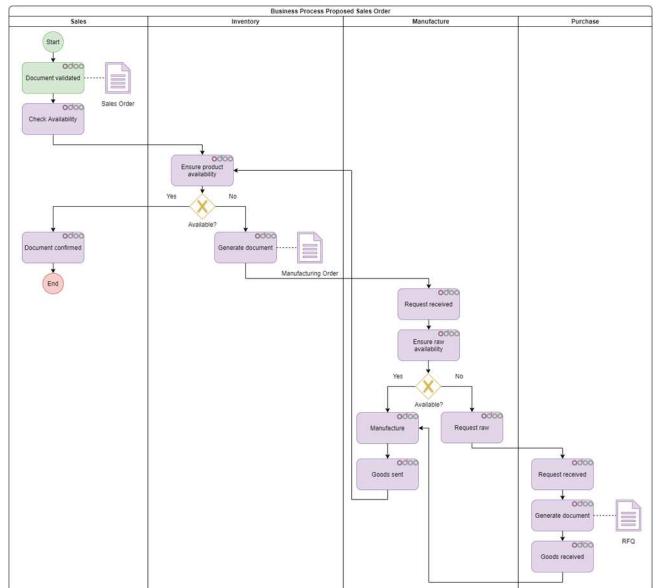


Fig. 6 The Business Process Proposed SO

As a result, if the raw material is unavailable in the WH. By then, the manufacturer would ask for restock to purchase by the system. Then, the purchase would acquire the request by the manufacturer on the system. Following this, the purchase would create a Request for Quotation (RFQ) document for raw materials. After the buyer receives the raw material, the manufacturer begins the production process. Subsequently, the requested product has been prepared for the transaction by the manufacturer. Afterward, the inventory

would check the availability and suitability of the items before updating the status and preparing for document verification. Finally, the SO document that has been requested is confirmed and arranged for further procedure.

*2) Product Shipping:* The provided presentation outlines the flow as shown in Figure 7 that would begin the purpose of product shipping. This phase starts with validating the INV document on the ERP system, and moreover, the availability was checked on the system after the document validation. Afterward, the system ensured that the packaging is classified into two types: non-sustainable packaging, determined by plastic bags, and the cassava bag, classified as sustainable packaging. Following this, the shipment provider has also been checked to ensure the availability and categorization of the service, divided into three varieties. For example, the service cost would be measured for the express, regular, and sustainable delivery.

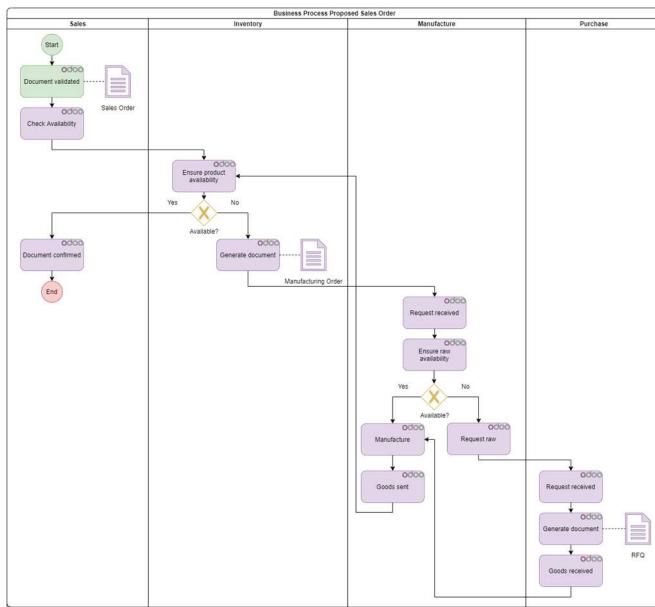


Fig. 7 The Business Process Proposed Product Shipping

Additionally, the Delivery Order (DO) document has been created by the system. Furthermore, the commodity shipment is initiated by sales, according to the customer preferences about the packaging and service of the product. The next step is for the customer would receive the goods. Following this, the client would verify the product that has been received. Finally, the sales would update the status of the shipment due to the product being delivered and confirmed by the buyer.

#### D. Configuration Sales Module

*1) Sustainable SO:* The configuration of SO is made in the presented Figure 8. Furthermore, the first layer on the screen shows several data, such as the SO number, SO0111, INV, and the client's name. Moreover, below the first layer is an order lines section that consists of nine rows.

The screenshot shows the SAP Sales Order configuration interface. At the top, it displays the navigation path: Quotations / S00111. Below this, there are tabs for Edit, Create, Print, and Action. The main area shows the Sales Order details for S00111. The customer information includes Unique Carpet Decor Indonesia, Raha Putriyati, Jl. Danau Sunter Utara Blok G 3 Kaw No 17, Jakarta Pusat, JK 10118, Indonesia. The order date is 07/13/2021 17:44:44, and the payment terms are Immediate Payment. The order lines section contains two items: Cow Leather (FG-CL-BLR) and [SM-SDC] Sustainable Delivery. The Cow Leather item has a quantity of 10.000, a unit of measure (UoM) of Square Feet (ft2), a unit price of 42.550.00, and a subtotal of Rp 425.500. The [SM-SDC] Sustainable Delivery item has a quantity of 1.000, a UoM of Units, a unit price of 24.050.00, and a subtotal of Rp 24.050.

Fig. 8 Configuration Sustainable SO

For instance, product, quantity, and unit of measure (UoM) of the products. As can be seen, the customer has ordered a cow leather with black color dan using recyclable materials. Moreover, the quantity of the product is ten, while the UoM is square feet (ft2). Additionally, the unit is charged with taxes, which results in the subtotal with code FG-CL-BLR. Other than that, the shipment service is attached to the order lines, which is sustainable delivery. Afterward, the quantity is depended on the shipment. So then, the UoM is units, while the exemption of taxes would not affect the subtotal of the sustainable delivery.

*2) Sustainable Product Shipping:* As can be seen on the illustration above shows sustainable shipment service interface. It displays about five adjustments that have been made. For example, the product type is classified as a service, and Secondly, the category is determined as deliveries. Thirdly, the internal reference is SM-SDC. In addition, on the right side of the pictures, there is a sales price that has been set to zero to assist the automated calculation in the next illustration. Lastly, the UoM has been set to units as shown in Figure 9.

This screenshot is identical to Figure 8, showing the SAP Sales Order configuration interface for S00111. It displays the same customer information, order date, payment terms, and order lines. The order lines section shows the same two items: Cow Leather and [SM-SDC] Sustainable Delivery, with their respective details and subtotals.

Fig. 9 Configuration Sustainable Product Shipping

Afterward, an automated delivery price calculation needs to be adjusted. As can be seen in the picture above, there are two options for the provider. The first one is fixed price, and the second one is based on rules implemented. At the same time, the determination of the pricing rules is required, as shown in Figure 10.

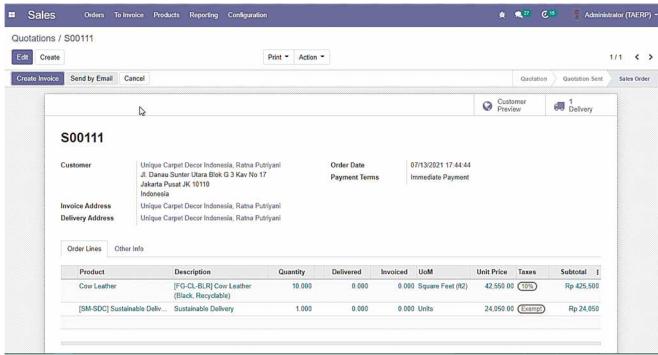


Fig. 10 Configuration Sustainable Product Shipping Rules

For instance, if the weight is less than and equal to one Kilogram (KG), then the calculation is the basic price plus the price that multiplies with the weight of the order. Likewise, if the weight is more than and equal to two KG, then the calculation is the basic price plus the price that multiplies with the weight of the products that have been ordered, as shown in Figure 11.

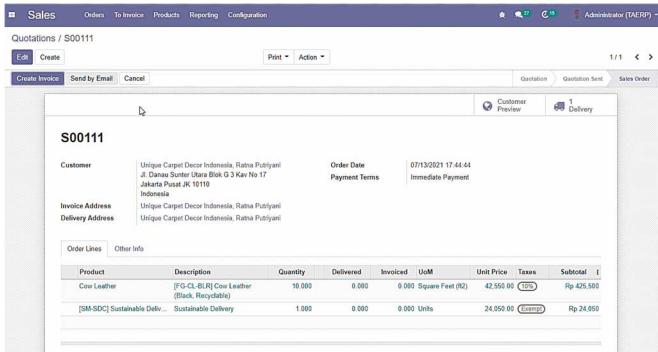


Fig. 11 Configuration Sustainable Product Shipping Condition

#### E. Dashboard Design Purposed

1) *Sustainable Sales:* To start with, the illustration above is a visualization of a sustainable sales dashboard. Furthermore, the data that is presented refer to the transaction data on the ERP system. So then, the raw data that is exported from the system into CSV format is managed and transformed on the data visualization as shown in Figure 12.

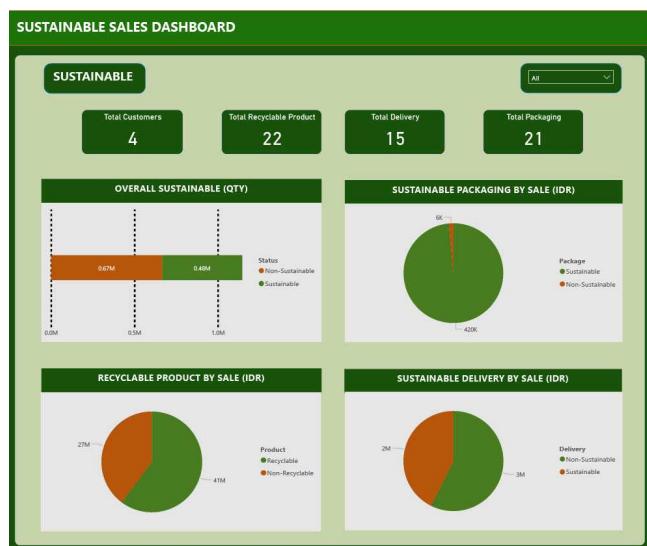


Fig. 12 Sustainable Sales Dashboard

2) *KPI Sales:* As seen in the table above, about eight indicators have been displayed on the sustainable sales dashboard. The first indicator is about the calculation of the total buyer of the product, packaging, and deliveries refer to the sales report using card visualization. Secondly, the total recyclable product is the sum of transactions containing a recyclable product; the visualization used is a card. Thirdly, the total deliveries are the number of total orders that use sustainable and non-sustainable to find the comparison; card is used on this indicator. Fourthly, the card is used for the total packaging indicator, which focuses on the final number of the packaging that uses sustainable deliveries as a service.

TABLE III  
KEY PERFORMANCE INDICATOR

<b>Indicator</b>	<b>Description</b>	<b>Characteristics</b>
Total Customers	The total customers that create transactions on the product, packaging, and/or service	Larger the Better
Total Recyclable Product	The total transactions using recyclable product	Larger the Better
Total Delivery	The total transactions using sustainable delivery	Larger the Better
Total Packaging	The total transactions using sustainable packaging	Larger the Better
Overall Sustainable (QTY)	The total transactions using the sustainable product, packaging and-or service	Larger the Better
Sustainable Packaging by Sales (IDR)	The comparison between the sustainable and non-sustainable packaging	Larger the Better
Recyclable Product by Sales (IDR)	The comparison between the recyclable and non-recyclable products	Larger the Better
Sustainable Delivery by Sales (IDR)	The comparison between the sustainable and non-sustainable deliveries	Larger the Better

Besides, the stacked bar chart displays overall sustainability, which contains the sum of the transactions involving the product, packaging, and sustainable deliveries. Furthermore, the pie chart displays the sustainable packaging by sale, which focuses on calculating the differences between sustainable and non-sustainable products in quantity. Afterward, the pie chart is also used to present the recyclable product by sales indicator to highlight the differentiation between recyclable and non-recyclable products. Finally, the differentiation has been viewed on the sustainable delivery by sale to underline the contrast between sustainable and non-sustainable deliveries.

#### IV. CONCLUSION

To summarize, this research with application development uses an open-source ERP system. Moreover, the Sales module has been used to configure the S-SCM to design and present the sustainable indicator on the dashboard by the BI application. Besides, the Sales module has integrated with three modules, such as inventory, by automatically generating the sustainable DO document after the sustainable SO has been created.

At the same time, the MO document has been generated automated by the Manufacturing module. In addition, the accounting module would receive the customer INV document after the sales module creates an INV on SO processes. Another reason is that this system would assist the Sales team in monitoring and maintaining the performance and the completion that has been aimed according to the company's purpose and goal.

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