Implementing Procurement Management in Nuclear Medicine Installation Using ERP

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Abstract: To support health services at nuclear medicine installations certainly requires various types of goods, ranging from medical devices, radioactive materials, medicines, and various other needs. The right procurement process is key in ensuring the smooth running of quality nuclear medicine installation health services. The process of procurement of goods at nuclear medicine installations in public hospitals is still carried out conventionally and separately between divisions or sections, this can cause communication problems, lack of data integration, and difficulties in monitoring stock and fulfilling requests quickly. Therefore, a system that can manage the procurement of goods is needed. ERP system development using open-source Odoo to support the integrated procurement process using the Quickstart method. The ERP system can facilitate the procurement of goods for nuclear medicine installations in designing systems starting from the bidding process to vendors, purchasing goods, receiving goods to enter the warehouse, to the payment process to vendors. The ERP system will combine business processes and data from various divisions or parts in one centralized database. This integration allows the use of consistent and real time information in decision making, transparency, and data accuracy. The results of this research are in the form of a system design using the ERP purchase module to support the procurement of nuclear medicine installation goods.

Keywords: Procurement; Nuclear Medicine; ERP; Odoo

Abstrak: Untuk menunjang pelayanan kesehatan di instalasi kedokteran nuklir tentunya membutuhkan berbagai jenis barang, mulai dari alat kesehatan, bahan radioaktif, obat-obatan, dan berbagai kebutuhan lainnya. Proses pengadaan barang yang tepat adalah kunci dalam memastikan kelancaran pelayanan kesehatan instalasi kedokteran nuklir yang berkualitas. Proses pengadaan barang pada instalasi kedokteran nuklir di rumah sakit umum masih dilakukan secara konvensional dan terpisah antar divisi atau bagiannya, hal ini dapat menyebabkan masalah komunikasi, kurangnya integrasi data, dan kesulitan dalam memonitoring stok dan memenuhi permintaan dengan cepat. Oleh karena itu, dibutuhkan sebuah sistem untuk mengelola pengadaan barang. Pengembangan sistem ERP menggunakan open-source Odoo untuk mendukung proses pengadaan barang yang terintegrasi dengan metode Quickstart. Sistem ERP dapat mempermudah pengadaan barang instalasi kedokteran nuklir dalam merancang sistem mulai dari proses penawaran ke vendor, pembelian barang, penerimaan barang untuk masuk ke gudang, hingga proses pembayaran ke vendor. Sistem ERP akan menggabungkan proses bisnis dan data dari berbagai divisi atau bagian dalam satu database yang terpusat. Integrasi ini memungkinkan penggunaan informasi yang konsisten dan real time dalam pengambilan keputusan, transparansi, dan keakuratan data. Penelitian

ini menghasilkan rancangan sistem dengan menggunakan modul pembelian ERP untuk mendukung pengadaan barang instalasi kedokteran nuklir.

Kata kunci: Pengadaan Barang; Kedokteran Nuklir; ERP; Odoo

1. Introduction

A hospital, according to the WHO (World Health Organization), is an integral part of a social and health institution that provides comprehensive, curative, and preventative services to the community [1]. Treatment procedures in hospitals are evolving with time, with one example being the installation of nuclear medicine. Nuclear medicine as a branch of medical science that uses open sources of radiation derived from the disintegration of artificial radionuclide nuclei, to study physiological and biochemical changes at the cellular and molecular levels, and is used for diagnostic, therapeutic, and research purposes [2].

Nuclear medicine installations require a variety of commodities, including nuclear-based medical devices, radioactive pharmaceuticals, and other consumable medical goods. The procurement procedure at nuclear medicine facilities is crucial to ensuring the efficient operation of services, patient safety, and the availability of necessary instruments and resources. According to the Presidential Regulation on Government Procurement of Goods and Care, procurement of goods has a significant role in the implementation of efforts to improve health care [3]. According to Permenkes No. 56 of 2014, hospitals must provide a variety of services, including pharmaceutical services, which include the management of pharmaceutical commodities, medical devices, and consumable medical materials as support services for health services provided to patients [4]. The procurement process at the Nuclear Medicine Installation is still done conventionally and separately across portions or divisions, resulting in sluggish communication, no data integration, and difficulty monitoring stock due to lack of integration.

Currently, the hospital's nuclear medicine installation lacks a specialized integrated system to oversee the acquisition of items, from bidding to payment to vendors. As a result, an Enterprise Resource Planning (ERP) system that combines each business function is required to enable the management and monitoring of supply chain management. The use of an ERP system will help with resource planning and management [1]. The ERP system utilized in its implementation is Odoo software, which is openERP. Odoo is an ERP application that has a number of modules that can be customized and set as needed [5]. It is expected that the use of ERP will make it easier for hospitals to develop the procurement business process.

2. Materials and Methods

2.1. Enterprise Resource Planning

ERP is an abbreviation for Enterprise Resource Planning. ERP is an integrated system used by companies to integrate all company resources [6]. The use of an ERP system will facilitate planning to managing company resources. ERP can minimize traditional functional barriers in organizations by sharing data, information flow, and introducing common business practices among users in the organization [7].

ERP enables departments within a firm to be integrated into the same system, facilitating planning and management operations in each department. ERP systems provide several modules that may be tailored to specific business requirements. Warehouse modules, accounting, purchase, order management, customer management, human resource management, and other modules are among those available [8].

2.2. Odoo System

Odoo is a business-oriented open-source ERP (Enterprise Resource Planning) program. Odoo was created with the Python, XML, and JavaScript programming languages. Odoo is made up of three parts: the PostgreSQL database, which is the default database, the Odoo application server, and the web server. Odoo modules include Sales, Inventory, CRM, Purchase, Manufacturing, Finance, Accounting, and others [9]. These modules may be tailored to meet specific business requirements [10].

2.3. Nuclear Medicine

Nuclear medicine is a branch of medical science that uses the application of open (unsealed) radioactive materials both in diagnosing and treating diseases or in medical research. Deep diagnostics nuclear medicine is based on the use of radioactive emissions from radionuclides. In nuclear medicine, radioisotopes can be delivered into the body (invivo research) or merely interacted with biological materials extracted from the patient's body, such as blood, stomach fluid, urine, and so on, and then placed in a test glass (invitro study) [11].

2.4. Purchase Module

The purchase module is one of the modules used in the Odoo application to manage the process of procuring items in an organization or company, and it controls all actions linked to the acquisition of goods or services to be sold in a specific business. Procurement Goods are the essential operations of a corporation, thus management must regulate these activities. The scope of purchasing products or services is not only limited to how the commodities are accessible on time and within a specified goal price, but also how strategy relationships between organizations may function successfully and efficiently [12].

2.5. Quickstart Method

The Quickstart method is used in this research to establish the procurement process because it is effective and simple to use because it is built to match the Odoo system workflow. [13]. The Quickstart method is intended for small and medium-sized businesses [5]. The Quickstart method consists of three stages, as shown in Figure 1: kick-off call, analysis, and configuration.
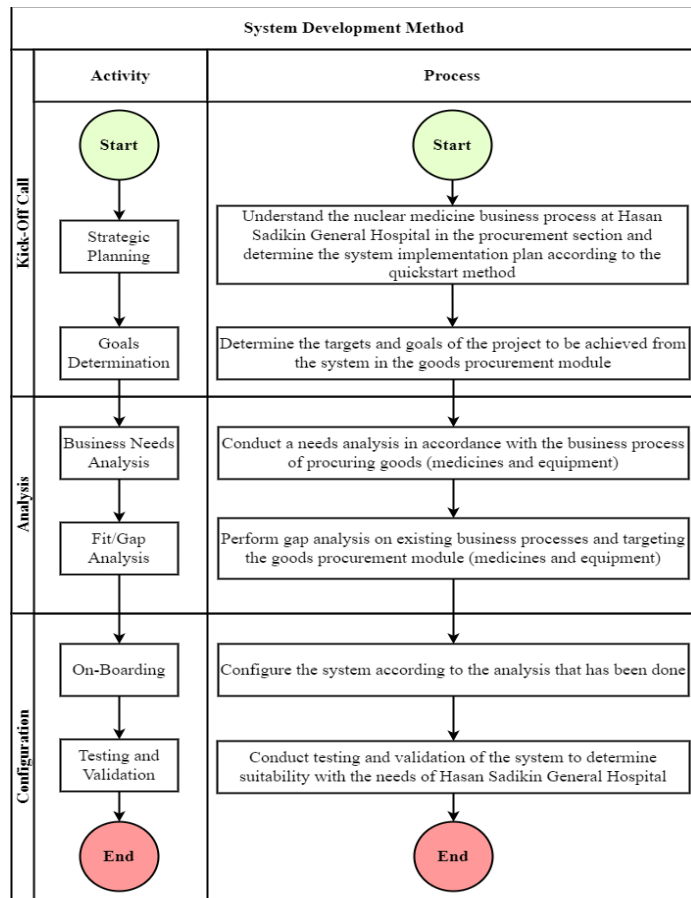
Figure 1. Quickstart Method

3. Results and Discussion

Procurement procedures in healthcare business are explored in this research. At this company, traditional procedures are still used to enter, control, monitor, and update the procurement process. ERP systems are used to link the procurement process to other processes and automate input, control, monitoring, and updating.
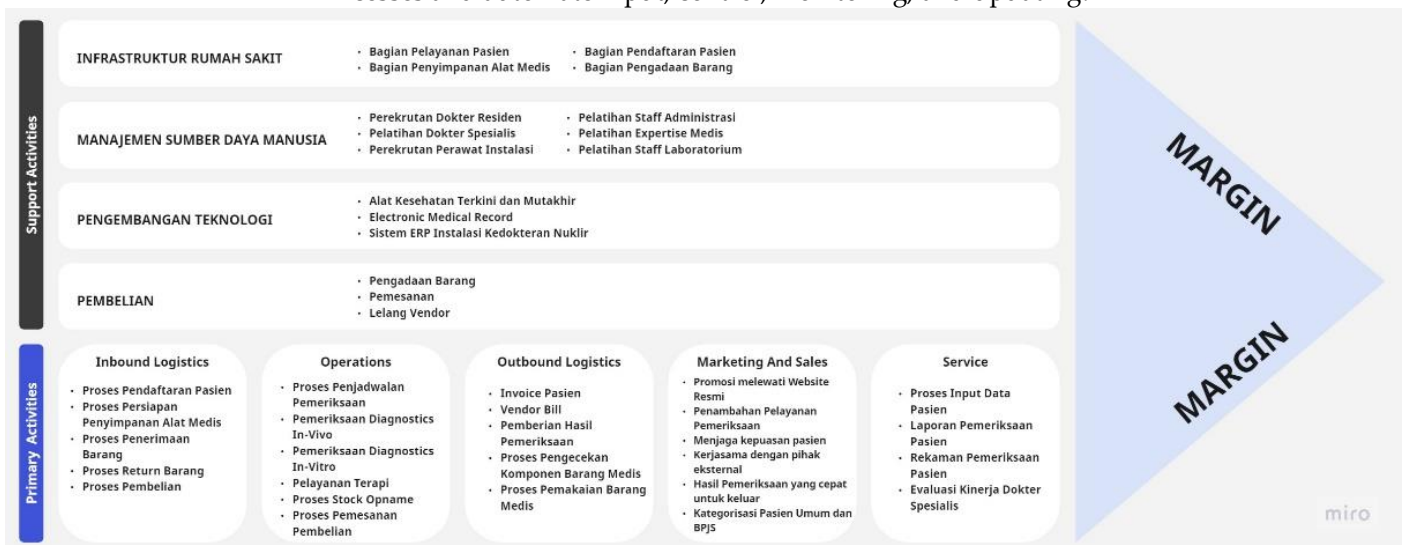

Figure 2. Value Chain

Figure 2 displays a value chain that illustrates the operations performed by the organization in order to design, produce, and distribute items or services to customers.

3.1. Kick of Call

The kick-off call stage is the first stage of the Quickstart method, at this stage, an analysis of the needs related to the research to be conducted, namely determining the implementation plan for developing a nuclear medicine installation procurement system using the open-source ERP Odoo.

Table 1. Strategic Planning

Environment	Development	Basic Concept
Currently, the hospital's nuclear medicine installation lacks a specialized system that can manage the procurement of nuclear medicine installation products from bidding through vendor payment. Data and information exchange are still managed conventionally using physical documents.	Designing an ERP system for procurement of goods for nuclear medicine installations using open-source Odoo.	Enterprise Resource Planning, Procurement Odoo, Quickstart Method, nuclear medicine installation.

Table 1 explains that the nuclear medicine installation does not yet have an integrated system in the procurement business process. Therefore, an ERP-based system using open-source Odoo is designed to manage the integrated procurement process so that the data and information exchange process can be carried out automatically in the system.

3.2. Analysis

The analysis stage is the stage of analyzing current business processes to find deficiencies and find out the needs of nuclear medicine installations. The deficiencies and needs found are what will later be used as a reference in improving and designing proposed business processes that will be implemented in the development of a nuclear medicine installation procurement system.

Table 2. Fit/gap Analysis

Business Process	Needs	Fulfillment			Explanation	Solution
		N	P	F		
Vendor Selection Business Process	A system that makes it easier for procurement staff to submit offers to several vendors is needed.		✓		Eksisting: The process of bidding for goods is still done conventionally to vendors who are commonly used. Targeting: The product purchase offer can be done by creating an RFQ on the system that can be sent to several vendors.	The solution provided is the implementation of an ERP system using the open-source Odoo, so that the bidding process can be done selectively by comparing offers from several vendors
Purchasing Business Process	A system that can automate the purchasing process is needed		✓		Eksisting: Purchasing documents are still conventionally created when the bidding process is approved. Targeting:	By implementing an ERP system using Odoo, RFQ can be automatically generated into purchase orders (PO) and sent directly to vendors.

| Business Process	Needs	Fulfillment			Explanation	Solution
		N	P	F		
					When the bidding process is approved, the RFQ will automatically turn into a Purchase Order (PO).	
	A system is needed that can confirm the receipt of goods and is integrated with warehouse staff.			✓	Eksisting: Warehouse staff receive goods by matching the goods that arrive with the physical purchase documents. Targeting: The process of receiving products is confirmed and validated based on the PO that has been created in the system.	By using Odoo, the process of receiving goods and validating good receipts is done through the system directly based on the PO because of the integration between the procurement staff and warehouse staff.
	An integrated system is needed between the procurement department and the accounting department to create a bill when the goods have been received			✓	Eksisting: In the payment process, especially in making bills, there is no system integration between the procurement department and the accounting department. Targeting: Procurement staff create a vendor bill on the system that will be verified by accounting staff to carry out the payment process	The Odoo system integrates the procurement and accounting departments so that the accounting department can make payments using vendor bills that have been created by the procurement department.

A. Vendor Selection Business Process
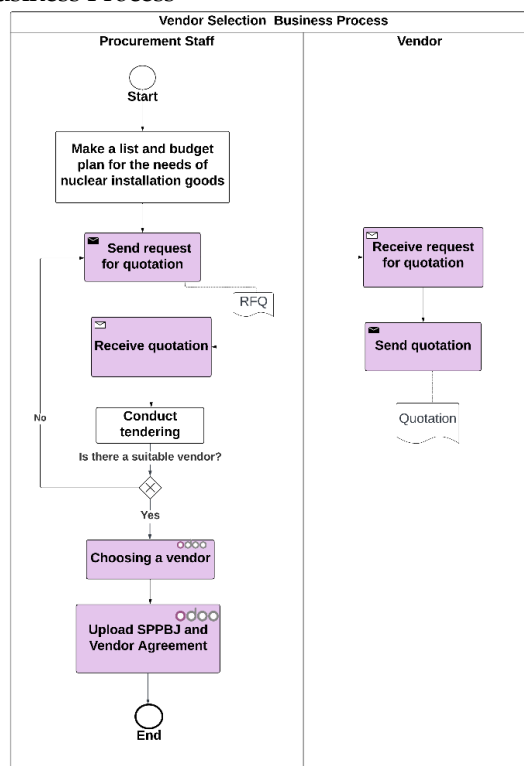
Figure 3. Vendor Selection Business Process

According to Figure 3, the vendor selection targeting business process begins when procurement staff make a list and budget plan for the needs of nuclear installation goods. Procurement staff will then send a request for quotation to the vendor. The vendor will receive the RFQ and send a quotation document to the procurement staff. Procurement staff will receive the quotation and conduct tendering. If there is a suitable vendor, the procurement staff will select the vendor and upload the SPPBJ and vendor agreement.
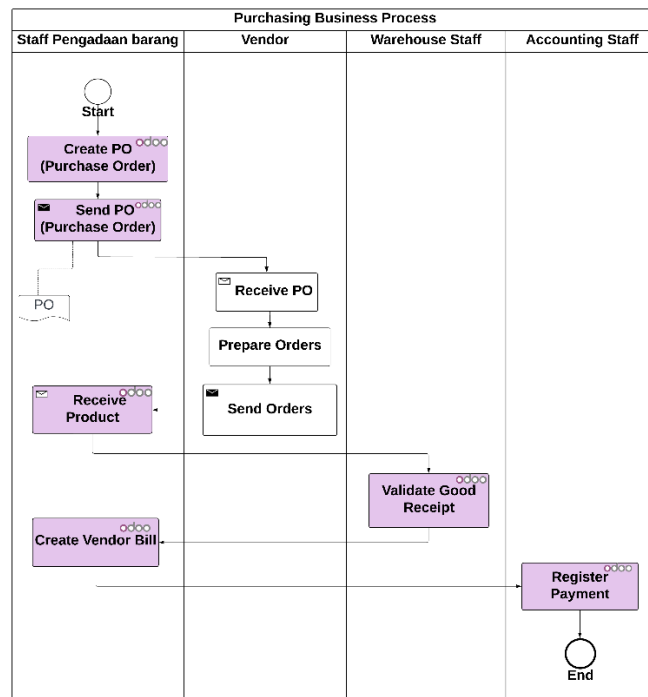
B.   Purchasing Business Process

Figure 4. Purchasing Business Process

According to Figure 4, the purchase targeting business process starts when the procurement staff creates a purchase order and sends the purchase order to the vendor. The vendor will then receive the purchase order and prepare the goods so that the order can be shipped. After sending the order, the procurement staff will receive the product so that the warehouse staff can validate the goods receipt. After that, the procurement staff will create a vendor bill so that the accounting staff can register payment.

3.3.   Configuration

Configuration and customization are carried out at the configuration stage based on the results of the targeting business process analysis to facilitate the procurement of products at the nuclear medicine installation.

Table 3. Configuration & Customization

Menu	Activity
Vendor Form	Added file upload field with binary data type for "SPPBJ (Letter of Appointment for Procurement of Goods and Services)" and "Vendor Agreement".
Purchase Order Form	Added a field with the related field type "Vendor Agreement" which is integrated if you have uploaded a file in the vendor menu.

According to table 3, the vendor form and purchase order form menus are configured and customized to meet the demands of the nuclear medicine installation targeting business process.

A.   Vendor Form

Figure 5. Vendor Form

Based on Figure 5 In the vendor form, customization is carried out by creating an upload field for the "SPPBJ" (Appointment Letter for Procurement of Goods and Services) file as a letter stating that a vendor has won a tender and uploading the "Vendor Agreement" file which is used as a work contract between the vendor and the hospital's nuclear medicine installation. This Vendor Agreement file will be used as a reference for every purchase of goods.

B.   Request for Quotation (RFQ) Form

Figure 6. Request for Quotation Form

Based on Figure 6, the Odoo system has a request for quotation form that will be sent to the vendor. The format contains information regarding the vendor's name, product name, the number of items to be purchased, the expected arrival date, and the person in responsibility. If the RFQ form is completed, the next step is to email the RFQ form to the vendor, wait for a response from the vendor, and then proceed to the next step, which is to create a purchase order.

C.   Purchase Order Form

Figure 7. Purchase Order Form

Based on Figure 7, to begin the Purchasing business process, the procurement department completes the Odoo Purchase Order (PO) form. The format contains information regarding the vendor's name, product name, the number of items to be purchased, the expected arrival date, and the person in responsibility. If the PO form is completed, the next step is to email the PO form to the vendor, wait for a response from the vendor, and then proceed to the next step, which is to wait for the arrival of the products.
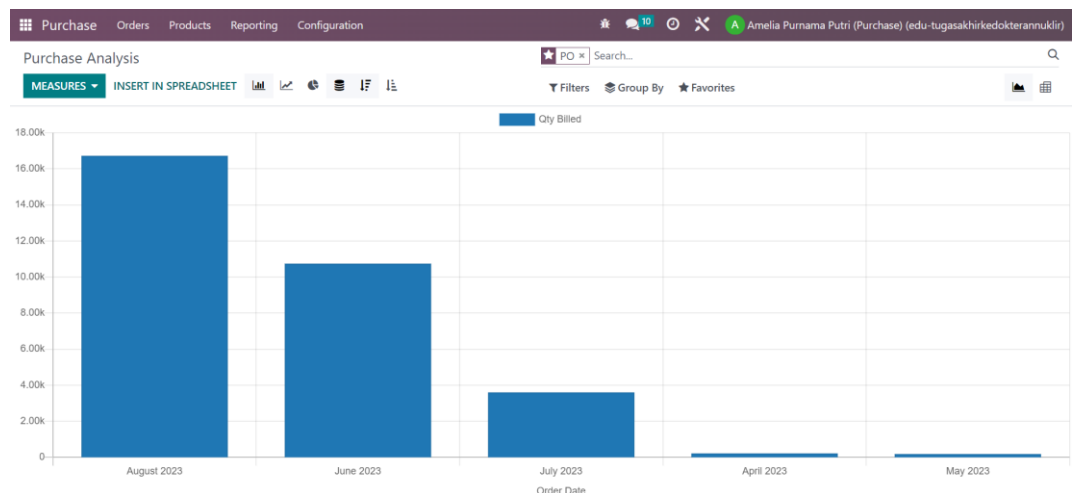
D.   Purchasing Report

Figure 8. Purchasing Report

According to Figure 8, the Odoo system may provide reports on vendor purchases and payments. The reporting format is in the form of reporting charts and Excel spreadsheets that may be altered in weeks, months, or years.

4. Conclusions

Based on the results of the research, the development of a procurement system utilizing an ERP-based system with open-source Odoo in the purchase module was successful. The system also includes reporting capabilities and data storage for stock management. The ERP system can integrate the procurement department with other departments, such as the warehouse and accounting. This integrated system enables faster data interchange, which will help procurement management in nuclear medicine facilities. Further research needs to be done to integrate the procurement module with other modules such as supply chain management, planning, quality, and ensure compatibility with the business needs of nuclear medicine installations, with support from the IT department for the direct implementation process.

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