



Utilization of Service Oriented Architecture to Customize Accounting Business Process in Open ERP System for Smart SME's

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ABSTRACT

Small and medium enterprises or commonly referred to as SMEs in Indonesia are business activities that are in great demand after the economic crisis which resulted in the termination of employment (PHK) experienced by most companies. The role of SMEs in the Indonesian economy has now been recognized by the wider community. However, many SMEs in Indonesia are still running their business processes separately, especially in the accounting system, so that the business processes are running poorly, financial transactions that are still recorded and reported manually and separately, sales/purchase account items that are still recorded manually, and there's no system that supports the accounting process for SMEs.

The output from this research is an Open Source ERP-based Smart SME system design in the accounting module by embedding the "smart" feature, namely analytic accounting. This design expected to be the standard and best practice in the SME accounting system so that SME's actors can create and get more structured financial reports and can design an integrated system that supports a real-time data management system.

The research method used in this research uses the Service Oriented Architecture (SOA) approach. This method also refers to certain services on one platform such as services for making payments, transferring payments, and checking the status of a bank account in one application. In general, all the research processes carried out refer to the step by step of SOA and there must be input and output in designing the business model. This method is used to design business process models and services based on the accounting system problems experienced by SMEs.

1. Introduction

Technology in the finance industry still dominated by banking (for example, technology core banking system), then the current technological innovation occurs at the side of the user (customer)[1]. Small and medium-sized businesses or SMEs in Indonesia are business activities that are in great demand after the economic crisis that has resulted in the termination of employment (PHK) experienced by most companies. The role of SMEs in the Indonesian economy has now been recognized by the wider community. Based on data from the Central Statistics Agency (BPS) and the Ministry of Cooperatives and Small and Medium Enterprises in 2017 the number of SMEs in Indonesia has reached 62.9 million. SMEs in Indonesia have been able to contribute to 5,425.7 billion Rupiah or 53.3% of the total GDP (Gross Domestic Product) National. Since the economic crisis in our country that occurred in 1998, up to 80% of large businesses have gone bankrupt and many of them have laid-off workers. Based on data from the Ministry of Cooperatives website in 2017. With the total number of SMEs of 62.9 million in 2016 in our country, SMEs play an important role in reducing unemployment in Indonesia. Until now, SMEs can absorb at least 97.2% of the total workforce. This shift allows the proliferation of SME is a business activity that is in great demand after the economic crisis which resulted in the termination of employment (PHK) experienced by most companies. SMEs have many shortcomings, including the limited resources in conducting system design, limited financial management capabilities, and operational activities for SMEs which are still carried out separately. For example, such as in the clothing production process, where each process has separate and separate financial statements. This makes it difficult for SMEs to calculate the trial balance obtained based on reports that have been made.

With the emergence of this problem, the Open Source ERP solution will be applied in designing the Smart SME system model by applying the accounting module. The design carried out prioritizes data integration and the addition of analytic entries that serve to control cost and revenue from the results of transactions conducted by SMEs. This research was conducted using the SOA (Service Oriented Architecture) method, which is a methodology that is used to design business process models and services that will be used to suit the problems of accounting activities experienced by SMEs.

The results of this study are a design of the Open Source ERP-based Smart SME system model on accounting modules that have been adapted to the SME accounting business needs to be used as standardization and best practice in accounting activities for SMEs in Indonesia.

2. Literature Review

2.1 Enterprise Resource Planning

Enterprise Resources Planning or ERP is a system that is used to run the core business and carry out back-office management that is supported by several integrated modules such as purchasing raw materials, producing goods, selling goods and managing corporate financial accounting. Can be interpreted that ERP is a system that is used to be able to follow and support the continuity of management and handling of the company's system and automate business processes related to aspects of production, operations and financial companies [2].

ERP systems are interpreted in application systems that are used to manage data, administration and management processes of the company and help management to analyze companies in making decisions in a complete, integrated and web-based corporate environment online. ERP is developed with business processes that have become best practices, however, it can still be customized or adjusted to all user requirements (user needs) flexibly.



Fig. 1 - Enterprise Resource Planning

2.2 Small Medium Enterprise

Small enterprise is a productive economic enterprise that is independent, carried out by individuals or business entities that are not subsidiaries or not branches of companies that meet the criteria of small businesses. Medium-sized enterprise is a productive economic enterprise that is independent, carried out by individuals or business entities that are not subsidiaries or non-branch companies that are owned, controlled or become part of, either directly or indirectly with small or large businesses [3].

2.3 Open Source ERP

Open Source ERP or commonly called as OpenERP is an open-source enterprise management software that is one of the ERP applications designed to address business process problems, meet business needs, and help improve business performance in a company. The application used in this design was built using python language known as Odoo [3]. OpenERP is equipped with various modules starting from eCommerce, point of sales, marketing, CRM & sales, project, purchase, accounting, warehouse, manufacturing, human resources, and other supporting modules.

2.4 Accounting and Finance

Accounting and finance is the main module of an ERP system that is used to collect financial data from various functional processes and also to produce financial reports that are very valuable to the company. This module serves to assist companies in handling all transaction accounts that relate to entries to the system, record inputs and outputs in the financial process, and record the flow of financial activities. Accounting in Odoo also has several submodules, namely, financial accounting, controlling, investment management, enterprise controlling, and treasury. By using this module, top-level management can find out the company's financial condition in real-time [2].

2.5 SOA Methodology

SOA or Service Oriented Architecture is a systematic method used in conducting a system design that refers to step by step of the research flow that is owned by SOA and there must be input and output in the business process design. This method also refers to certain services on one platform such as applications that can make payments, transfer payments, and check the status of bank accounts in one application. In general, SOA is an architecture framework that allows the exchange of data on a company's systems so that they are integrated to run business processes [5].

In the development of this application, it will use 2 (two) of several existing methods which will then be modified to produce a method that is a guide in the development of web-based application services.[5]. The method to be modified is SOA Thomas Erl and SOMA Many methods can be used to build service-based systems, namely Thomas Erl's SOA method, Service-Oriented Modeling and Architecture (SOMA), Service Oriented Architecture Framework (SOAF), and Service-oriented Unified Process (SOUP) [5] In system design that is carried out using two of the existing methods, it will be modified to produce a method that guides the development of web-based application services [6]. The method to be modified is SOA Thomas Erl and SOMA.

In the development of this application, it will use 2 (two) of several existing methods which will then be modified to produce a method that is a guide in the development of web-based application services [11]. The method to be modified is SOA Thomas Erl and SOMA

a. SOA Thomas Earl Method

The high-level method from Thomas Erl with a top-down approach, consisting of 7 (seven) stages. Here's a picture of the method from Thomas Erl:

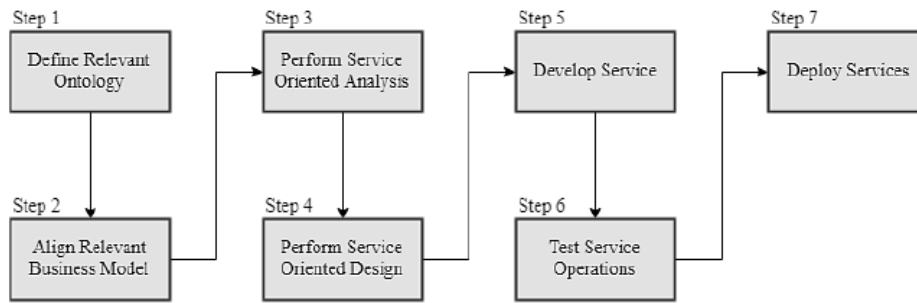


Fig. 2 - SOA method from Thomas Earl

b. Service Oriented Modeling and Architecture (SOMA) Method

SOMA method is a software development lifecycle to find solutions with service-based concepts. SOMA at its high level consists of 7 (seven) stages to identify services, i.e.



Fig. 3 - Service Oriented Modeling and Architecture

3. Methodology

3.1 Research Methodology

Based on Zeigler's theory, the conceptual model can be interpreted in abstraction in the form of a simulation model of the system design and the simulation model can be used as a form of simplification of the actual system design. The conceptual model carried out in this study is divided into 3 concepts, namely input, process, and output to create an accounting system.

Based on this approach given in figure 4, the resulting output is in the form of purchase invoices as a purchase report regarding the quantity and costs incurred in ordering goods to suppliers, sales invoices as reports from the sales department regarding the quantity and cost of revenue in selling goods to customers, the data will be entered into general ledger, then it will produce a financial statement as a form of final financial report.

1. **Input**
The input is in the form of supplier data along with data on the purchase of goods originating from suppliers, then customer data along with sales data of goods to the customer.
2. **Process**
There are two processes carried out, namely the buying and selling process. In the purchasing process there are inputting supplier data, receipt receipts, invoices from suppliers, supplier payment data (account payable / supplier payments), and SME cash expenditure/reduction data. Then in the purchasing process there is inputting customer data, sales receipts (sales receipts), invoices for customers, receipts of customer money (account payments), as well as data on income/addition of cash SMEs.
3. **Output**
The resulting output is in the form of a purchase invoice as a purchase report regarding the quantity and costs incurred in ordering goods to suppliers, a sales invoice as a report from the sales department regarding the quantity and cost of revenue in selling goods to customers. The data will be entered into general ledger, then it will produce a financial statement as a form of final financial report.

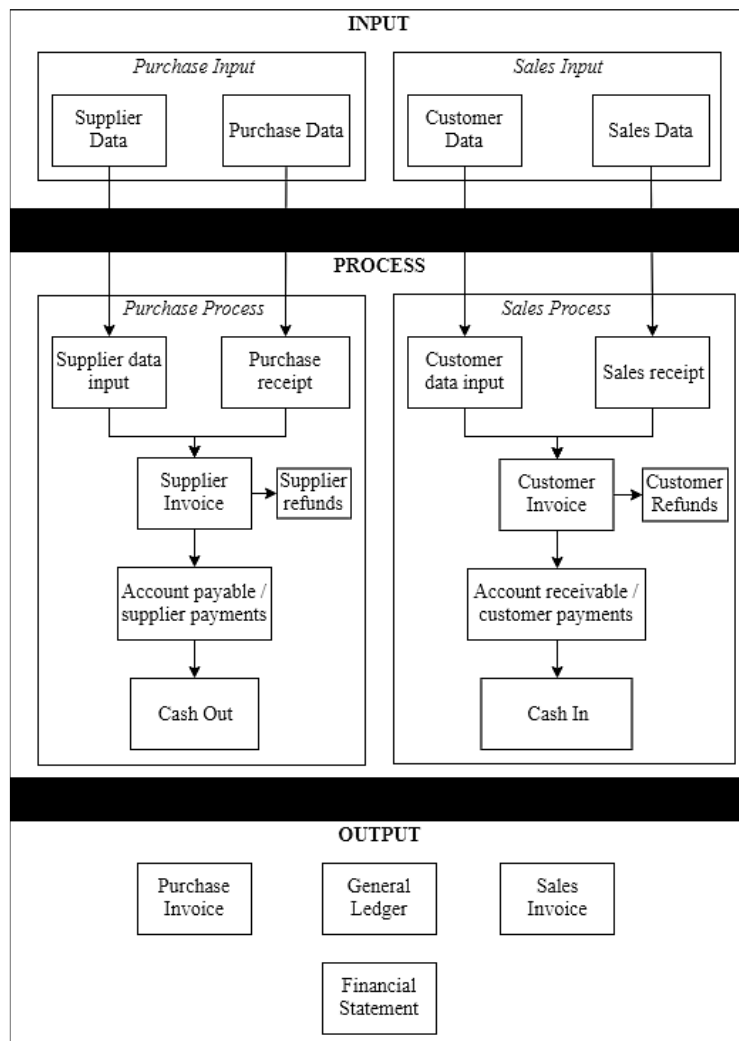


Fig. 4 - Conceptual model of research

Based on this approach figure 5, the research systematics is a descriptive explanation that describes the steps that will be carried out in carrying out the design in this study. The process of designing the Odoo system model is described using the SOA method. The SOA method has advantages in the documentation and flexibility stages applied to produce a blueprint document as a form of standardization or best practice from the accounting process in recording and managing financial reports for SMEs.

Systematic research based on SOA methods that will be used in the design of this model consists of 4 stages, from the identification stage, enterprise architecture planning, implementation stage, and deployment stage.

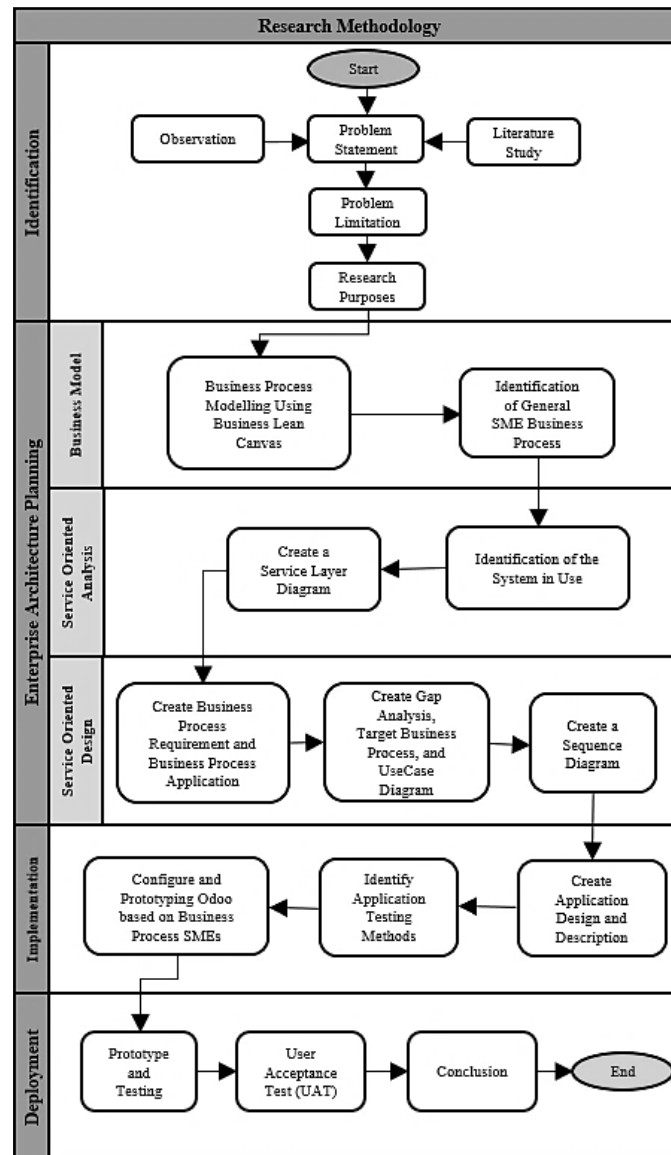


Fig. 5 – Research Systematic

4. Identification Phase

The identification stage consists of the formulation of the problem, the boundaries of the problem, observations of the research conducted, looking for literature studies that support the research, and the objectives of the research conducted.

5. Enterprise Architecture Planning

This stage is a form of realization of the concept description based on the needs of SME actors, analyzing mapping problems, solutions and advantages of concepts. This stage is divided into 3 processes, namely

- 1) Business Model
- 2) Service Oriented Analysis
- 3) Service Oriented Design

6. Implementation

In the implementation phase, the researcher will make a design and description of the application made, identify the application testing method, then configure and prototyping the accounting process in Open ERP

7. Deployment

At the deployment stage, researchers conduct a prototype and test the design application.

8. Lifecycle Testing Phase

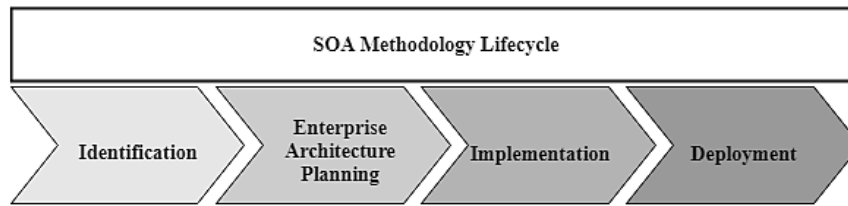


Fig. 6 - SOA Methodology Lifecycle

Based on this approach given in figure 6, SOA lifecycle has four main phases, such as identification, enterprise architecture planning, implementation, and deployment [5].

1. Identification Phase
The identification phase consists of observations of the research conducted, problem formulation, looking for literature studies that support research, determining research objectives, and define the limitation of problems [4].
2. Enterprise Architecture Planning
At this phase, researchers will make several designs, including business process modelling, gap analysis, business model targeting, designing service, and sequence diagram.
3. Implementation Phase
In the implementation phase, the researcher will install open ERP, and establish the service that will be used, then configure and prototyping the system in the accounting process based on the design of the business process that has been made [5].
4. Deployment Phase
At this phase, the researchers conduct a user acceptance test or UAT that is used to check the suitability of the system made with the design business process, then evaluate the system that has been designed, and end by making conclusions and suggestions on the research conducted [5].

9. Analysis and Design

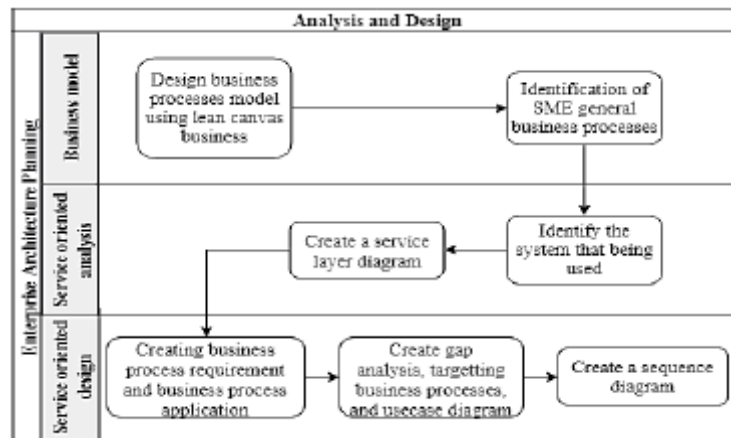


Fig. 7 - System analysis and Design Phase

Based on this approach given in figure 7, system analysis and design have three main phases, such as business model, service-oriented analysis, and service analysis design [5].

1. Business Model
At the design stage of this system, the researcher created an application design that began with the making of a lean canvas business, called BLC, which focused on problems, solutions, unique values, unfair advantages, customer segments, key metrics, channels, cost structures, and revenue streams. Next, the researcher identifies SME business processes in general, covering the main business processes, namely: purchase, production, sales, and accounting. which also involves customers, suppliers, and the warehouse part of SMEs
2. Service Oriented Analysis
At this stage the researcher will identify the system used by SMEs at this time, so researchers can see and design system models that are in accordance with the constraints experienced by the system running on SMEs, then the researcher will design a service or service by creating a service layer diagram for describes the linkages of devices found in the data layer, business layer, service layer, and presentation layer with

data source, services, user / client, and external systems that will use this application to manage finances with accounts payable, account receivable, and analytic entries.

3. Service Oriented Design

At this stage, the researcher will identify the design of business process requirements and business process applications using activity diagrams. Business processes discussed are core processes contained in the accounting system, namely, purchase requests (PR) or account payable (AP), sales order process (SOP) or account receivable (AR), as well as business processes that describe the features of analytic entries contained on the system. Next, the researcher will conduct a gap analysis based on the comparison between the business process requirements and business process applications that have been made, make use case diagrams, make business process targeting in the accounting process in accordance with gap analysis, and create sequence diagrams that describe the input and output of each process done on the system [6]

10. Service Layer Diagram

At this stage, researchers describe the design of the system to be performed using a service layer diagram following the stages in the SOA method. This diagram illustrates the connectedness of devices used at the data layer, business layer, service layer, and presentation layer with services, data sources, external systems, and users/clients that will use this application to manage finances with the functions of account payable, account receivable, and analytic accounting features.

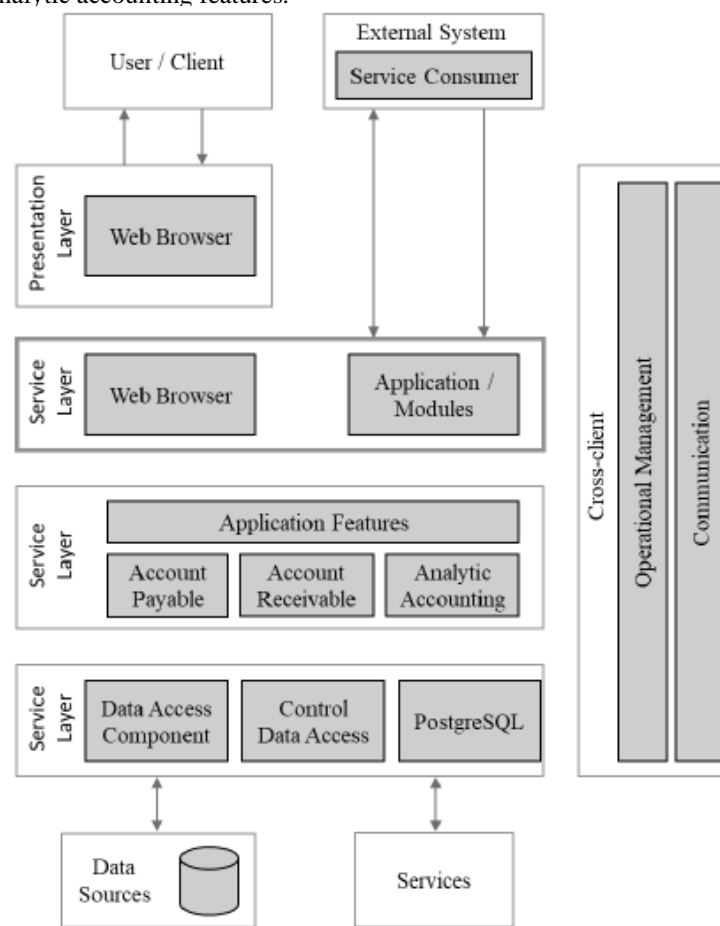


Fig. 8 - Service Layer Diagram

4. Result and Discussion

A. Proposed Account Receivable (AR) Business Process

The business process of receivable account proposals begins with the sales who receive the goods confirmation and send the product confirmation, then the accounting staff will validate the item confirmation, if the data is invalid, then the data will be entered the draft journal list. And if the data is declared valid, then the accounting manager will create a customer invoice, and the accounting staff will send an invoice to the sales department. Then the sales will process the

invoice and receive payment status. After that, the accounting manager registers the payment and checks the journal. Then the accounting staff will print an item sales report.

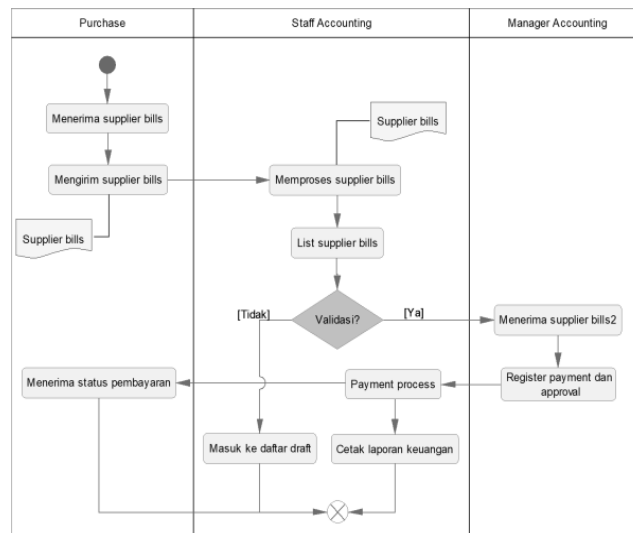


Fig. 9 - Account Receivable Business Process

After the accounting department receives supplier bills, the accounting department will make payments in the form of cash or account payable (A/P) to the supplier. If payment has been completed, the supplier will confirm receipt of payment to the purchase so that a purchase invoice can be sent to the accounting department. Furthermore, the accounting department will input purchase transaction data into the general ledger, make a chart of accounts, and make financial statements in the form of financial statements. on the other hand, the accounting department also performs trial balance calculations to calculate profit and loss, cash flow, and capital planning for further business activities.

Purposed Account Receivable Business Process

The account receivable process starts with the customer who confirms the order of goods to the accounting department with input sales data. Then the accounting department will send an invoice to the customer, then the customer will receive an invoice and make a payment, then the sales will confirm the payment conformity. After that, the accounting department will receive payment, then input transaction data into G/L, create COA, generate financial statements/reports, and see a trial balance to calculate a balance sheet [6].

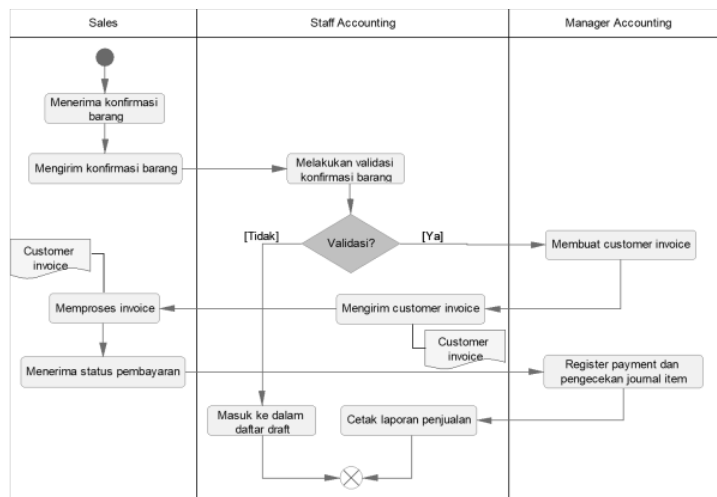


Fig. 10 - Account Receivable Business Process

The sales order process (SOP) activity starts with the customer who orders the goods and sends the purchase order (PO) to the sales department. Furthermore, the sales department will process the PO and check the goods to the warehouse. If the goods are not available, the sale of goods will be made on a make-to-order (MTO) basis. However, if the goods are already available, the sale of goods is done by make-to-stock (MTS).

B. Analytic Entries

Analytic accounting process starts from the staff accounting section which verifies the invoice based on the sale or purchase transaction of goods that have been carried out, then performs the payment register and payment approval. Furthermore, the accounting manager will do the making and input of accounting journals, the next step the manager will make the transaction data based on the journal entries and cash disbursements that have been made, perform data records, and will finally analyze the costs and revenues contained in SMEs.

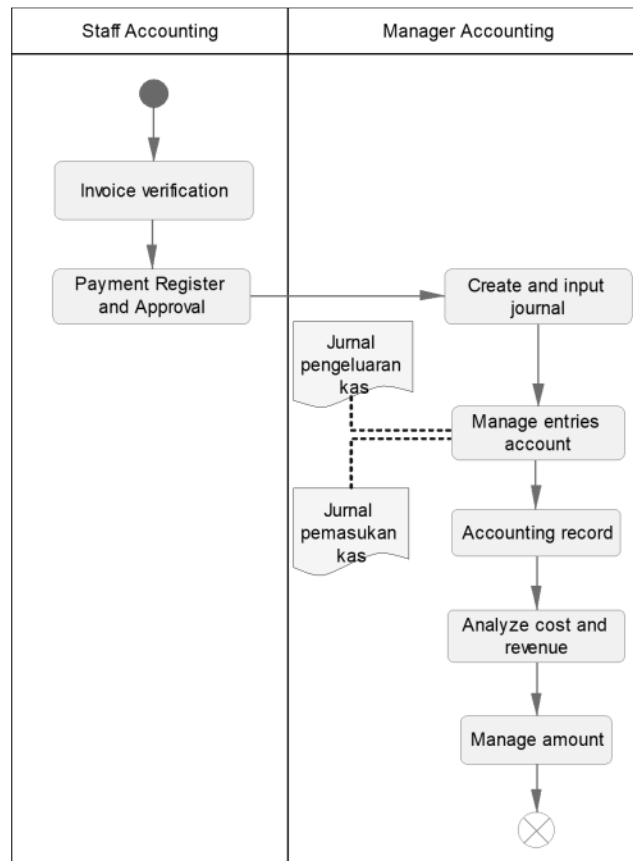


Fig. 11 - Analytic Entries

In this section, the manager can also arrange the amount of money for the needs of further business processes such as payroll or purchase of raw materials.

C. Modeling Application Software Requirements

To provide a clearer picture of the functions provided by the application, an application control modeling will be performed which will be shown in the form of a use case diagram illustrated as follows.

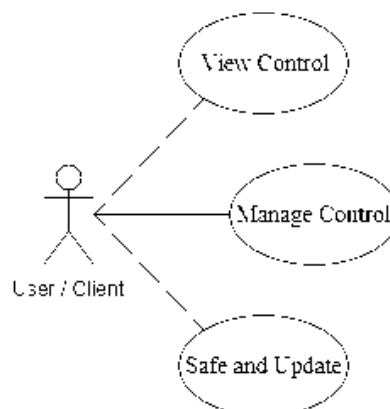


Fig.12 - Modeling Application Software Requirements

5. Conclusion and Future Research

Based on the results of the research from the design of the Open Source ERP system on the "Smart UKM" application that has been carried out in the accounting process, some conclusions can be drawn, namely the design of this system model based on the steps contained in the SOA research method flow and produce a business flow can be used by SMEs in Indonesia. As well as the results of the model design that is carried out in the form of modeling business processes in the accounting system that is adapted to the processes in the ERP system and producing a blueprint document or best practice in the accounting process that can be used as a reference for future accounting system development and planning for SMEs.

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