Research Article

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Application of organization goal-oriented requirement engineering (OGORE) methods in erp-based company business processes

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Abstract: The implementation of an information system that supports company goals is the main strategy of an organization. But aligning business strategies with information system(IS) and information technology(IT) is not as easy as it seems, because there are several gaps of strategies between upper level and practical level. Often the focus in system development is only on the architecture of the future system, even though the study says that the engineering model of needs is the most important thing in the process of developing the company's system. PT. SBS is a distributor and supplier company. Along with the development of its business, business processes also become more complex. The information system that was originally felt to be sufficient is considered to be no longer optimal so that it often results in delays in delivery with a fairly large percentage. Therefore, an Enterprise Resources Planning(ERP) system will be developed but it must be ensured that the business processes used are oriented towards organizational goals. The purpose of this study is to introduce and explain the stages of the Organization Goal-Oriented Requirement Engineering (OGORE) method as a requirement engineering method in a company's business processes that focuses on organizational goals. The research method was done by collecting business process data and defining key performance indicators(KPIs) in a small discussion group with stakeholders in the company. The results of this method were Goal Tree Model (GTM) diagrams which was then used as a reference in describing

new business processes and in preparing the requirements specification documents. The conclusion obtained that the stages of the OGORE method are able to eliminate needs according to the organization's goals. It is also recommended to use the OGORE method as one of the requirements management steps in the Enterprise Architecture method to create new method as an agenda for the future.

Keywords: Business Process, Organization Goal-Oriented Requirement Engineering (OGORE), Goal Tree Model (GTM), Key Performance Indicator (KPI)

1 Introduction

Often in making the architecture of is / it system development, the focus is only on representing the present and future system architecture, whereas according to [1] requirements modeling are the most important activities in the system development process company. In fact, requirement modeling based on the organization's goal is classified as a new type of requirement analysis [1].

PT. SBS is a distributor and supplier company in Jakarta which is engaged in office supplies and stationery items. The previous information system in the company was able to handle all basic needs starting from the purchase, storage, and sales module. Along with the development of its business, business processes in this company also developed to become more complex. The initial information system was created to accommodate around 500 variations of goods. Along with its development, the company currently has more than 1500 variations of goods. Some manual procedures are needed that require a considerable amount of time to be able to meet the business process needs. As a result, organizations often experience delays in delivery. This problem occurs triggered by work processes within the company which is considered to be less optimal because the system is less integrated. Therefore, the management of the company decided to develop the system using an ERP system called SmartSoft in order to

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encourage better work processes in this organization. However, studies show that the main mistake in developing a system is the capability to analyze business objectives or organizational goals [2]. In system development planning, it must be ensured that the business process used is a business process oriented towards organizational goals. The Organizational Goal-Oriented Requirement Engineering (OGORE) is a new method that is introduced from an approach that uses organizational objectives extracted into system and information technology objectives with KPIs at each goal that overrides the individual user needs [3]. The results of the OGORE method are the Goal Tree Models (GTM) which opens up the possibilities of minor changes that are needed by the system based on the main objectives of the system so that the system is more directed according to the organizational goals.

Contributions of this study have these three features; the paper analyses business processes that run in actual company; the paper shows the explanation of the stages of using the Organization Goal-Oriented Requirement Engineering (OGORE) method; and the paper employs the Goal Tree Model (GTM) that is produced to be refined and used as a reference for developing systems that support the achievement of an organization goal at PT. SBS.

2 Problem Statement and Preliminaries

2.1 Requirement Engineering

Requirements engineering are a difficult step and very essential in software development. Generally, the needs come from a thoughtful approach with users and other stakeholders, can be in the form of brainstorming sessions, interviews, or questionnaires; all is done to obtain information about user needs for further system development [4]. Requirement engineering is a branch of software engineering that deals with goals, functions, and constraints of software systems for purposes in the real world. Current requirement engineering is often referred to by the community as goal-driven [5].

Requirement engineering is a process where the needs of one or more stakeholders and their environment are based on finding solutions to a problem and is the key to the success of any system development project. The purpose of the needs revision is to understand the needs that arise from stakeholders and turn them into solutions. This means that the focus of engineering needs lies in the interaction and not the nature of a solution to the problem [6].

Activities from engineering needs including [5] domain analysis, elicitation, negotiation and agreement, formulation, specification analysis, documentation, evolution,

2.2 Organization Goal-Oriented Requirement Engineering (OGORE)

In fulfilling the requirements to involve users in building a system, it takes a method that can manage engineering customer needs so that the system developed avoids the risk of deviating from the organization's goals. According to [7] OGORE is a new method that is being developed that really emphasizes organizational goals, which have the aim of reducing the risks that arise because of the needs of users based on their personal desires.

According to Adikara's research, starting from the organizational goal approach extracted to IT goals and putting the Key Performance Index (KPI) on each goal, the goal of the OGORE concept is to define company profiles and extract expected organizational objective can be affordable through a new system [7]. Then KPI is defined for the purpose of engineers and stakeholders, it must be emphasized that KPI can only be reached if stakeholders and users use the development of a new system based on its objectives. With that, it will reduce the risk factors of the user's needs; because the defined goals come from organizations and not from users. Steps of the Organization Goal-Oriented Requirement Engineering (OGORE) as explained are confessed in the MultiConference of Engineers and Computer Scientists in Hong Kong that there are two main processes namely Organization Goal-Oriented Elicitation and requirements refinement process and analysis. Flowcharts of steps can be seen in Figure 1.

Steps in Figure 1 can be divided into three stages, which are [3]:

1. The initial step is done by defining the vision, mission, and goals of the organization. Engineering needs are carried out with stakeholders to identify organizational goals that must be achieved by developing this system.
2. The second step is done by defining KPI for each goal of the target to be achieved. After the elicitation process is done, we get the Goal Tree Model, KPI, and business domain that can be used as initials of information to improve needs and process analysis.
3. The third step is to improve the need using the results of the elicitation that has been done with the method of case-based reasoning (a method of

Figure 1: OGORE Steps (5).

problem-solving based on solutions to similar problems that have previously occurred).

3 Methods of works

Data collection is done by collecting data on the business process of buying and selling at PT. SBS. The two business processes are then described using the BPMN diagram tools. The literature study is then carried out as a guide and the basis of knowledge for writers in conducting research. The literature study used is taken from the literature of studies related to engineering needs with the Organization Goal-Oriented Requirement Engineering (OGORE) method in previous studies. Furthermore, the formulation and limitation of the problem are carried out to be the reference of the author in conducting this research, so that the research carried out is directed under the objectives and limits set.

The OGORE process is the stage of using OGORE techniques to achieve the research objectives of the business process engineering needs that are under the company's

main objectives. This process is carried out according to the stages of previous research, which are:

- Defining the vision, mission and main objectives of the organization that must be achieved through the development of this system in terms of business processes and technology.
- Defining KPI for each goal to be achieved.
- After the KPI is given, elicitation is done to get the goal tree model (GTM), KPI, and business domain that is used as information to improve the needs and process of analysis.

The results of OGORE method are in the form of a Goal Tree Model (GTM) which will be documented and will become a reference in developing the stages of the business process that focused on the organization goal. The results of the process carried out are GTM mapping in the company's business processes to obtain a business strategy that will be implemented at PT. SBS.

3.1 Purchasing Business Process at PT. SBS

The purchasing process in this organization involves several roles, which are procurement, warehouse, QC, finance, and general manager (GM).

3.2 Sales Business Process at PT. SBS

This business process involves marketing, warehouse, operational, delivery and finance teams.

4 Result

4.1 Requirement Gathering Process

The first stage of the OGORE method is the collection of needs that was conducted by interview techniques and small discussion groups from stakeholders in the company, as well as consultants and company system developers. The discussion begins with the company's vision, mission, and objectives, as well as an ongoing system operating procedures and expected system implementation results.

Here are the purpose and function of the general operating system that must exist in the business process of purchasing:

1. Make purchase requisitions documents under the needs of the goods
2. Making purchase orders documents to suppliers
3. Making a receipt document containing detailed information on the goods received

And then the purpose and function of the general operating system that must exist in the business process of selling include:

1. Making sales records in the form of a Sales Order (SO)
2. The process of making a list of items to be prepared usually called a picking list (PL)
3. Making documents for shipping goods or delivery orders (DO) which is the basis used by couriers to deliver goods from the company to the customer or expedition
4. Document receipt of goods by the customer
5. Function to make invoices as billing documents made based on sales orders, delivery orders, receipts of goods from customers and the status of payment of goods from customers.

The stakeholders that interviewed include from the Department of Procurement, Department of Warehouse, Department of QC, Department of Finance, and The General Manager (GM).

The purposes of the data gathering is to observe and report with the purchase requisition made by the warehouse that must be approved by procurement. The history of goods coming in and out must be accessible in real time to facilitate the process of stock opname. The number of purchase requisition items that have become purchase order and approved must be reported to the warehouse parties.

Moreover the quality of products that purchase must be checked and valudated by the Quality Control Department. Prior the purchase, the Finance Department will provided detail checke whether the items that intend to buy already match with the budget and requested invoice. We select two persons from the Department of Procurement, two person from Department of Warehouse, one person from Department of QC, one person from Department of Finance, and one person as The General Manager (GM).

These people are the representatives that suitable on the data gathering.

4.2 Determining Key Performance Indicators

Through interviews about the company's objectives and the objectives of the system development function described above, goals, tasks, resources, and actors can be obtained from the company. Then KPI is determined to be achieved by management for each business process in implementing SmartSoft ERP in this company. In purchasing business process, there are nine key performance indicators that were determined

a) Purchasing activities:

- Control the purchase of goods which are company needs
- Total stock details and prices must be accessible in real time
- Controlling purchase orders under the terms of purchase applicable per certain period
- Control purchase orders that are made to match the purchase requirements provided
- Ensure that the goods received by the warehouse have been recorded directly on the system
- Controlling the stock in the warehouse
- Ensure that the goods received are in good condition and intact

- Control payments according to items received
- Manage payments according to the supplier's grace period

b) Purchasing business process KPI:

- 100% PO based on PR / item analysis (demand for goods and stock items)
- Real-time goods calculation
- 100% of POs are processed according to approval
- 100% PO based on PR
- 100% receipt of goods recorded on the system
- 100% PR based on goods needs
- 100% of the items are received in good condition
- 100% payment according to the items received
- 100% payment on time

As on sales business processes, there are twelve KPI's that were determined in this step.

c) Sales activities:

- Controlling that the sales that occur are customer goods needs
- The amount of detailed item inventory and selling price to the customer must be accessible in real time
- The number of details of sales can be accessed periodically in real time
- Control sales order data and customer needs
- Access sales data that has been done by the customer
- Print proof of payment and description of online sales items
- Control the stock of goods out
- Updating goods stock directly
- Control the delivery of successful items
- Control and verify the sale of goods through PL, SO, and DO
- Control online payments
- Control invoices to fit other documents

d) Sales KPI:

- 100% of sales based on analysis of customer goods demand (supply and PO)
- Analyze the stock in real time
- 100% SO based on analysis of PO customer requirements and requests
- 100% sales history can be accessed real-time
- 100% of online sales and payment data has been verified
- 100% of goods are prepared based on the PL

- 100% Quantity of product input and output accordingly
- 100% of items sent successfully are recorded in the system
- 100% Picking List is based on SO
- 100% DO is made based on PL and SO
- 100% delivery of goods based on DO
- 100% of online payments have been recorded on the system
- 100% of documents (invoices, tax invoices, receipts) are made based on the SO that is active.

4.3 Goal Tree Model Improvement

Based on the goal tree model (GTM) that has been obtained, then needs are refined by conducting a discussion group and conducting a GTM comparative analysis of the case studies that resembles this to reduce the possibility of errors that occur in business processes in this company. Figure 2 shows the refinement made in purchase business processes as an improved GTM, and Figure 3 shows the refinement made in sales business processes as an improved GTM in sales process. These refinements are described as follows:

a) Purchasing activities:

- Purchase requisition made by the warehouse must be approved by procurement first and seen whether the requested stock of goods is fast-moving items because the goods which are not a fast-moving items does not require too much stock and whether the demand for goods is under sales order
- History of goods coming in and out must be accessible in real time to facilitate the process of stock opname
- The number of purchase requisition items that have become purchase order and approved must be reported to the warehouse parties in order to follow up on the goods needed by SO that can indeed be fulfilled.

b) Purchasing KPI:

- 100% PR is processed according to approval
- 100% history of in and out goods accessed in real time
- 100% of the number of goods approved in the known PO warehouse

c) Sales activities:

Figure 2: Improved GTM of Purchase Process.

- Sales order made by marketing staff is processed after obtaining approval from the marketing manager and finance manager. An analysis of customer validation and the feasibility of customer payment conditions are made on the sales order.
- Delivery order is processed according to the approval of the general manager
- Control the stock of goods in and out to make it easier when doing stock inventory

d) Sales KPI:

- 100% SO is processed according to approval
- 100% DO is processed after getting approval
- 100% history of items accessed real-time

Figure 3: Improved GTM of Sales Process.

4.4 Business process diagram based on improved GTM

Through the new GTM results, the sales and purchase processes will be illustrated in the form of BPMN. In the purchasing business process, several actors are involved including the warehouse, QC staff, procurement staff, general managers, and finance. The purchase business processes are described as follows:

1. The procurement party analyzes the required stock and confirms the warehouse

2. The warehouse checks the stock and history then makes homework
3. Procurement then analyzes the PR agreement, if approved, PO will be made
4. PO will be analyzed by the general manager to be adjusted to the terms of purchase
5. The approved PO will be sent to the supplier and confirmed by the procurement to the warehouse so that the number of future goods is known
6. QC staff then checks the incoming goods to ensure the condition and type of goods are correct
7. The warehouse team will then make the receipt document according to the items received

8. Finance will match the invoice with the issued PO and the number of items received
9. Finance will then make payments according to the payment due date to the supplier.

As in the sales business process, several actors are involved include marketing staff, marketing managers, operational staff, general managers, warehouse, delivery, and finance. These sales business processes run as follows:

1. Marketing staff analyze the needs of goods for customers and make offers to customers.
2. Marketing staff makes SO according to customer goods requirements agreed upon by both parties.
3. The marketing manager analyzes SO validation that is made and forwarded to the finance to be confirmed
4. After approval, operational staff will make the PL according to the SO provided
5. The PL is forwarded to the warehouse to be prepared for the goods and given to the delivery staff
6. Operational staff will then make DO as a shipping document
7. DO which was made will be analyzed by the general manager based on SO and PL
8. When approved, the items will be sent by delivery staff to the customer
9. The delivery staff will make the receipt document in accordance with the receipt of goods, any returned items will be noted in returned documents and given to the warehouse staff to be forwarded to the operational staff
10. Staff marketing prints documents for paying off sales items online and is given to operational staff
11. All shipping documents are continued to finance for analysis and printing of invoices and other documents (tax invoices and invoices).

4.5 Requirements Specification Document

The final result of this research is the making of requirements specification documents. The feature design customization limit is only done in the Smartsoft ERP system environment. The result of ERP feature is a feature of the SmartSoft ERP that has been provided with the addition and emphasis of features according to the main needs of business processes which includes purchase orders, receive orders, purchase return, sales orders, cash register, invoice, sales return, stock adjustment, petty cash, check out control, debt and receivables, down payment, bank account, transaction journal, general ledger, posting and

Figure 4: Sales Order and Purchase Order Approval Interface.

closing, export and import transaction journal, and financial statements.

There are features added mainly to eliminate any errors or personal interests in the company's business processes, which are PO approval through the PO checking feature and SO approval through the SO checking feature that can be accessed and analyzed. The main view of the approval feature can be seen in Figure 4.

5 Conclusions

Based on the results of the application of the Organization Goal-Oriented Requirement Engineering (OGORE) method in engineering the need to implement SmartSoft ERP systems in business processes in PT. SBS concluded that the OGORE method was able to eliminate needs under the company's objectives in the business process with the following explanation:

1. The OGORE method provides a solution to anticipate user errors in business process operations by defining approval processes in the initial process of operational documents such as sales orders and purchase orders.
2. Anticipating the occurrence of errors from the warehouse in tracking and analyzing the stock of goods from the previous system, which previously only can see the amount of stock with the addition of the history and entry information features of goods that can be accessed real time.

3. Preventing fraud in making data that is not under the initial document because the system is already connected so that only sales order documents and purchase order documents are approved that can be processed immediately and cannot be changed again without the consent of the stakeholders.
4. The addition of monitoring features that provide access to stakeholders to be able to see the status of each purchase order and sales order that is carried out helps to achieve control of the business processes of buying and selling at the company. Through the research carried out, advice that can be given in the use of the Organization Goal-Oriented Requirement Engineering (OGORE) method is to be able to use the results of the research and methods in the form of Goal Tree Model (GTM) as a reference in refining the GTM in future research. It is also recommended to use the Organization Goal-Oriented Requirement Engineering (OGORE) method as a requirement management method in Enterprise Architecture methods such as The Open Group Architecture Framework (TOGAF) to create a new method as an agenda for the future.

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