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DESIGN OF A PROCUREMENT MANAGEMENT SYSTEM FOR THE CORPORATE EXCELLENCE STRATEGY OF PT. XYZ

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ABSTRACT

One factor that is often the center of expense expenditure by companies is material purchases. The purchase involves several parties, namely the buyer and the seller or supplier of the goods, and in practice the user is the party who requests or assigns the task to the provider for certain goods. Therefore, to maintain the smooth supply of the company's raw materials, every implementation of the company's activities will not be separated from the need for procurement of goods and services. This study aims to design and build an application model for aircraft parts procurement systems from the preparation of business processes, system design and database design. The stages of the research will be carried out by formulating the needs of information systems model for spare parts procurement in accordance with the company's objectives and designing the model of spare parts procurement application systems to support the improvement of aircraft components. The design phase is carried out using a Data Flow Diagram (DFD) case tool and database design uses a relational database as a storage medium for all transaction data. The results of mapping the attributes into a relational table are designed with the concept data modeling and physical data modeling.

INTRODUCTION

In this industry 4.0 era, more and more companies are using information systems to carry out their business processes. Over the past decade, information systems have changed from simple systems that have limited capabilities to complex systems with integrated architecture [2]. Similarly, the PT. XYZ is a company engaged in component repair and aircraft parts sales. PT XYZ has three Divisions and twelve departments, which to support its business transactions use an integrated information system that accommodates business ERP (Enterprise Resource Planning) processes. One of the main

business processes at PT XYZ is the procurement of finished materials in the form of aircraft parts intended for the needs of customer aircraft component repairs and the sale of spare parts to customers. This material procurement process starts from the Purchase Requisition to Quality Inspection from the procurement request until the goods arrive at the receiving. Each spare part purchased will be matched to the time of planning to arrive, the quantity of planning to the order, and the quality of the goods according to the order. Matching the quantity of the order with the receipt, the timely arrival of planning, good quality of goods, and the quantity of the order is the responsibility of the supplier. If there is a mismatch in terms of both quality and quantity, the admissions department will publish the minutes and submit it to the Procurement Department. Furthermore, the purchasing department follows up by coordinating with the supplier.

Problem Formulation

Based on the introduction above, the problems to be investigated can be formulated as follows:

1. Is there already a design model for aircraft component parts procurement at PT. XYZ
2. Is there a computer-based information system at PT. XYZ to procure aircraft parts that are integrated with other systems.
3. Are there any supporting devices for managing aircraft parts procurement activities that are currently available at PT. XYZ
4. Is there an application model that can provide useful information for management, both for the benefit of selling spare parts and for repair services
5. Is there an integrated database between work units within the Logistics Division.

RESEARCH OBJECTIVES

From the description above, in general the purpose of this research is to design and build an application model for aircraft parts procurement system from the start of business process preparation, system design and database design.

RESEARCH METHODS

There are two stages that will be carried out to realize the ultimate goal of this research. The stages of the research to be carried out are as follows:

1. Formulate the need for information system model for spare parts procurement in accordance with company objectives.
2. Designing an application model system for spare parts procurement to support aircraft component repair.

This research method uses the waterfall model, where the model development is carried out from the level of system engineering continues to the level of analysis and design, while for the programming and testing stages will be carried out in further research.

LITERATURE REVIEW

Procurement

Procurement is an activity that is complex enough to get the goods needed by the company in terms of their needs and uses, as well as in terms of quality, quantity, delivery time and affordable prices [5]. Procurement is the purchase of goods and services by the company [9]. Whereas Procurement Management is the coordination of all activities related to product purchases and service needs to perfect the mission of an organization [9].

The process of purchasing goods and services is one of the tasks of the procurement department. However, if viewed from its purpose, namely to provide goods and services at low prices, quality, and delivered on time. The duties of the procurement department are not limited to routine purchasing activities. In general, the tasks performed by the procurement department are as follows [5]:

a. Design the right relationship with the supplier.

Relationships with suppliers can be long-term partnerships or short-term transactional relationships. Which model is the right relationship depends on many things, including critical whether or not the goods purchased from the relevant supplier and the value of the purchase.

b. Choose a supplier.

The activity of selecting suppliers can take a lot of time and resources if the intended suppliers are key suppliers. The difficulty will be higher if the suppliers to be selected are in foreign countries (global suppliers). For key suppliers that have the potential to establish long-term relationships, this selection process can involve an initial evaluation, inviting them for presentations, site visits and so on.

c. Select and implement suitable technology.

Procurement activities always require technological assistance. With the advent of the internet, procurement technology has developed very rapidly.

d. Maintain required item data and supplier data.

The procurement department must have complete data about the items needed as well as data about the supplier.

e. Doing the buying process.

This activity is the most routine work carried out by the procurement department. The buying process can be done in several ways, such as routine purchases and purchases through tenders or auctions. Routine purchases and purchases by tender go through different processes. There are a lot of negotiation and administrative activities that must be carried out in this purchasing process.

f. Evaluating supplier performance.

Supplier performance evaluation is also a very important job done to create sustainable competitiveness. The results of this assessment are used as input for suppliers to improve their performance. For buyer companies, supplier performance can be used as a basis for determining the purchase volume (if there is more than one supplier for similar items) or for determining supplier

ratings. The criteria used to assess suppliers should reflect supply chain strategies and types of good

Supplier Evaluation and Selection

Supplier evaluation and selection is one of the activities of the procurement department which has a major role to maintain the smooth production process in a manufacturing company, so this activity should receive more attention. This is because suppliers are an important part of the procurement of goods. The supplier selection and evaluation process has an important role and significant impact on purchasing management in the supply chain [4]. This process is also a complex problem in decision making problems with several criteria which are influenced by several conflicting factors.

Supplier Selection Criteria

Choosing a supplier is a strategic activity, especially if the supplier will supply critical items and or will be used in the long term as an important supplier [6]. In general, many companies use basic criteria such as the quality of goods offered, price, and on time delivery. But often the selection of suppliers requires other criteria that are important to the company. Of course, the level of importance of each criterion depends on the characteristics of the goods or services to be purchased and the strategic objectives to be achieved so that the procurement function appropriately supports the organization's overall strategy to be realized. After the criteria has been established and a number of supplier candidates have been obtained, the company must choose the prospective supplier to be used. The company might choose one or several of the alternatives. In this selection process the company may have to rank to determine which suppliers will be selected, or which will be the main suppliers and which will be used as backup suppliers.

PROCUREMENT METHOD.

Some companies use different methods to obtain products and services depending on what and where they are buying, the quantity needed, how much money is used and others.

The main methods of procurement consist of [9]:

a. Buy from manufacturers, wholesalers, or retailers from catalogs and negotiations.
b. Buy through linked catalogs by checking seller catalogs or buying through industry malls.
c. Buy through an internal buyer catalog where the company approves vendor catalogs including price agreements. This approach is used for desktop purchasing implementation, which allows requisitions to order directly from the vendor.
d. Hold a tender offer from a system where suppliers compete with each other. This method is used for large purchases.

e. Buy from public or privacy auction sites where the organization participates as a buyer.
f. Join a group of buyer systems which examines participant demand, creating large numbers. Then this group can negotiate prices or initiate a tender process.
g. Collaborate with suppliers to share information about sales and inventory, so as to reduce inventory and enhance on time delivery.

The procurement model includes [7]:
a. Focus on business
b. Adaptive to the latest trends
c. Based on information technology systems
d. Continuous process transformation
e. Strategic Partnership
f. HR Development
g. Continuous innovation

Procurement Business Process

Procurement procedures and processes vary within an organization, including delivery time, product quality, supplier credibility and in the procurement cycle the primary consideration is profit margins [1]. The procurement procedure starts with the Procurement Department obtaining relevant suppliers and agreeing to the terms of a good agreement regarding the price of the goods to be traded. A business transaction has requirements for certain products or services, by issuing bid proposals, either through direct negotiations or through an auction process [1].

Procurement business processes generally include [1]:
a. Identifying the needs of goods and services
b. Finding suppliers
c. Requesting proposals/quotations (RFP/RFQ)
d. Negotiating with suppliers
e. Agreeing terms with suppliers
f. Arranging and receiving products/services
g. Performing quality assurance
Analysing results and margins

Figure 1. Procurement business process [1]

Software Development Life Cycle (SDLC)

Software Development Life Cycle (SDLC) is a methodology in making information systems consisting of several stages. SDLC is prepared according to the needs of management or organization. SDLC has several models such as fountain, spiral, RAD, waterfall, incremental, and prototyping. The stages in SDLC are requirements, design, coding, Testing, [3].

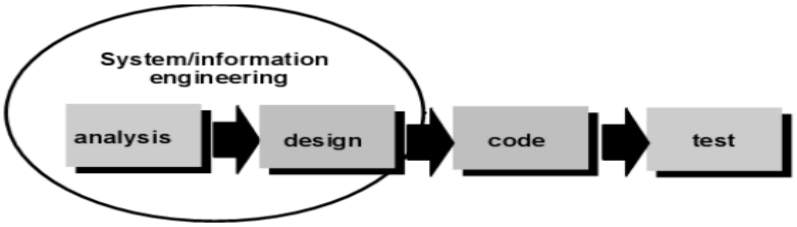

Figure 2. SDLC Model [3]

While the phases of the waterfall model according to Ian Sommerville are as follows:

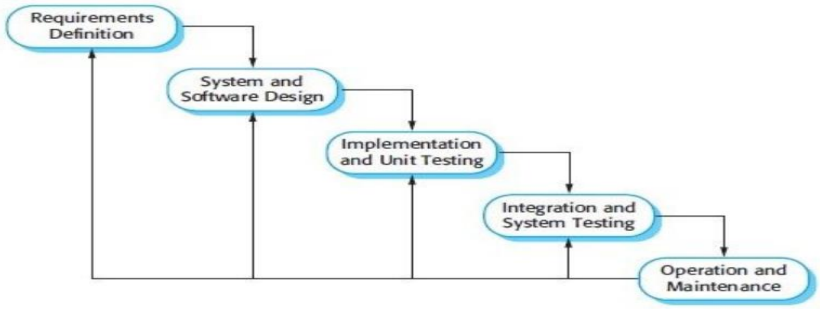

Figure 3. Phases of the SDLC Model [8]

a. Requirement Analysis and Definition

At this stage the system features, constraints and objectives are determined through consultation with system users. All of these will be specified in detail and function as system specifications. The way to do this is to collect the complete requirements and then analyze and define the needs that must be met by the program to be built. This phase must be done in full to be able to produce an accurate design

b. System and Software Design

In the System and Software Design Phase, a system architecture will be formed based on established requirements. in addition, identification and depiction of the basic abstraction of the software system and its relationships are carried out. The design is done after the complete requirements are collected in full.

c. Implementation and Unit Testing

In this Implementation and Unit Testing phase, the results of the software design will be realized as a set of programs or program units. Program design is translated into codes using predetermined programming languages. The program built by each unit will be tested if it meets the specifications.

d. Integration and System Testing

In this Integration and System Testing phase, each program unit will be integrated with each other and tested as a whole system to ensure that the system meets existing requirements.

e. Operation and Maintenance

In this Operation and Maintenance stage, the system is installed and put into use. It also corrects errors that are not found at the manufacturing stage. In this stage, system development is also carried out such as the addition of new features and functions.

Procurement System Business Process at PT. XYZ

The procurement system process is first carried out in the Logistics Division of the Planning Department as a central function of Porecasting management. This department formulates and determines the planning of spare parts requirements from the results of forecasting with the output in the form of a Purchase Request. Henceforth the Procurement Department will take the following steps:

a. Receive Purchase Requests from the Spare Planning Section
b. Make Requests for Quotation submitted to the Supplier or Vendor.
c. Receive Quotations from Suppliers
d. Evaluating Sheet
e. Winner Selection
f. Create Purchase Order (PO)
g. Send POs to QA (Quality Assurance) for inspection and approval
h. Receive PO QA Verification results
i. Send POs to Suppliers and the Ministry of Finance
j. Receive reports of receipt of goods from the Receiving section.

In general, the business process description of the existing procurement system is as follows:

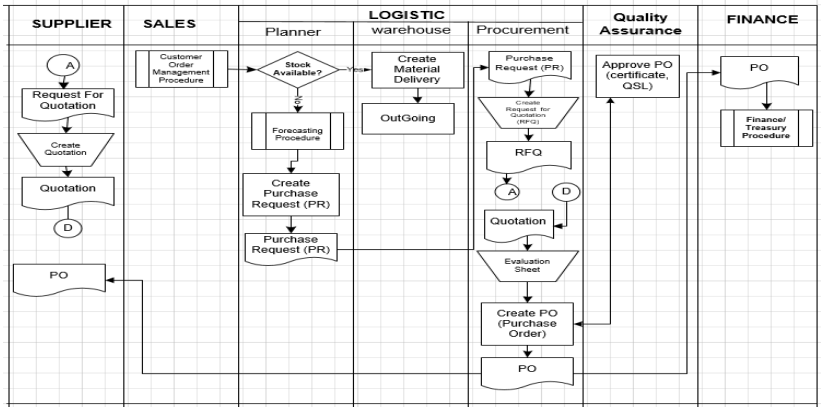

Figure 4. Existing Procurement business processes

System design

The planning stage is done using the Data Flow Diagram (DFD) case tool. The DFD design for the Procurement System application system is as follows:

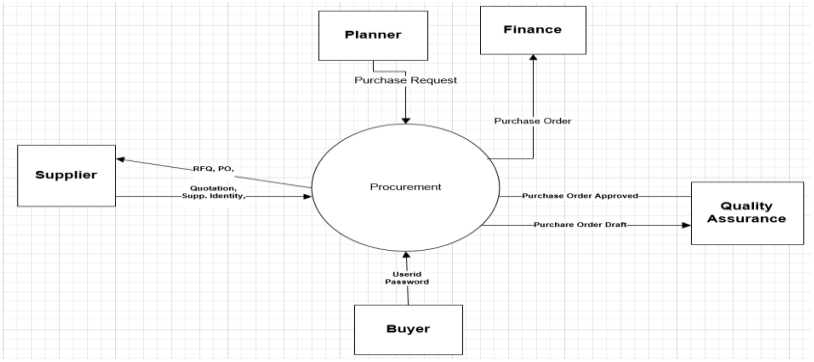

Figure 5. Context diagram of the Procurement application system

The main processes in the Procurement System can be seen in table 1.

Table 1. Procurement Application System Processes

Process Number	**Process Name**	**Description**
1.0	Supplier data management	The process for managing supplier data consisting of the complete supplier identity and the parts that are supplied
2.0	Request for Quotation	Process request for price / invitation to Supplier / vendor through the procurement department / buyer to submit material or service supply (price, method of payment, etc.). Then the Supplier / Vendor will respond the invitation by giving a document called Quotation
3.0	Quotation	*Supplier / Vendor Answers to RFQ from buyers that contain, Prices, Lead Time, warranty and others*
4.0	Evaluation Sheet	The process by which the procurement / buyer team analyzes and evaluates all quotations from incoming suppliers / vendors. The process is in the form of evaluation and analysis of prices, terms of payment, duration of delivery, warranty and others.

5.0	Winner Selection	The vendor / supplier selection process is based on the evaluation sheet process results and information recommendations from Purhase Requisition (PR) to further make a Purchase The order.
6.0	Purchase Order	Request process or instructions from the Procurement Department in this case the Buyer to the supplier / vendor (external supplier). Purchase Order (PO) identifies the vendor, Confirming the product ordered, the amount needed, and agreed prices. PO made at the time ready to confirm the order
7.0	Login	Facilities intended for users and buyers to enter the application system.

From the description of each process above, we can draw a level 0 data flow diagram for the Procurement Application System as shown in Figure 6.

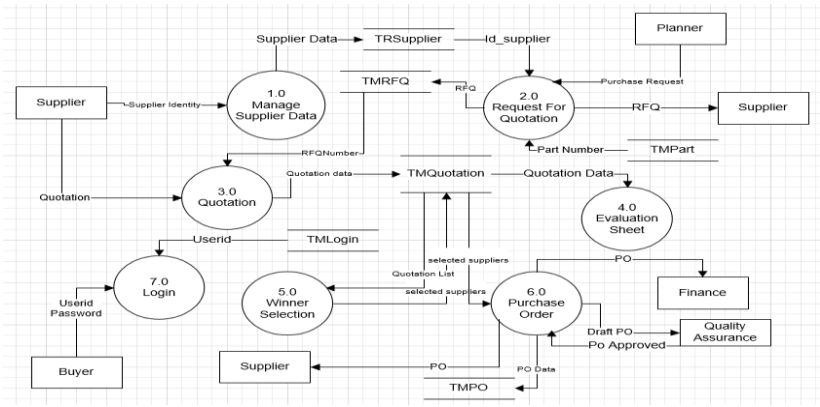

Figure 6. Data Flow Diagram Level 0 Procurement application system

Database Design

The procurement system was built using a relational database as a storage medium for all transaction data. Each process interacts with transactions to access the database, so a process mapping is needed into the relational

database. The results of mapping the attributes into the relational table can be seen in the concept data modeling and physical data modeling as follows:

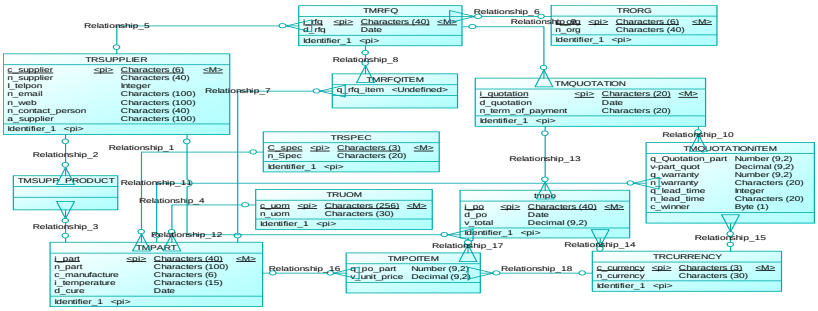

Figure 7. Concept Data Model

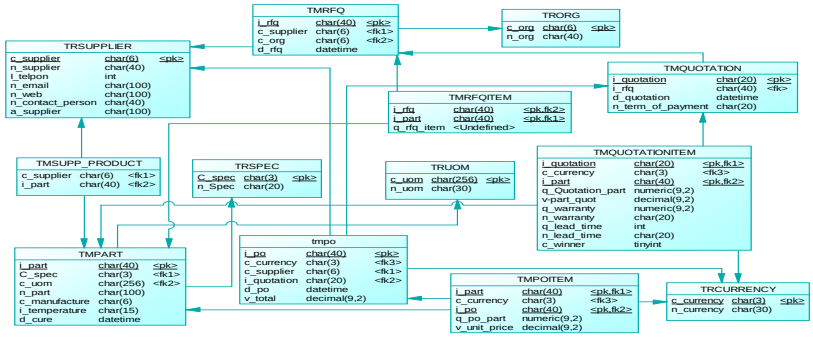

Figure 8. Physical Data Model

CONCLUSION

From the results of the Procurement application system design, the following conclusions can be drawn:

1. With this system aircraft procurement data can be controlled properly.
2. The management will be able to easily control the use of funds used for the procurement of materials whenever needed

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