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Architecture Information System in Electrical Distribution Company Using TOGAF

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ABSTRACT

The development of technology has now become very important in the field of distribution business. Technology development has helped many companies improve their performance. Information technologies at companies are needed to support their development of company in various sectors. The Electrical Distribution Company acting as the sole agent for the distribution of electrical components produced in Japan. This organization already has several information systems and quality products, but in some business processes there are still some weakness, such as some processes manually, the system is still not integrated with each other, etc. Enterprise Architecture can help companies to designing the development of organizational structure, business processes, information systems and infrastructure of an organization, so that in the organization can run and work in accordance with the vision and mission. Enterprise architecture has several frameworks that can be used in the design information system such as the TOGAF, Zachman, and others Frameworks. This research will use one of the enterprise architecture frameworks, the Open Group Architecture Framework TOGAF is a method for how to build, manage and implement enterprise architecture and information system. The results of this study are in the form of blueprints adjusted to the interests of business processes and business needs of the existing.

Key words : Electrical Distribution Company, Architecture Information System, TOGAF, Enterprise Architecture.

1. INTRODUCTION

The rapid development of information technology in the current era of globalization cannot be curtailed from influencing the business world for example on the field of Electrical Distribution [1]. The Electrical Distribution Company was established in July 1979 in Jakarta this company acting a sole agent for the Distribution of electrical components produced in Japan. The company needs the role of Enterprise Architecture related to business strategic planning [2].

Enterprise architecture is a technology management and planning that will help for the development of the company by understanding the current condition of the companies in terms of a holistic and interconnected perspective between existing technology resources, information flow, business processes, and strategy guide [3]. In practice, Enterprise architecture has many methods used by organizations to plan the development of IT / IS. One of the most popular methods is the TOGAF framework [4].

TOGAF provides a complete method for how to build, manage, and implement the enterprise architecture and information system called the ADM [5]. ADM is a method that contains activities that are presented progress at each stage of architectural models and ADM always harmonized with organization goals and needs [6].

Organization in achieving its goals and needs, this organization has many departments; all departments must change several company systems and business processes to support multiple processes in system integration [7]. All departments must also support good decision making, timely and efficient human resources, and distribution. In this case, in the future hope to advance efficient information systems will increase competitiveness through better cost reduction and logistics [8].

To solve the problem, this research will be refining and adapting the so powerful and popular patterns oriented to develop enterprise architectures. The following are some enterprise architecture challenges that will be addressed specifically and adapt the pattern-oriented approach to the TOGAF framework [9]. The first step to enter TOGAF is to understand the organization's business processes first. The aim is to provide a complete, broad, and consistent knowledge base that can be used in defining the architecture and implementation plans in the form of a blueprint [10]. The purpose of this research is to design enterprise architecture planning using TOGAF framework in several divisions in the company to get a blueprint information technology that is in harmony with the business so that it will help the company to develop.

2. LITERATURE REVIEW

This section will briefly summarize some of the underlying concepts about Information Systems, Enterprise Architecture, and TOGAF ADM. A par from theory will also briefly summarize the result of previous research.

2.1 Information System

Information System is a social system, which has embedded in its information technology. The extent to which information technology will increase rapidly.

A simple definition Information system is a system in the organization that delivers information and communication services needed by the organization [11].

2.2 Enterprise Architecture

System Enterprise architecture is a single entity that deals with the principles, methods and a model that is used as the design, and realization of an organizational structure, business processes, information systems, and infrastructure of an organization. The enterprise architecture framework is known as a thinking framework, the use of a thinking framework is better judged to accelerate and simplify architectural development, ensure complete coverage of design solutions and ensure selected architecture that enables future development in response to business needs [12]. Enterprise Architecture is a representation of the structure and behavior of a company's business processes. This describes a system that currently exists and the system in the future. EA include:

• An insight into the utilization of current information technology in business operations

• A vision for the future utilization of information technology in business operations.

• A roadmap to the evolution of information technology landscape from the current state to the future state, along with the transient states in between [13].

2.3 TOGAF ADM

TOGAF describes a systematic process of technological transformation from ideas, strategic requirements into workable and documented products, systems, or solutions [14].

This is so that TOGAF users will use ADM TOGAF as a guide in designing the architecture. Four domains of TOGAF are:

a. Business architecture: explains how business processes are aligned with the goals of the company.

b. Data architecture: explains how provides an overview of how to save, manage, and access data which is a structure of the set of physical data and organizational logic and data management resources.

c. Application architecture: describes specifically how to recommend applications are designed and those applications can interact with each other.

d. Technology architecture: provides an overview of recommended hardware or software infrastructure supporting those recommend applications and their interactions.

TOGAF ADM is a methodology that describes a method for EA development and more clear view in figure 1 The main components of TOGAF provide an architectural guide at levels:

1. Providing a phase of architectural development (business, information systems, and technology).
2. Gives narration to each architectural phase that describes the phase in terms of objectives, approaches, inputs, steps, and outputs. The input and output sections provide definitions of the structure and results of architectural content.
3. Provide a phase summary that includes management requirements/needs [15].

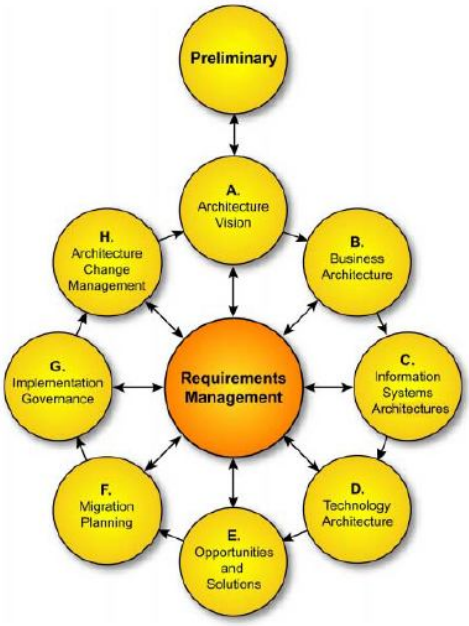

Figure 1: TOGAF [14]

2.4 Previous Research

The conclusion of a previous research journal made by Hendy Tannady, Johanes Fernandes Andry, Fergyanto E. Gunawan, and Jordy Mayseleste contained:

The conclusion of the results and discussion that has been can be concluded as follows:

• Enterprise Architecture at FFS Company was analyzed based on TOGAF analysis and produced a blueprint of the main architecture of TOGAF, namely business architecture.

• Provide good system development application development and business changes that can occur if the company architecture is implemented.

• The impact of implementing enterprise architecture towards company business processes is the creation of effectiveness and efficiency in the process business FFS Company [16].

3. RESEARCH METHOD

Base on Figure 2 Research Method for Research Methodology. Step by step of this research include are:

• Literature studies are conducted to add theoretical references that support research through books, journals, articles, and others related to enterprise architecture.

• After getting literature studies, authors can identify the problem and can choose the right framework for the current problem. For the current, research the author uses the TOGAF [17].

• For collecting data. The first step authors will observation in the company to get data needed for research.

• After collecting data through observation, the last step author will search for more detailed data with interview employees in the company to get data needed for a research.

• Then, the authors will analyze the data that have been obtained used Value Chain, SWOT, and Organization Issue to find out the problem in the company.

• After analyze data author will make a design of enterprise architecture. For making a good recommendation for a problem that exists in the company

• After design enterprise architecture author will give a recommendation to the company in the resulting research.

The Result from this research is the blueprint for the guidelines for creating information systems, so that, they can support the ongoing business processes [18].

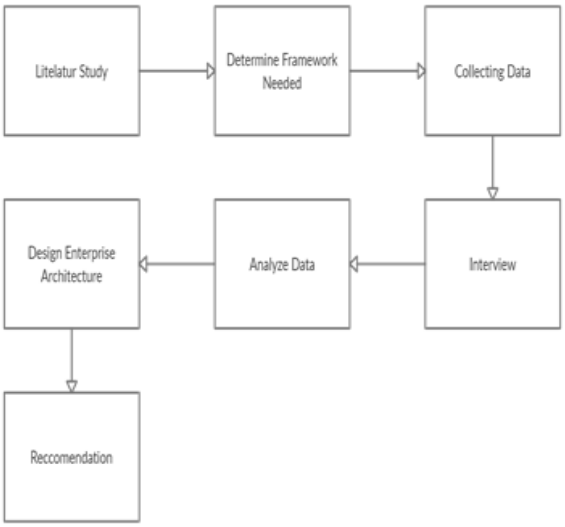

Figure 2: Research Method [17]

4. DEVELOPMENT AND RESULTS

4.1 Preliminary Phase

This phase is the preparation phase for architectural modeling; this is done so that the architectural modeling process can be well directed. In this phase will discuss analysis Value Chain and SWOT.

4.1.1 Value Chain Analysis

In this stage will tell about current technologies and systems found in companies using the value chain. This model divides business processes into two activities, namely the main and supporting activities, based on Figure 3 Value Chain Analysis.

• Inbound Logistics: Company activities to purchase products from a supplier for resale to customers and receive products from suppliers to be distributed.

• Operation: Company activities to selling products and preparation shipment (check the stock of products).

• Outbound Logistics: company activities to delivery order to customer.

• Marketing Sales: the company's activities to find customers, by giving a discount, rebate, etc.

• Services: services provided by the company to customers, so they remain satisfied and loyal in using company services. By giving warranty product and return of goods if damage products.

• Infrastructure: infrastructure that supports the running of a company's business processes.

• Human Resource Management: activities companies to manage their human resources.

• Technology Development: all technologies currently used by companies, to help their business processes run.

• Procurement: company activities to find items needed in business processes.

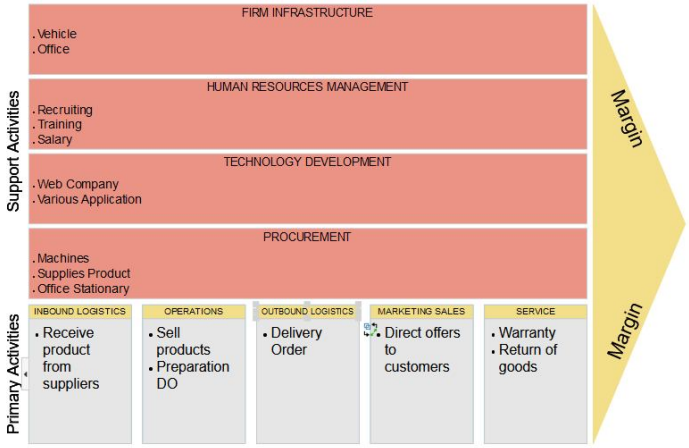

Figure 3: Value Chain Analysis

4.1.2 SWOT analysis

In this stage will tell about SWOT, SWOT is a strategic planning method used to evaluate strengths, weaknesses, opportunities, and threats in a project or business speculation. The results of the SWOT analysis include are:

Strength:

• Already have an Information System for accounting and inventory, web, fingerprint, and sales report application.

• It was established from 1971 until now and has many customers.

• Has worked closely with the government or private sector for large projects.

• Have a product that has very good quality.

• Strategic location near the highway so will find the office easily.

Weakness:

• Management in the sales process is not good. Because customers who still have an account payable can buy more items.

• Weak finances, because it has an account receivable from customers who have not yet complete their payment, so sometimes it's had to buy restock products or project costs.

• Some business processes are still done manually and less effective

• Lack of people in IT division so impacts to working odd jobs in the IT division.

Opportunity:

• Having a good relationship with clients, there are many technologies to support business processes.

• Because in the future there will be new companies, the possibility of turnover will be even greater if the company continues to provide good quality

Treat:

• Poor management can allow companies to go bankrupt.

• Can't keep up with technology developments in the future

• Many companies are engaged in the same field of competition so that it can be a threat if the company loses quality with its rival companies

• Natural disasters can affect the company's work system so that business processes in the company are not going well.

4.2 Requirement Management

Table 1: Organization Issue

Business Process	Issue
Accounting Division	Delays in recording, then there are data inequalities with other divisions that will be problems.
IT Division	Working odd jobs, because of a lack of people in the IT Division, so there is no segregation of duties correct.
Absence	Fingerprints already exist for employees in the office but for employees who leave the office absences are still done manually
Payroll	Salary management is still manual with Microsoft Office Excel
Assets	Asset management is still poor, often miscalculating existing budgets and assets.
Report	Reports to the President Director still use the manual method with Ms. Outlook.

The purpose of this phase is to analyze and manage architecture. The steps to be taken in this phase are identifying the problems of each activity, making solutions to activities, and making information systems solutions for identified problem. Organizations Issue will use for identified problem in company.

The Application is payroll application, field workers absence application, asset management application, and reports administration application. The following will explain the function of each existing application design:

• Payroll Application: Manage employee salary lists within the company to be provided in accordance with company rules and regulations.

• Field Workers Absence Application: Absence for workers who are not in the office environment.

• Asset Management Application: Assist companies in maintaining the value of assets, monitoring asset depreciation, making it easier to make a budget so as not to make excess purchases, and making reports related to asset management.

• Report Administration Application: Help the President Director to see all reports from all divisions directly.

Base on Table 1 Organization Issue, it will be made a solution organization issue to solve the problem in Table 2 Solution Organization Issue.

4.3 Application Architecture

This section will mention the application candidates proposed to help solve the problem, there are four application designs needed by the Electrical Distribution Company.

Table 2: Solution Organization Issue

Business Process	Solution Issue
Accounting Division	Have to do regular checks with the other division about accounting records.
IT Division	The addition of IT employees, and give each respective job.
Absence	Making applications for absences who work outside the office.
Payroll	Making application for salary input.
Assets	Making an application for managing assets.
Report	Making an application for a report to the President Director.

4.4 Technology Architecture

4.4.1 Network Architecture

This phase will be explained current network architecture and recommendation network architecture for the Electrical Distribution Company. Technology architecture identified from the information system architecture.

Still Running in company network architecture at this time are running with four computers are connected with 1 switch. Computers in the company have been used for various applications or websites. The switch will be connected to the modem. While the modem is used to connect the network to

the internet. Base on Fig.4 is the recommendation of Network Architecture.

Recommendation for Network Architecture in company can be seen in Figure 4 Recommendation Network Architecture, will be the addition four computers for recommending the application, 1 switch to share with several additional computers, its purpose to make avoid network down on all computers if one of the switches is damaged, and the network less congested because of used by many users, and addition 1 core switch as a connector old and new switch.

4.4.2 Recommendation Network Equipment

In this phase will be explained about recommendation network equipment which will be used in the recommendation network infrastructure can be seen in Table 3. Recommendation Network Equipment.

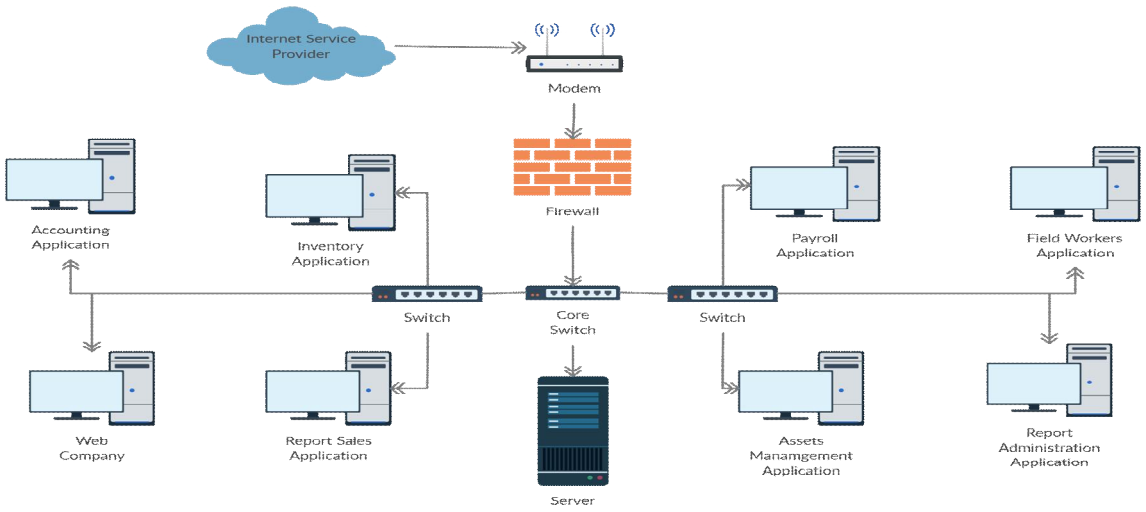

Figure 4: Recommendation Network Architecture

Table 3: Recommendation Network Equipment

Equipment	Specification
Server	IBM System
Processor	Intel i3 series
Memory	192 GB
Storage	2 Terra Byte
Graphic Card	MSI GeForce GTX 1650
Input Device	Mouse, Keyboard
Output Device	Monitor LCD, Printer

4.5 Migration Planning

At the planning stage of this migration has a goal to plan the process of transferring technology from the old system to the new system that has been designed and recommended. This phase contains the order of implementation of information system applications that are adjusted according to the priority level and roadmap application.

4.5.1 Order of Implementation

In the order of implementation using an operational perspective to determine the order of implementation of information system applications. There are two divisions from an operational perspective, namely the front office system and the back-office system. A front office system is a group of application systems that can provide direct services, while the Back Office System is a group of applications that help with administrative and general work.

• Front Office System, Candidate applications that are intended for the Front Office System do not exist because the application is intended only for the Back Office System

• Back Office System, Application candidates intended for the Back Office System can be seen in the following in Table 4. Candidates Back Office System.

4.5.2 Roadmap Application

At this stage will explain the strategic application development direction. There are 4 applications based on information system architecture which the future will be implemented in this organization.

Table 4: Candidates Back Office System

Application	Function
Payroll Application	Management salary employee.
Field Workers Absence Application	Workers attendance who do not work at the office.
Assets Management Application	Management assets and budget.
Report Administration Application	Managing reports from every division in the company.

There are three types of implementation sequences, namely short term, medium term, and long term.

• In the short term: Field Workers Absence Application to absent workers who do not work at the office.
• In the medium-term: Asset management applications for asset management such as buying assets, maintaining assets as well as managing the required budget, and payroll applications to manage employee salaries to be paid to employees.
• In the long run: Report administration application to help check all reports from each division in the company.

4.5.3 Target Implementation Planning

Planning the target implementation of the recommended application for Electrical Distributor Company consisting for:
• System Planning, at this stage the problem will be defined and the system objectives will be determined.
• System Analysis, at this stage an analysis of the current system and proposals will be carried out by identifying problems and defining information needs.
• System Design, at this stage will be carried out making process modeling, database modeling, and interfaces.
• System Implementation, at this stage, will be made a system consisting of coding, testing, and revision. By adjusting the order of implementation it will start from Table 5. Order Implementation.

Table 5: Order Implementation

Application	Order of Implementation
1. Field Workers Absence Application	6 months in 2021 (January to June 2021)
2. Payroll Application	6 months in 2021 (July to December 2021)
3. Assets Management Application	6 months in 2022 (January to June 2022)
4. Report Administration Application	6 months in 2022 (July to December 2022)

The schedule of each application is the same, starting from:
• Requirement Planning, Current system analysis and recommend system analysis will be done for 1 month
• Design System, System design, database, and the interface will be done for 2 month
• Implementation, Coding will be done for 2 month, then 2 week for testing, and the last 2 week for revision.

4.6 Blueprint Business Architecture

In this section, the business process in an electrical distribution company is both ongoing and recommended in each process in detail. The following is the explanation:

4.6.1 Payroll

Figure 5: Blueprint Payroll Recommendation

Still Running payroll system in company is process that is currently running on payroll, Finance uses Ms. Excel to manage employee salaries, and below are the recommendation. Recommendation for Payroll application, can be seen in Figure 5: Blueprint Payroll Recommendation.

Based on Fig 5, in the payroll Blueprint, a recommendation has been made to design a system that can help Finance to salary management.

4.6.2 Field Work Absence

Still Running Field Work Absence systems in company is process that is currently running on the attendance of field workers using a manual absence to do attendance, then HRD will check the attendance, and below are the recommendations.

Recommendation for field work absence, can be seen in Figure 6: Blueprint Field Work Absence Recommendation.

Based Fig 6, In the Blueprint Field Work Absence recommendations, has been made system design that can help field workers and HRD for attendance and report generation. This application is integrated with the payroll application because absent reports affect salary management.

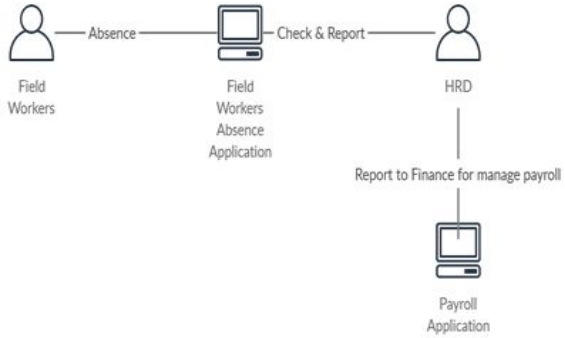

Figure 6: Blueprint Field Work Absence Recommendation

4.6.3 Management Assets

Still Running Management Assets systems in company is process that is currently running on asset management using manual management to manage assets, then finance will check the management report and below are the recommendation. Recommendation for Management Assets, can be seen in Figure 7: Blueprint Management Assets Recommendation.

Figure 7: Blueprint Management Assets Recommendation

Based Fig 7, in the asset management Blueprint recommendations, have been made to design a system that can help GA and Finance for asset management and report generation.

4.6.4 Report Administration

Still Running Report Administration systems in company process that is currently running on the administration of the report using Ms. Outlook to do make a report, after the report is sent the President Director will check the report and below are the recommendations. Recommendation for Report Administration can be seen in Figure 8: Blueprint Report Administration Recommendation.

Based on Fig 8, Blueprint administration report recommendation has been made in designing a system that can help all divisions and the President Director to manage reports and check reports. Field worker absence applications, payroll applications, and asset management applications are integrated with report administration because they all affect the report.

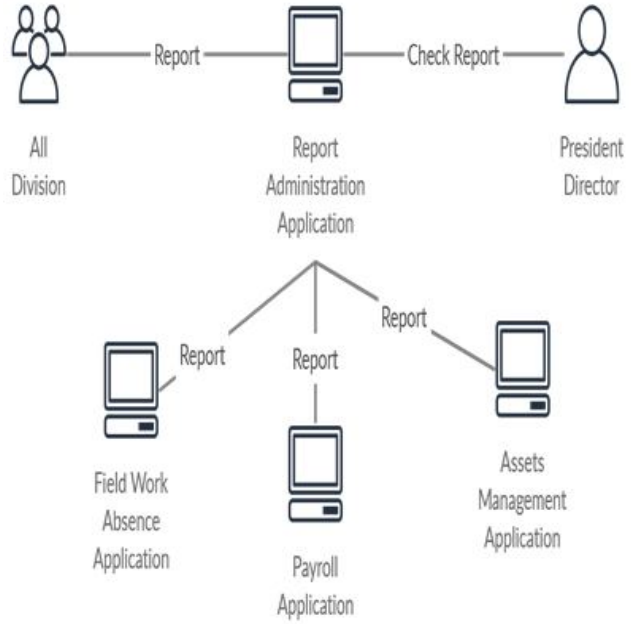

Figure 8: Blueprint Report Administration Recommendation

5. CONCLUSION

From the research result, concluded in the business process of Electrical Distributor Company already have an information system and information technology for business process, but there are still some business process sectors that have not been integrated with information systems/information technology, so in this research, a design enterprise architecture will be conducted. The framework that will be used in enterprise architecture research is the TOGAF framework. The resulting design enterprise architecture is a blueprint. Based on the results of planning, there are four new application designs that have been made namely Payroll Application, Field Workers Absence Application, Management Assets Application, and Report Administration Application.

The difference with previous research, namely research at the FFS Company is the content of the discussion in the results section, more focused than previous research in the development of information systems and blueprints which is explained from Information System Architecture, Technology Architecture, and Migration Planning in detail.

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