Design Enterprise Architecture in Forwarding Company Using TOGAF Method

Devi Yurisca Bernanda, Kevin Christianto, Agustinus Chandra, Adrian Pradipta

Abstract— **Information technology (IT) is a technology used to process data, including processing, obtaining, compiling, storing, manipulating data in various ways to produce quality information. By increasing the role of information technology, investment in information technology is getting bigger and more complex in its management. Therefore to develop enterprise architecture it is necessary to adopt or develop it yourself in a company. The framework that can be utilized for the development of enterprise architecture, namely by using TOGAF is a method that is suitable and proven to be able to develop an Information Technology enterprise architecture and business needs. TOGAF has the steps needed in building enterprise architecture, especially in forwarding company.**

Keywords— Enterprise Architecture, Forwarding Company, TOGAF, Information technology.

I. INTRODUCTION

PT DMLN is a leading forwarding company in Indonesia, located on central Jakarta. Forwarding Company is a trucking services company engaged in freight forwarding services. Freight forwarding services carried out by land are carried out by truck. The company is committed to prioritizing customer trust and satisfaction as the key to success, with the dedication of management and staff in meeting customer needs and expectations.

To meet these expectations, the company plans and organizes the structure of Information Technology seriously to strengthen its IT processes. To support and improve the company's business processes and make a company that is able to compete well in the competition of the industrial world would be better if the company is implementing information systems and information technology in running its business processes [1]. In addition, the application of information systems and information technology in the company's business processes is expected to help increase productivity, reduce costs, provide facilities to share data and information, improve service to customers, as well as data integration [2]. In order for IS / IT to be applied in accordance with the company's business processes, it must be well designed [3].

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Enterprise architecture design becomes standardization and guidance to realize the objectives of the company's strategy, integration with business processes, facilitating change, reducing development processes, modernizing the time frame, resource requirements and convergence with information technology standards [4]. The selection of EA framework as a framework in the development of information systems will accelerate and simplify the development of an architecture that allows the architecture that is built to be able to adapt to the development of the organization in the future because the creation of information systems that are not adapted to the architecture of technology can produce supporting technology that is not aligned with organizational goals [5]. Various types of paradigms and methods can be used in designing enterprise architecture, including the Zachman Framework, TOGAF ADM, EAP, and others.

In this case, it will be discussed how to use TOGAF ADM in the design of enterprise architecture, so that a clear picture is obtained about how to design an enterprise architecture, to get a good enterprise architecture and can be used by organizations to achieve its strategic objectives [6].

The purpose of the research and the making of this research based on the problems described are as follows:

1. Designing a new business process that implements enterprise architecture with the TOGAF ADM principle.
2. Implementing applications that will be created so that they can help develop this business process.

The benefits of research obtained in this study so that The Forwarding Company can support and improve its business processes and make companies that are able to compete well in the competitive world of industry will be better. In addition, by implementing an information system and information technology in the company's business processes it is expected to help increase productivity, reduce expenditure costs, provide facilities to share data and information, improve customer service, and integrate data using the TOGAF ADM principle.

II. RELATED LITERATURE AND STUDIES

A. Enterprise Architecture

Enterprise architecture is a picture or blueprint for an organization that is aligned with the organization's vision and mission (business architecture) with information technology, consists of data, applications, and technology [7].

Enterprise Architecture Planning (EAP) is a method developed to build enterprise architecture. The stages of

EAP development are the stage to start, the stage of understanding the current conditions, the stage of defining the vision of the future, and the stage to formulate a plan in achieving the vision of the future [8].

B. TOGAF

TOGAF (The Open Group Architecture Framework) ADM (Architecture Development Method) is a suitable and proven method that can develop enterprise IT architecture and business needs. TOGAF ADM has the steps needed to build enterprise architecture [9].

TOGAF is an implementation of an appropriate EA framework for Management of Technology from a practical perspective and a research agenda. TOGAF describes a systematic process of technological transformation from strategic ideas and requirements to products, systems or solutions that can be applied and documented. Information is the main resource for the enterprise. TOGAF was developed by the Open Group in 1995; this framework is based on the Technical Architecture Framework for Information Management (TAFIM) developed by the US Department of Defense (DOD) [10].

But in its development, TOGAF is often used in various fields such as manufacturing, banking, and education. The TOGAF Framework is used to develop enterprise architecture, where there are detailed methods and tools in implementing them so that they can differentiate from other Enterprise Architecture frameworks. The advantage of using this TOGAF framework is that it is very flexible, the following are the phases in step by step see Figure 1.TOGAF ADM.

Figure 1: TOGAF ADM Phase [11]

The phases in TOGAF ADM are sequential and interrelated. Following are the phases in ADM [12]:

• Preliminary Phase, The preparation phase in the development of corporate architecture by defining the framework and determining the principles of architecture as a basis for architectural design.

• Phase A: Architecture Vision, It is the initial stage in the process of architectural development by defining the scope of development, stakeholder identification, after requesting and obtaining approval. In addition it is described in high level of the solution that will be proposed.

• Phase B: Business Architecture, Describe the development of business architecture which includes, business processes, organizational functions, and business services to support an approved architecture vision.

• Phase C: Information System Architecture, Describe information system architecture that includes data architecture and application architecture to support architecture vision.

• Phase D: Technology Architecture, Describe the development of technological architecture in the form of logical and physical applications to support architectural vision.

• Phase E: Opportunities and Solution, Early implementation planning by identifying what projects are needed to achieve a predefined architecture.

• Phase F: Migration Planning, Identify project benefits, costs, and dependencies that will be carried out in the migration process. The list of priority projects will be the basis for making detailed planning in the process of migration to the target architecture.

• Phase G: Implementation Governance, Provide supervision of the suitability of the target architecture with architecture implementation.

• Phase H: Architecture Change Management, Establish procedures for managing changes to the new architecture.

• Requirements Managements, The process of managing needs in all phases of ADM and in accordance with business integrity.

C. Value Chain

The concept of value chain analysis described by Michael Porter can help in analyzing specific activities that can create competitive values and advantages for the organization. The value chain consists of two categories of activities, namely: primary activities and supporting activities [13].

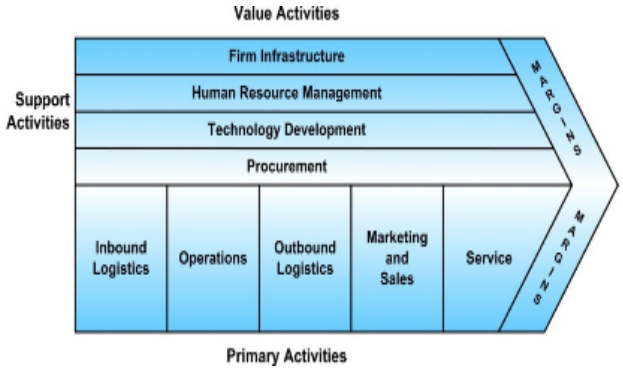

Figure 2: Value Chain [13].

a. Primary Activities in this value chain as follows:

1. Inbound Logistics: Activities related to receiving, storing, and disseminating inputs.

2. Operations: Activities that transform inputs into output become final products.

3. Outbound Logistics: Activities related to distributing products / services.

4. Marketing and Sales: Activities related to marketing

and sales such as market research, promotions and so on.

5. Service: Activities related to service providers to improve product maintenance such as installation, training, repair, material supply and maintenance.

b. Support activities described by Porter as follows:

1. Firm Infrastructure: Is an activity, costs and assets related to general management, accounting and finance, security and safety of information systems and other functions.

2. Human Resources Management: consists of activities involved such as acceptance, hearings, training, development and compensation for all types of personnel and developing the level of expertise of workers.

3. Technology Development: activities related to costs related to products, process improvements, equipment design, development of computer software, telecommunications systems, new database capabilities and development of computer-based system support.

4. Procurement: activities related to how resources are obtained.

III. METHODS

The research method used by the author in this research is descriptive method in Forwarding Company. Methods of collection of data by solving problems in the company and by interviewing the company. For the case of this research, the authors only use several TOGAF phases for corporate architecture approval, such as:

- Preliminary Phase
- Phase A: Architecture Vision
- Phase B: Business Architecture
- Phase B: Information Systems Architecture
- Phase C: Technology Architecture

The following Figure 3. Research Methodology.

Figure 3: Research Methodology [14]

Based on Figure 3. Research Methodology, the first step of this research is to conduct a literature study for studies related to the study used in this study and gather relevant information, then choose TOGAF as a suitable work effort for the Company. The initial step the author will collect various data that will be used in research. Data collection can be done by observing business activities at company. After that the author conducted an interview with company officials to request data. Then the authors analyze the data from the interviews to be able to create enterprise architecture. The author will provide analysis and provide for companies based on the enterprise architecture design that has been created. The final step, the writer will make a report and give it to the company.

IV. RELATED LITERATURE AND STUDIES

The forwarding company is a subsidiary of a public company, which is engaged in the leading Freight Forwarding Services is a company engaged in the field of land transportation services. With its headquarters in Jakarta, this expedition company has two branches.

4.1 Analysis Value Chain forwarding company

Base on figure 2 there is a value chain that has supporting activities and main activities.

4.1.1 Main Activities

This section will describe in detail the various main activities carried out in business processes in this company.

a) Inbound Logistics

This stage describes the processes of activities that occur between suppliers and companies. The processes are purchasing trucks, fuel for trucks, truck spare parts, and GPS to be installed in trucks. The company will contact the supplier to make a purchase and the supplier will send the goods along with the bill to be paid to the company, so the company will pay the bill made by the supplier.

b) Operation

This stage contains an explanation of the activity processes carried out by the company to prepare its trucks before delivering goods. First, the truck will be prepared in advance by the clerk. This stage, the truck will be inspected in its entirety, starting with the brakes, tires, fuel, parts, and all parts of the truck. Once it is certain that the truck is in good condition, the truck will be given permission to transport goods. If there is a truck that has not been installed with GPS then it will be immediately installed in the truck.

Second, the clerk will arrange the schedule of the order and order certain drivers to carry out their respective orders using a truck that has been checked beforehand.

Third, the driver and truck will be sent to the place of the client who wants to send goods to get a travel document along with the goods to be delivered.

Fourth, when arriving at the client's place, goods that have been neatly packaged will be directly transported to the tailgate to be immediately sent to the destination delivery.

c) Outbound Logistics

This stage will contain an explanation of the processes of activities that occur between the company and the party to whom it is being delivered. The process is the delivery of goods that have been transported to the truck to the destination, and then the driver will unload the goods and give a letter of delivery or letter of goods to the recipient for signature.

The signature on the letter means that the goods have arrived at the location of the recipient of the goods properly. After

the letter is signed, the driver will return to the company and provide the signed letter to the clerk, and later from the letter, a bill will be made to the client sending the goods.

d) Marketing and Sales

This stage contains an explanation of what activities occur in the company especially in the marketing and sales department. In this company, there is a marketing process that uses a system of connections and trust, marketing is done directly, and marketing is done through the website.

e) Services

This stage describes what services are provided by the company for its service products so that customers will remain willing to use the company's services. The services provided include a guarantee for every shipment of goods carried out. This guarantee includes punctuality, the safety of goods to the destination and so on.

4.1.2 Supporting Activities

This section will describe the activities that support the main activities in the company's business processes.

a) Firm Infrastructure

In the company's infrastructure, there are several parts that support the course of the main activities, which exist in this company include management carried out in various fields that exist in the company's business, such as finance, resources, information and so on, as well as a workshop that is used to store spare parts and repair trucks that have minor damage.

b) Human Resource Management

Activities that support the running of the business, especially in the human resources section, include recruitment, selection, and placement of work positions aimed at screening employees who are skilled to work with the best performance and in accordance with their fields in the company, training for several employees assessed still have fewer skills so they can get better, as well as salaries, rewards, and sanctions for their workers.

c) Technology Development

To support the running of the processes contained in the main activity, it is also needed assistance from technology. At present, the company uses only a small portion of technology to help its business processes, including the use of Microsoft Word and Excel to assist reporting, as well as e-mail, telephone, and internet facilities for information dissemination.

d) Procurement

Some tools that are held or prepared to help the main activities include trucks, fuel trucks, spare parts trucks, and GPS. In addition, office stationery is also needed to support the business. Each of these tools is needed to help carry out the main activities in the business owned by the company.

4.2 Planning Model Interaction

This sub-section refers to phase E of TOGAF, Opportunities, and Solutions. This sub is intended to show and position the functions of businesses in companies engaged in trucking services. There are 8 applications to be implemented, can be seen Table 1. Planning Model Interaction. Implementation of this application consists of two parts including the short term, and long term. Short-term implementation means that the application is urgent and needs to be implemented in a short time, and long-term implementation is for non-urgent applications but application design requires more time because of its complexity. Planning Model Interaction, the following is an explanation of the 8 software that will be implemented.

Table 1. Planning Model Interaction

No	Short Term Applications	Long Term Applications
1	Company Website	Truck Maintenance
2	Daily cash	Leave
3	Finance	Tracking
4	Shipping Registration	Asset Management

4.2.1 Short Term Applications

1. Company profile website, will help in the marketing process of company services. So companies don't have to do 'door to door' anymore. Prospective customers can easily find out the services offered by the company through this website.
2. Daily cash application, this application will help in supervising and tidying up cash transaction data collection every day. In addition, this application will help to generate reports automatically. Managers can easily monitor the entry and exit of cash transactions.
3. Finance for managing financial from income, outcome, and general ledger.
4. Shipping Registration is the process by which a ship is documented and given the nationality of the country to which the ship has been documented. The nationality allows a ship to travel internationally as it is proof of ownership of the vessel.

4.2.2 Long Term Applications

1. Truck maintenance application, this application will help in managing trucks owned by the company. This application will store truck data and generate reports on maintenance activities carried out on a truck and its costs.
2. Leave application, this mobile-based online leave application works for employees to apply for leave without having to go to the office or use an existing leave application (web-based). This application can make it easier for employees to make leave applications if their circumstances are not possible to come to the office or have to open an existing leave application, but enough to use a mobile phone.
3. Tracking, this application serves to help the business process of product delivery, this application can monitor during the shipping process.
4. Asset management system for monitor assets owned by the company in the value or depreciation of those assets and also can make a budgeting for procurement of new assets if need to be replaced or added.

4.3 Technology Architecture

Building technology architecture base on requirement, starting from determining the type of technology candidate needed by using the Technology Portfolio Catalog which includes software and hardware. In this stage also consider the alternatives needed in the selection of technology. The techniques used include the Environment and Location Diagram, Network Computing Diagram, and others. The steps taken in this phase are identifying models, perspectives and tools that will be used, developing technology

architecture baselines, developing technology architecture target descriptions, making gap analyzes, determining candidate roadmaps, tackling all architectural impacts, making reviews for stakeholders, completing architecture technology and create architectural definition documents.

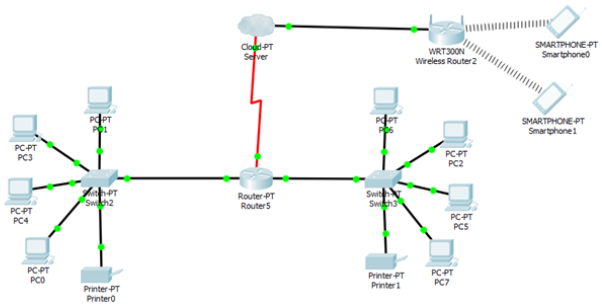

Figure 4. Proposed Network

Base on Figure 4. Proposed Network, review and explain the recommended topology after adding it with several applications approved through this paper. In principle, it is still the same as the topology used today, only added with a router that is issued directly to the company's cloud server to be connected with a gadget or cellphone for employees who use applications that have been designed.

The success of the implementation is influenced by many things, therefore it is necessary to identify the factors that determine the success of this implementation:

1. A strong and consistent management commitment and direct involvement will greatly help accelerate implementation.
2. Approval of the implementation plan
3. Arranging Standard Operation Procedure (SOP)
4. Availability of resources, technology, and infrastructure.
5. Increased understanding, skills and knowledge of human resources through training.

V. Conclusion

Based on the results of the research that has been done, conclusions can be drawn, among others, namely:

1. In the business process of forwarding company has optimized the use of information systems and information technology so that in this study several new system designs for enterprise architecture were made in order to harmonize business strategies and IS / IT strategies. Some of the system designs use the TOGAF framework and produce a blueprint of the main architecture on TOGAF, namely business architecture, application architecture, data architecture and technology architecture.

2. The business process of the forwarding company in the matter of attendance that will be maximized through the mobile system and GPS tracking will greatly facilitate the employees of company to do attendance when he is in front of the office.

3. The impact of implementing enterprise architecture on the business process of the organization is maximizing the existing system.

4. At the time of implementation of enterprise architecture, re-evaluation needs to be done to adjust to the old system changes to the new system.

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