IT Roadmap to Improve Business Strategy using TOGAF ADM: A Case Study of Government-Owned Electricity Company

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Abstract. Service industry in Indonesia has applied IT to conduct and establish their business process through automation and integration in order to achieve effectiveness and efficiency, especially in the industry of electricity. However, there is still no alignment between business strategy and IT assets. Thus, it is necessary to implement Enterprise Architecture to have appropriateness between the organizational’s goal and the strategy’s execution in the field. This research identifies various components in the respected industry by implement TOGAF ADM as the framework through observation and interview, with begin with preliminary phase until migration planning. The purpose is to create IT Roadmap in the form of recommendation for the electricity company in order to achieve their short and long term objectives.

1. Introduction
Business organizations are growing rapidly and very competitive, which they should always generate and create innovative responses in every condition for their services. Thus, the organization need to be updated and always develop its business strategy regularly [1, 10] in order to increase profit, growth, satisfaction and performance due to competition and supplier pressures [2]. To improve business strategy, the company should maximize the advantage of IT to support the achievement of organizational goals [3] with the implementation of Enterprise Architecture (EA) to improve business strategy and improving the alignment between business process and IT assets. By having the framework, it is expected the company have expandability, extendibility, sustainability and maintainability in conducting their business service by business function. In the recent years, there are several researchers that study the implementation of EA in many aspects such as service industry [4]. Most of them use TOGAF as a framework to designing EA because it has guidelines, method and tools to developing EA. It also describe the systematic technique to develop and manage EA lifecycle, which is called Architecture Development Method (ADM). The organization can utilize EA to define business architecture, data architecture, application architecture and technology architecture by creating business model, business strategy and business process which are aligned with the infrastructure of IT organization [5]. On the other hand, application technology has been used as the fundamental tools to support every aspect in the company, even in the primary business process such as operating system, database, network management, etc. Thus, the developed applications have to be adjusted with the requirement and optimization process in regard of the client request and company needs where the efficiency and effectiveness has been obtained. This research provides the suggestion in the form of EA implementation to the service industry, especially in maintenance and logistics for Electricity Company. In current conditions, data of materials in the logistic is done manually.
2. Literature Studies

Business strategy is a long-term planning made by organization to achieve the goals of the company itself. While the information system is a system that has a set of information that have relation to the operational of an organization that is useful to make certain decision. By knowing these two concepts, it can be deduced that by implementing information technology, can help the business strategy running on the company more efficiently and effectively [2, 9]. Maintenance is a conception of all activities that necessary to maintain the quality of facilities in order to function properly as the initial condition. [7]. Whether logistic is place that used to store all kinds of goods purpose of production, ranging from raw material, goods work in process, finished good until goods support (tools) production. Government organization representative office units are spread all over Indonesia. In this globalization era, information technology, and communication technology increased rapidly. Government organization need to be flexible, easily expandable and sustainable IT infrastructure. To build alignment between IT needs and organization it need EA to maintain the coordination of the project [5]. To design EA, organization should adopt framework called EA framework. This framework can be used to develop the EA, which expected to align and organize the complexity of system, business strategy and IT strategy [8]. The architectural framework must describe a method for designing information systems to collecting building blocks and taking into account how building blocks are located [11, 12]. In the last 20 years, EA already developed into a specific research and best practice that can be implemented in organization, which some of them have been always being used such as Zachman Framework, Open Group Architectural Framework (TOGAF), Federal Enterprise Architecture and Gartner Methodology [13]. Some studies propose many ways to selecting EA framework. Considered factor and criteria depend on time and how complex the framework is each EA Framework claims that their schema can be used for many areas [14]. Consequently, EA projects may encounter lack of support in the following areas, which are requirements analysis, governance and evaluation, guideline for implementation, and continual improvement of EA establishment [6] but the framework used should be validated by user interpretation and judgement that link the process, tool, method and technique [14].

3. Research Methodology

Enterprise architecture applies architecture principles and practices to guide organizations through the business, information, process, and technology changes necessary to execute their strategies. These practices utilize the various aspects of an enterprise to identify, motivate, and achieve these changes. TOGAF ADM is one of the framework to developing and controlling EA life cycle with integrating business needs and Information technology [11] by giving main and support features that can be used by organization. ADM is form of repeated cycle in each process in each phases, whether in each iteration there is a new decision to make. To identify the needs and meet the objectives, the interview and observation of daily business process in the company have been used in this research.

4. Analysis and Design

Practitioners are responsible for performing the analysis of business structure and processes and are often called upon to draw conclusions from the information collected to address the goals of enterprise architecture, which are effectiveness, efficiency, agility, and durability.

![Figure 1. Business Value Chain](attachment:image.png)
Architecture Vision describes the early phases of the architecture development cycle. This includes information on defining the scope, identifying stakeholders, creating Architecture Vision, and requesting and obtaining approval. Next figure is the value chain diagram of service industry that explain there are 2 kinds of activity in service industry, such as support activity and primary activity. Requirement catalog is describing relation between objective and requirement business needed in service industry. Process flow catalog describe how to mapping list of function, business service and business process.

Table 1. Requirement Catalogue and Process Flow Diagram

| Function | Objective | Requirement | Business Service | Business Process |
|----------|-----------|-------------|------------------|------------------|
| Maintenance | Able to carry out the process of maintaining properly | Have a work planning process in maintenance | Preparation of substations disturbance | The design of the transformer disturbances without any indication |
| | | Implementation of zero accident | Work program planning & performance reports | Planning of substation work program |
| | | A good document storage process | Proposed HR development | Implementation proposed human resource development |
| | To improve the work ethic in maintenance | Carry out quality training process | Transmission Network Assessment | Recording, Verification and Investigation of Disorders |
| | Implement monitoring and maintenance | Carry out preventive maintenance | Supporting Maintenance Facilities |
| | | Have good system security | Transmission Network Maintenance | Maintenance |
| | Carry out administrative management techniques in order to support maintenance activities | Have an accurate administrative management process that can be accessed in realtime. |
| Logistic | Able to control the movement of goods inside the Logistic in connection with the in and out goods transaction | Availability of Logistic Management System (WMS) that allows employees to control the movement of goods. |
| | Facilitate transaction of goods demand to all of the PLN units | Record the administration material | Receive material Facilitation | Receipt of goods from the purchase function |
| | | Availability of applications that can implement goods transactions | Receipt of goods from mutation between Logistic in one parent unit (Intra Company) |
| | | Manage Goods Receipt, Goods Expense, and Maintaining of the goods. | Material Expense Facilitation | Expense goods for mutation Logistics between parent units (Inter Company) |
| | | Managing the amount of goods that can be available for goods demand request. | Expense goods for being used |
| | Carry out maintenance of material organize and maintain material storage. | Controlling the implementation of the physical inventory of the Logistic every 3 month. | Expense goods for mutations between Logistics in one parent |
| | | Implement Stock opname | Expense goods for being used |
| | | To justify material age. | Maintenance material Facilitation |
| | The Record of material | Record of the goods receipt | Physical Examination of goods using SAP (Stock Opname) |
| | | Record of goods expense | |
| | | Record of goods description | |
| | | Record of goods being quality checked | |
Information system architecture describing how information system can help business architecture and vision architecture. Information system include two part, which is Data Architecture and Application Architecture. Data Architecture used to manage data that exist in organization. On designing data architecture will be considered 3 main things, such as data management and migration data. Entity relation diagram is diagram that mapping relations between data entities, with a description of the relations that owned by each entity.

![ERD Diagram](image)

Application architecture is an architecture that define the types of applications that needed to manage data and support enterprise business functions. Table below is target application suggestion to Service Industry.

| Logical Application Component | Physical Application Component | Description |
|-------------------------------|-------------------------------|-------------|
| Management of substation documents | DMS | Application to manage data / documents / to be generated from an activity |
| E-document management | | |
| Document sharing management | | |
| Information maintenance asset management | PIPA | Application to manage all information about asset maintenance |
| Goods Receipt Management | Online Warehouse | Data collection of goods receipt from suppliers. |
| Goods Expense Management | | Data collection of goods Expense |
| Maintenance Goods Management | | Data collection of Stock Opname report |
| Online Warehouse Management | | |
| Online Transaction Management | | An Application used to integrate business process warehousing functions, which helps control movement of goods in Logistic and facilitates transaction requests and goods delivery. |

Technology Architecture is to define technology that being used to support functionality of the application. In this phase will be analyzed whether the use of relevant technology to the application
built. Figure below is the target of Environment and Location Diagram Services industry. Therefore, demand for goods requested by maintenance it takes long time, which makes the business process of service industry ineffective. To solve this problem service industry need to implement EA to know how models and information technology design that alignment with information system also with organization needs [6].

Figure 3. Environment and Location Diagram

The roadmap architecture contains the translation of a work package that will realize the target architecture that has been designed by placing the work planning into an implementation timeframe to show the progress of the existing architecture to the target architecture. The depiction of this architecture roadmap is based on the results of risk and value analysis, and an analysis of the gap and its dependencies that have been taken from previous phase.

Table 3. IT Roadmap

| No. | Project                                                                 | Duration Estimate | Period  |
|-----|-------------------------------------------------------------------------|-------------------|---------|
| 1   | Developing Online Warehouse Application                                 | 2 year 8 month    | 2019    |
| 2   | Application Development Management of asset-maintenance information    | 1 year 4 month    | 2021    |
| 3   | DMS Substation Application Development                                  | 1 year            | 2022    |
This case explores the implementation of Enterprise Architecture (EA) in Service Industry in Indonesia to improve business strategy. Previously, this service industry has been implemented Enterprise Architecture, but in fact, there are some issues that still lack and significantly impact to the effectiveness of business process. First, the existing IT doesn’t fully covered business service. We found that they already have some applications, but there are not integrated each other neither in each of function in service industry. As a result, the applications that have been made is useless and being abandoned. To make the application is useful and can be used properly, implemented of EA is necessary for integrated the IT in order to align with the business of the existing process. Second, the lack of integration between primary activity especially maintenance and logistic. As a service industry, it is important to serving customer quickly and correctly. If there are problems that occurs, service industry need to solve it a soon as possible. In this case, communication between maintenance and logistic still do by manually. That’s will impact on the satisfaction of the customer. With suggesting developing the centralized application, it can help business process of service industry is effective and efficient. The information shows the benefit of the EA. The most important benefit were: can have better integration between business and IT, Reduced costs, easily to do decision making and effectiveness of the business.

5. Conclusion
This Electricity Company have to improve the business strategy in order to implement EA. The suggestion of EA not only build new application, but also can developing and improving business process itself. So, service industry can achieve their goal. In this paper we designing EA with TOGAF ADM starting from preliminary phase until migration planning. the output will be IT Roadmap that can be a reference for service industry to develop EA. It would be better if in the next research, the researcher can complete it until architecture change management, which is the last phase from EA design. And being implemented in Service Industry itself.

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