Enterprise Architecture Design Using The Open Group Architecture Framework (TOGAF) at Logistic Courier Services

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Article Info	ABSTRACT

Logistics services are growing day by day in line with increasing consumer demand. This supports a new habit, namely the activity of sending express services. These delivery service activities require a structured system design so that users can use various kinds of logistics services. The role of enterprise architecture planning that can provide a framework as a reference for developing information systems is TOGAF (Open Group Architecture Framework). Through this research, it is hoped that the company can improve the effectiveness and efficiency of work in its business processes and integrate company systems that can support the company's business processes. In this article, the authors will design a company architecture using TOGAF in Indonesian Logistic Courier Services (LCS) to identify problems. The results of the research are in the form of a blueprint for the company's enterprise architecture because it can provide a framework as a reference for developing information systems. Through this article, LCS does not have serious problems with the system so that users do not feel disturbed when using this logistics delivery service. However, there are still some things that must be improved and maintained to reduce errors when using this delivery service.

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1. INTRODUCTION

Logistics services are growing rapid [1] day by day in line with increasing consumer demand. Customer satisfaction with the performance provided by Logistic Courier Services (LCS) Indonesia's express delivery service will not work. Without a structured and in-depth system design, a company certainly cannot operate optimally, it may even cause users to switch to other express delivery services when the company's performance is problematic. Of course, it has a useful strategy for interacting between consumers and producers in running and operating the delivery service system. So that in the end the performance of LCS must look attractive and free from errors so that users can use the delivery service easily and there are no problems when choosing the delivery service.

Design of enterprise architecture using the Open Group Architecture Framework (TOGAF) at LCS Indonesia. Enterprise architecture using the TOGAF method can be useful to see the shortcomings of LCS Indonesia? And, what are the evaluations and drawbacks of the enterprise architecture based on the results of the TOGAF method? [2].

The rapid development of technology makes the use of IT play a very important role in supporting the company's internal business processes to support the realization of the company's goals, needs [3] vision, and mission. Synergy and corporate integrity can be realized by introducing IT into the company [4]. Currently there is no implementation that allows stakeholders to store company information. Thereby, reducing human error, helping and optimize [5] stakeholders to store data more securely and efficiently for companies that need to collect data [6]. The implementation of LCS's integrated system must plan the development of a blueprint [7]. The focus of this research is to create a blueprint development plan that serves as an organizational guideline for the implementation of IT development in the company's processes to support the company's stakeholders and help the company [8] grow and meet the stated goals of the vision and mission. The real purpose of integration is to fulfill the business in the process. In planning, designing, and managing an information system [9], a blueprint is needed. An enterprise architecture plan is needed that can provide a framework as a reference for developing information systems, namely TOGAF (Open Group Architecture Framework). Through this research, it is hoped that the company can improve the effectiveness and efficiency of work in its business processes [10] and integrate company systems that can support the company's business processes [11], [12].

The solution to the existing problems with the enterprise architecture at LCS Indonesia that provide through this article is to conduct an evaluation to find out whether the Enterprise architecture is effective and efficient. In this article, authors use The Open Group Architecture Framework (TOGAF) method to analyze the enterprise architecture at LCS Indonesia [13]. TOGAF is an enterprise architecture framework that provides a holistic approach to the planning, design, and implementation of information architecture in enterprises. On the website of the developer and publisher TOGAF states that this framework can be freely reproduced by any organization wishing to use it in developing the architecture of information systems used in an enterprise [14].

The many advantages that can be obtained from using the TOGAF framework are that users who implement it will get a truly open system solution at a lower cost. TOGAF also simplifies the processes associated with open systems, purchasing and product deployment. For IT, this framework better communicates goals and strategies to management. TOGAF provides a detailed methodology on how to build, manage, and deploy an information system and business architecture known as the Architecture Development Method (ADM). However, it will be developed in accordance with the needs of the business processes being carried out. In the enterprise architecture describes how a company designs a system to support business needs in realizing the vision and mission that has been determined. Enterprise architecture is an approach to managing enterprise information systems based on the information system model and its environment. Instead of building an enterprise information system using trial and error, a set of models are designed to predict the behavior and effects of system changes [15].

The business architecture allows you to think about the consequences of different situations and thus supports decision making. Many enterprise architecture initiatives have been proposed, especially the Open Group Architecture Framework namely (TOGAF). To predict whether Scenario A or B enterprise architecture is appropriate, three things are needed. First, models in both scenarios need to be created; Second, determine what is desired; target. If both scenarios provide the same functionality, do we want a system that provides high availability? service, or is the ability to modify the system more important? Is it more important to system performance than high information security or high maintenance of? Third, researcher need to understand the causal chain from scenario choice to destination. Scenario A has hardware redundancy that positively affects system device reliability, thereby increasing service availability. However, Scenario B is based on loosely coupled technology, which takes advantage of the modifiability of the system. To perform this type of analysis, the business architecture model must contain the appropriate information [16]. At the end,

the benefit of research from this article is to find out things that must be evaluated based on the shortcomings of LCS's Enterprise Architecture based on the results of the TOGAF method. To finding problems in the application of enterprise architecture at LCS using the TOGAF method [17].

2. RESEARCH METHOD

The research methodology aims to design, solve, and overcome the problems encountered. The research stages used are problem identification, literature study, system development, and the last stage is the results and discussion. Based on Figure 1, it is known that this research has 5 main stages, namely:

1. Literature Study, at this stage solve the problem by tracing the sources of writings that have been made previously. In other words, the term Literature Study is also very familiarly called the term literature study. In research to be carried out, of course, a researcher must have extensive knowledge about the object of research to be studied.

2. Carrying out an assessment, at this stage field research is carried out in the form of observations at LCS to find out whether it is necessary to implement an enterprise architecture or not.

3. TOGAF ADM modeling, the purpose of this TOGAF ADM modeling is to model an enterprise architecture based on the steps specified in TOGAF ADM.

4. Stage of Results Modeling and analysis, in this stage the results of the research contained in the TOGAF framework at LCS. The result of this modeling is the selection of the right process in model development.

5. Architectural Blueprint, at this stage the blueprint is obtained from the results of information technology analysis at LCS. It is hoped that the results of this blueprint can provide maximum results.

The following is a picture of the stages of research carried out in research in this article:
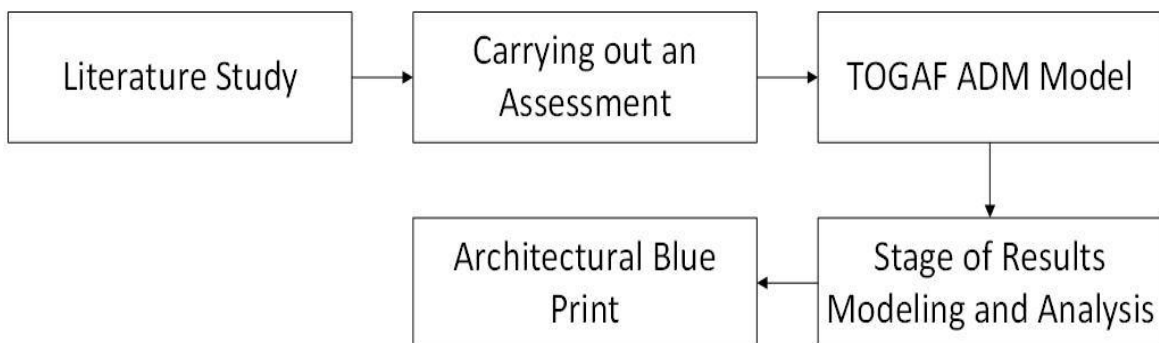

Figure 1. Stages of TOGAF Research [18].

In this article, we use the TOGAF method [19] to design enterprise architecture at LCS. TOGAF is a framework that is widely used in the development of enterprise architecture. TOGAF presents methods and tools for building, managing, and implementing, as well as maintaining architecture in information systems. The purpose of the TOGAF evaluation is to design an enterprise architecture to improve the performance of the logistics system at LCS [20].

3. RESULTS AND ANALYSIS

Enterprise Architecture (EA) modeling using the TOGAF framework approach, which can support information systems in running the Academic Process at LCS based on the stages of the architectural process. The process will be carried out with an enterprise architecture model through the TOGAF ADM stages.

3.1 Preliminary Phase

The definition of architectural principles is very important for the development of enterprise architecture. Architectural principles are usually based on business principles. However, it depends on how the principles are defined and disseminated within the company. Architectural governance issues are closely related to architectural principles. TOGAF ADM is the core of TOGAF which is a

detailed, complete and easy to understand methodology that is used for developing, developing, managing and implementing an enterprise architecture. This stage is the stage which is the preparatory stage in planning the enterprise architecture. This stage describes the initiation and preparation activities to meet the requirements so that the planning of the Company Architecture can run in accordance with the business processes and procedures of the company. Components of the Output Preliminary Phase, the output of the preliminary phase may include the organizational model for the enterprise architecture, including among others Scope of the organization affected, the Gap assessment, the Roles and responsibilities of the architecture team, and the Constraints of the architecture, and Budget requirements.

Logistic Courier Services (LCS) as a logistics company is growing at this time and also sees increasing client demand within the company. LCS must realize the importance of implementing information systems and information technology within the company by integrating company systems with IS/IT strategic plans. So that the company can achieve the company's vision and mission and goals. companies must be able to rely on IS and IT to support business processes. With company vision "To Be the Leading Logistics Company in Their Own Country with Global Competitiveness" and Mission "To Consistently Provide the Best Customer Experience", Enterprise Architecture Design a guideline or Blueprint will be made. In doing this design the method used in using TOGAF ADM which uses 5 phases, namely:

• Architectural Vision, objective: develop the ability of the value of business benefits to be achieved as part of the EA results delivered and will obtain agreement for the statement of architectural work to develop and implement the architecture specified in the enterprise architectural vision.

• Business Architecture, objective: develop a business architecture target that provides an explanation of how the company needs to operate to achieve their business goals, and as a strategic driver set out in the architectural vision, in a way that will address the architectural work and stakeholder concerns and will identify candidate component Architecture Roadmaps based on gaps between the baseline business architecture and the targets to be achieved.

• Information System Architecture, objective: developing a target IS architecture, describing how the enterprise IS architecture will enable the business architecture and architectural vision, in a manner that addresses the architectural work statement and stakeholder concerns and identifies candidate architecture roadmap components based on gaps between current and target IS (Data and Applications) architectures.

• Technology Architecture, objective: develop a targeted technology architecture that enables the architectural vision, business targets, data, and applications to be achieved and delivered through the various components of existing technology and technology services, in a way that addresses all architectural work statements and stakeholder concerns in identifying the various components of the architectural roadmap candidate based on the gap between the current technology architecture and the target to be achieved.

• Opportunities and Solutions, objective: produce a complete version starting from scratch of the architectural roadmap, based on a gap analysis with the candidate components of the architectural roadmap, determine which incremental approach is needed, and identify the transitional architecture that will provide a sustainable business value and determine the overall solution to achieve the target architecture based on building architecture.

3.2 Value Chain Analysis

Value chain analysis (VCA) is the process in which the author analyzes the LCS by identifying the main and supporting activities that can add value to the product/service which in turn can reduce costs or increase differentiation within the LCS, this represents the internal activities carried out by the company, this can change input to output. The purpose of value chain analysis is to identify which activities are the most profitable from the differentiation process for the company and to look for which activities can be improved to provide a competitive advantage. In other words, internal activities are analyzed to be able to reveal where these competitive strengths or weaknesses are. All companies that are currently competing certainly have a differentiation advantage will try to carry

out their activities better than those of competing companies. A company will be able to produce goods at a cost lower than the market price or to provide superior products, then therein lies the profit.

There are 3 stages that need to be passed from the value chain analysis, namely: 1. Identifying Value Chain Activities, Identifying value chain activities carried out by the company in the process of designing, manufacturing, and providing services to customers. Value chain development varies depending on the type of industry being run. Some industries may be involved in a single activity, for example, some firms produce only goods, while others only distribute and sell products. 2. Identifying Cost Drivers in Each Value Activity, this stage, the identification of activities where the company has a cost advantage, both current and potential cost advantages. Strategic information from cost drivers can direct companies to reduce or eliminate costs, so as to reduce costs and maintain or increase competitive advantage. 3. Increase Competitive Advantage by Reducing Costs or Adding Value, In this stage, the company determines the nature of the potential competitive advantage.
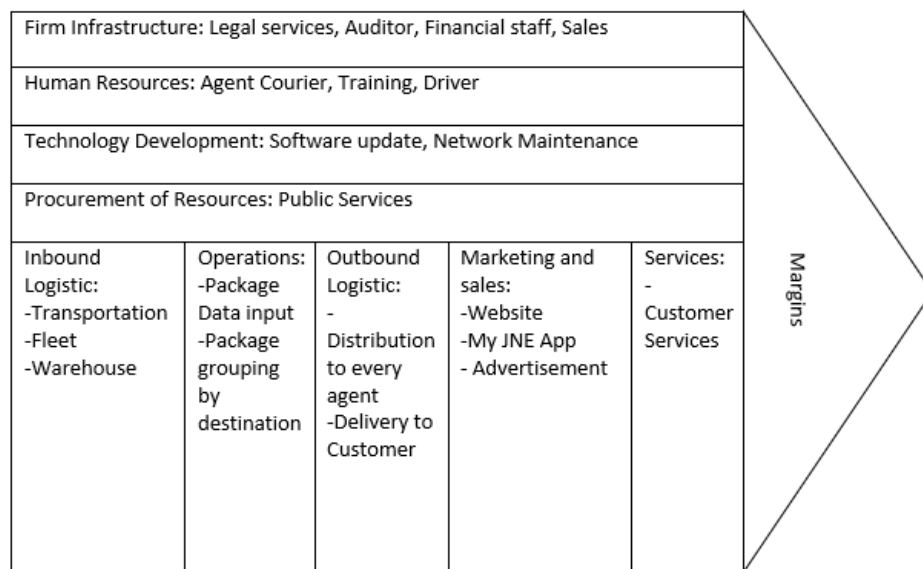

Figure 1. Value Chain of LCS

To identify the main and supporting activities [21], the Value Chain needs to be drawn to describe the activities within the company and as a reference to increase the company's value Value Chain analysis is a model that is used to help analyze specific activities that can create value and competitive advantage [22] for the organization, accordance with previous research conducted by Wicakson and Andry, the use of technology has not been maximized in helping the company's business activities. Designed business architecture, to develop between information technology and business processes that are in line with the vision of company. The function of the value chain is to describe how to view business as a chain of activities that convert inputs into outputs so that they have value for customers. Value chain analysis is a strategy that is used to analyze the company activities. In other words, by looking into internal activities, the analysis reveals where a company's competitive advantages or disadvantages lie.

Based on figure 1, the first primary activites from value chain analysys are inbound logistic. Inbound logistic are the processes related to receiving, storing, and distributing inputs. In this section, they need to purchase a transportation, a warehouse, and a fleet from suppliers to complete their operational need. Next is operations. Operations are the activites that change the inputs into outputs. In operations, they need to input the package data, group the package by destination to ensure that the package will be delivered to customer without any damages. Then, the next activites are outbound logistics. Outbound logistic are the activites that deliver your product or service to your customer. In Outbound logistic, they need to distribute the package to every agent, and make sure to delivery the package to customer without any damage. After that, the next activites is marketing & sales. Marketing and sales are the processes to make clients to purchase from the company instead of the

competitors. In these sections, The Company will do the marketing by website, advertisement to attract the customer attention to use their courier services. And for the last section of primary activites are services. Service is an activity that is related to after sales service. In this section, company must make sure that the packages are delivered to the customer without any damage and on time. If there is a package that is damaged by company mistakes, they must take the consequences and take responsible for that.

Supporting activities in the value chain are company activities that aim to provide activities to achieve the company's main activities. In this case, the supporting activities can be more efficient with the use of support activites. An increase in any one of the four support activites aids at least one primary activites to work more productively. Firm Infrastructure is the first support activites in value chain, and this activity is provided by the Logistic company. Such as legal services, and financial management for their employees. The next activites is Human Resources Management. Human Resources management is a support activites that made up of many activites, such as compensating, recuriting, training agent courier and driver. Despite technology is growing, human resources continue to play an important role in value chain of the logistic enviroment. Logistic companies train their delivery courier and driver to delivery package on time and without damaging the package on the process. Human resources management is critical in every industry not only in logistic environment. The next support activites is Technology Development. Technology development is the activites that involves everything that is used to turn input into output by the business. As for logistic industries, technology is very important to inform the customer whereabouts of their package, whether it is still in the warehouse or being delivered by a courier. And for the last support activites is Procurement. Procurement is an activity related to obtaining resources, such as the purchasing function used in the value chain. This is needed to support logistic business process such as purchasing warehouse, cars, and trucks for LCS to be fully operational.

3.3 Enterprise Architecture

The purpose of Enterprise Architecture is to optimize across the enterprise the often-fragmented legacy of processes (both manual and automated) into an integrated environment that is responsive to change and supportive of the delivery of the business strategy. Today's all of BODs know that the effective management and exploitation of information and Digital Transformation are key factors to business success, and indispensable means to achieving competitive advantage. An Enterprise Architecture addresses this need, by providing a strategic context for the evolution and reach of digital capability in response to the constantly changing needs of the business environment. Developing and sustaining an Enterprise Architecture is a technically complex process which involves many stakeholders and decision processes in the organization.

Design Enterprise Architecture Planning (EAP) is the process of defining the architecture for the use of information that supports the business and includes plans for implementing the architecture. In enterprise architecture planning, EAP focuses on data architecture, business architecture, application architecture, and technology architecture oriented to business needs to meet data needs. EAP or Enterprise Architecture Planning is an architectural planning method that is oriented to business needs consisting of data architecture, applications, and technology as well as an implementation plan of the architecture that has been made to support business activities to achieve the organization's mission. Strategies and policies in a profit-oriented organization have a public service mission that prioritizes customer service. This process also known as enterprise architecture planning (EAP). Enterprise Architecture are built to meet the company needs. This can be done through several stages that takes a very long time and cost very expensive. But LCS are willing to pay the time and price. What LCS care is about customers satisfaction, and this is one of their goals. And until now, the company continues to develop the technology system. The purpose is not to be left behind with modern technology in the future [23]. According to previous research by Tannady et al, 2020, the target of future Architecture that is being developed for the logistic company.

Here are the steps for customer needs:
- My LCS Application: This process includes the application that made for gadgets to align the system from customers to make it easier to know whereabout of their packages without asking

to the nearest LCS branch office. A network development, and server maintenance is needed to make sure that the application can run smoothly without any problem and can track customer packages precisely.

- Website: In this era, technology has spread to the companies in delivering a lot of packages and can make sure that any delivery that does not take a very long time. This website is used to call couriers to send packages to a destination location. And at the same time, the website also can track the location of our package and ensure that our package arrives at its destination. Proven this technology process requires costs that are not cheap, and the results obtained are proportional to customer satisfaction.

3. 4 Technology Architecture

The objectives this phase is develop a technology architecture target that allows the enterprise architectural vision, business goals, data, and application building to be delivered through its various technology components and services, addressing an architecture's job statement and stakeholder concerns, and seeking candidate components of an architectural roadmap based on the gap between basic technology architecture and targets to be achieved.

The technology architecture phase or the technology architecture phase defines the application components of the application architecture into technology components that represent software, hardware, and network components by purchasing from outside parties or being self-configured by the organization into the technology platform. The technology architecture will define the basic views and targets of the technology portfolio.

The approach taken by the author to develop this phase are technology architecture needs to capture the opportunities that exist for the enterprise through the adoption of new technologies. While enterprise architecture is guided by business issues, it is a driver of change that is often found in evolving technological capabilities. With the increasing number of digital innovations currently reaching various markets, stakeholders need to strive for and be open to various technology-driven changes, part of digital transformation will always emerge due to the convergence of telecommunications and computer capabilities that have opened Pandora with new ways of doing things. implementing an architectural infrastructure. Solution development methods are also constantly evolving to challenge traditional development methods and put emphasis on services for the common good and benefit from using an enterprise architecture approach. The architecture team will need to consider what relevant technology architecture resources are available in the architecture repository.

This phase describes the technology structure needed by LCS starting from determining the required technology such as hardware and software. And consider alternatives - alternatives in technology selection. At this time the hardware used in each branch office uses a computer with specifications that can support the required application recommendations. The recommended technology is the addition of a personal computer that will be used as a database and software used as a database system, namely the MySQL Database Management Application which has been implemented for a data storage system in the company that will be integrated with all branch offices. MySQL makes it easy for companies to reduce paperwork and keep data more secure. In addition, the company has an application called My LCS where the application still has a bug when registering or logging in. The OTP code that is sent to user's phone number cannot be recivied because of the bug. And not only OTP code, the location of the customer's package that is shown in the map is inaccurate. The following are the conditions of technology that have been applied at LCS:

- In accessing the internet, the company uses the services of a third-party services and the system applied still uses a LAN cable and Wifi. For fellow branch offices already integrated with each other with a website.
- The My LCS application is not accurate in displaying the location of packages from customers, and there is still a bug in the My LCS application that causes the OTP code couldn't be received when the user tries to login or register to the My LCS application. Seeing the current condition of information system integration within the company, it becomes the main target in the

development of the blueprint carried out in this research because the expected conditions of architectural technology are as follows:

- Networks that have been integrated with each other are provided with security protection in the form of a VPN or other cyber security so that companies can be protected from cyber attacks such as malware, trojans / viruses, or hackers.

- Update the My LCS application and fix bugs that cause the OTP code couldn't be received by the user. After that update the map / gps technology so that the location displayed is accurate and precise.
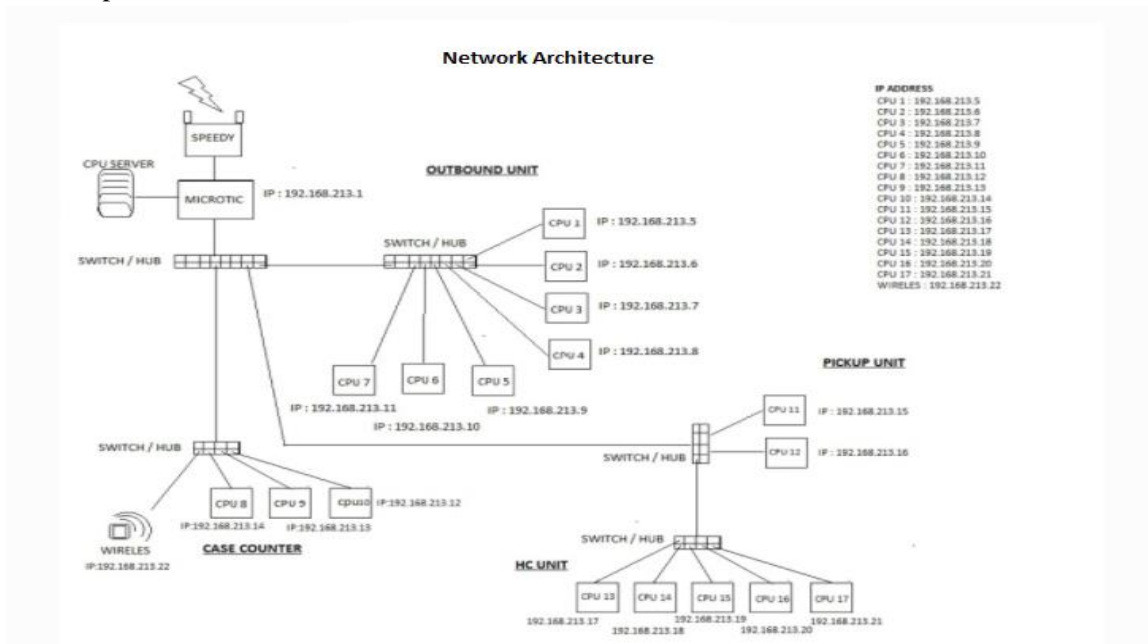

Figure 2. Network Topology
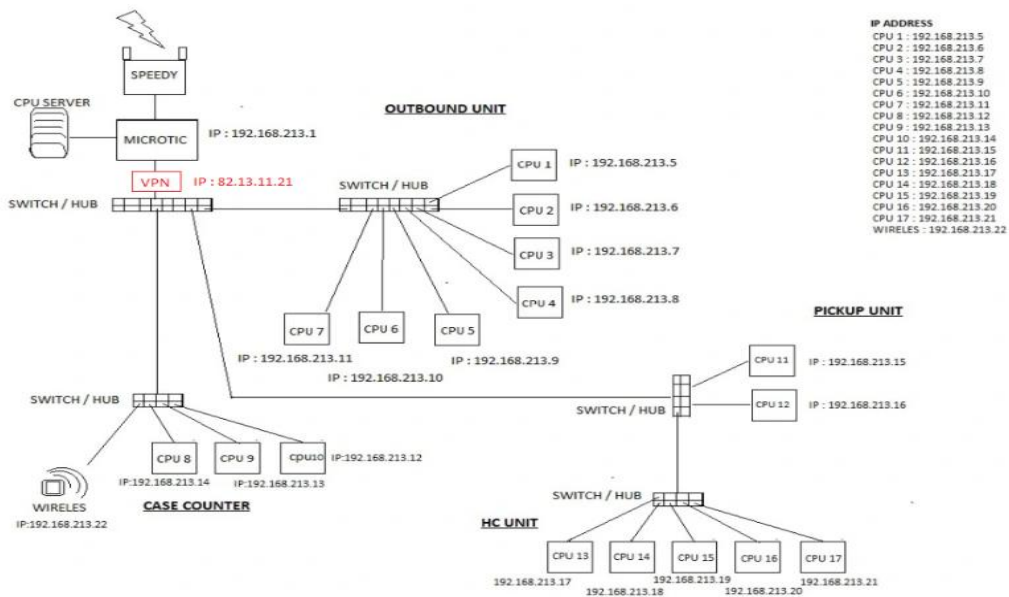
3. 5 Network Topology

Figure 3. Proposed Network Topology

For each environment, produce a logical diagram of hardware and software infrastructure showing the contents of the environment and logical communications between components. Where available, collect capacity information on the deployed infrastructure. For each environment, produce a physical diagram of communications infrastructure, such as routers, switches, firewalls, and network links. Where available, collect capacity information on the communications infrastructure. The following diagrams should be considered for development within a Technology Architecture: Networked Computing/Hardware diagram and Network and Communications diagram. The outpur of this phase are draft Architecture Definition Document included physical communication (network), a hardware device and a network.

The outputs produced in this phase include improved versions and updates of the architectural vision phase, such as technology principles, Architectural definition document drafts, including components of technology and their relationship to IS, namely physical communication and hardware and network specifications. Next is the draft architectural requirements specification, namely the results of the gap analysis, the output requirements of the business architecture and information systems architecture phases and the updated technology requirements.

At this company, they have the current network topology for office branch in LCS. And we will be proposed the Network topology in figure 3. Figure 2 describes the network blueprint of one of the branch offices of LCS which still uses a third-party internet named "Speedy". In the picture it is explained that from the HC unit, case counter, pickup unit, outbound unit that is connected to the switch/hub.

And the switch is connected to a proxy and a server which in the end is connected to a third party "Speedy" which provides internet access to all LCS via wireless connection. This will certainly endanger the security of customer data privacy if the LCS's branch office is exposed to a cyber attack because the IP is still in the form of public. Suggestions that can be done by LCS is to add encryption protection in the form of a Virtual Private Network (VPN). To minimize the occurrence of cyber attacks to update the network topology as shown in Figure 3. Proposed Network Topology describes the encryption protection using a VPN. With a VPN, the company's IP address will be encrypted into a new IP that slows down the attacker to find the real IP address with privacy data. This is what must be implemented by LCS in the future so that companies are safe from cyber attacks.

Table 1. Specification of Hardware

Hardware	Specification
Server with Procesor	HP ProLiant DL380 Gen9 2.1Ghz
Memory Hdd	16GB (1x16GB Registered DIMMs, 2400 MHz)
Storage for data	1 Terabyte
Super Video Graphics Array	SVGA 8mb
Device Input	Mouse and Keyboard
Device Output	A liquid-crystal display (LCD) Monitor & Printer

Table 2. Specification of Software

Software	Specification
Operating System (OS)	Ms. Windows 10 Enterprise
Browser for web	Ms. Edge
Server for web	Apache
Platform for Database	Ms. Sql Server 2020
Coding	Ms. Visual Studio C#
Presentation, Spreadsheet and Word Processing	Ms. Office 2020

To support the implementation of the proposed information system implementation activities at the university, it is necessary to make hardware recommendations that can support the

implementation so that it can be carried out in accordance with the goals that have been set. The description of the required hardware and software recomendations is contained in Table 1. Specification of Hardware and Table 2. Software Recommendations.

4.   CONCLUSION

Based on the discussion, it can be concluded that by using the TOGAF-ADM method which is used as a tool for the manufacture and design of enterprise architecture in this study, the design of the architectural model in general is in accordance with the vision and mission of LCS. Planning an enterprise architecture is making a blueprint that can be used as a guide or reference in the development and development of information technology both in terms of information systems and applications in terms of service improvement. The blueprint generated from enterprise architecture modeling using the TOGAF ADM method is a detailed plan starting from the business architecture, data, applications, and technology from LCS.

REFERENCES

[1]   H. Tannady, B. Wicaksono, and J. F. Andry, "Designing Architecture Technology Using Togaf Method In Aluminum Foil Manufacturer," *Solid State Technology*, Vol. 63, Issue 2s, pp. 4045-4054, 2020.

[2]   F. R. K. Husada, "Penerapan Sistem Paket ID Saat Proses Delivery Courier di LCS Express," vol. 8, no. 5, p. 55, 2019.

[3]   F. S. Lee, A. Chakir, R. Nathanael, and J. F. Andry, "Architecture Information System in Electrical Distribution Company Using TOGAF," *International Journal of Advanced Trends in Computer Science and Engineering*, Vol. 9, No.5, pp. 7149-7156, 2020.

[4]   R. Yunis and Theodora, "Penerapan Enterprise Architecture Framework Untuk Pemodelan Sistem Informasi," *JSM STMIK Mikroskil*, vol. 13, no. 2, pp. 159–168, 2016.

[5]   E. D. Madyatmadja, J. F. Andry, and A. Chandra, "Blueprint Enterprise Architecture In Distribution Company Using TOGAF," *Journal of Theoretical and Applied Information Technology*, pp. 2006-2016, Vol. 98. No 12, 2020.

[6]   The Open Group, "The Open Group Architecture Framework Version 8.1.1," Architecture, p. 778, 2009, [Online]. Available: http://www.opengroup.org/architecture/togaf8-doc/arch/toc.html.

[7]   B. G. Sudarsono, J. S. Antouw, J. F. Andry, and A. Sani, "Enterprise Architecture Landscape Using TOGAF Framework for Offshore Company," *TEST Engineering and Management*, May-June 2020, pp. 16880-16889.

[8]   Y. Geasela and J. F. Andry, "Design Enterprise Architecture In Cpo Industry Using Togaf Adm Framework," *ICTACT Journal On Soft Computing*, Vol. 10, Issue. 01, pp. 2022-2027, 2019.

[9]   I. Asisdiq, Sudding, and S. Side, "Penerapan TOGAF ADM Dan ITIL Dalam Pengembangan Enterprise Arsitektur," *Pendidik. Kim. PPs UNM*, vol. 1, no. 1, pp. 91–99, 2017.

[10]   P. Ranting and J. F. Andry, "Re-design Business Process at Forwading Company Based on Enterprise Architecture Planning," *IJNMT*, Vol. VI, No. 2, pp. 68-73, 2019.

[11]   O. Barros and C. Julio, "Enterprise and process architecture patterns," *Bus. Process Manag. J.*, vol. 17, no. 4, pp. 598–618, 2011, doi: 10.1108/14637151111149447.

[12]   L. Davindi and J. F. Andry, "Redesign The Heavy Equipment Company's Business Processes Based on EAP Using The Zachman Framework," *International Journal of Open Information Technologies,* Vol. 7, No.12, pp. 70-76, 2019.

[13]   N. E. Falabiba, "Penelitian menggunakan Architectur Development Method (ADM) dan The Open Group Architecture Framework (TOGAF) Pada PT XYZ," pp. 7–26, 2019.

[14]   S. Gregor, D. Hart, and N. Martin, "Enterprise architectures: Enablers of business strategy and IS/IT alignment in government," *Inf. Technol. People*, vol. 20, no. 2, pp. 96–120, 2007, doi: 10.1108/09593840710758031.

[15]   S. Firdaus, R. Andreswari, and R. Hanafi, "Analisis Dan Perancangan Enterprise Architecture

Pt Tjimindi Subur Pada Fungsi Outbound Logistic, Marketing And Sales, Dan Service Menggunakan TOGAF ADM," *eProceedings Eng*., vol. 6, no. 2, pp. 7742–7749, 2019.

[16]   D. A. Sudarmawan, "Interaksi Manusia & Komputer," *Andi Offset*, 2007.

[17]   Z. R Fanani, N. B. Puspitasari, A. Susanty, A. R. Andini, and R. Rumita, "Analisis Logistic Service Quality untuk Meningkatkan Kualitas Layanan Jasa Pengiriman JNE Express," *J. Tek. Ind*., vol. 15, no. 2, pp. 73–81, 2020.

[18]   L. Retnawati, "Perancangan Enterprise Architecture Menggunakan TOGAF di Universitas ABC," *J. IPTEK*, vol. 22, no. 1, p. 13, 2018, doi: 10.31284/j.iptek.2018.v22i1.221.

[19]   F. E. Gunawan, J. F. Andry, H. Tannady, and R. Meylovsky, "Designing Enterprise Architecture Using Togaf Framework In Meteorological, Climatological and Geophysical Agency, *Journal of Theoretical and Applied Information Technology*, Vol.97, No 20, pp. 2376-2385, 2019.

[20]   J. Leonidas and J. F. Andry, "Perancangan Enterprise Architecture Pada Pt.Gadingputra Samudra Menggunakan Framework Togaf Adm," *J. Teknoinfo*, vol. 14, no. 2, p. 71, 2020, doi: 10.33365/jti.v14i2.642.

[21]   B. Wicaksono and J. F. Andry, "Perancangan Arsitektur Bisnis Pada Industri Aluminium Foil Menggunakan TOGAF," *IT Journal Research and Development (ITJRD)*, Vol.5, No.1, pp. 98-108, 2020.

[22]   H. Tannady, J. F. Andry, F. E. Gunawan, and J. Mayseleste, "Enterprise Architecture Artifacts Enablers for IT Strategy and Business Alignment in Forwarding Services," *International Journal of Advanced Trends in Computer Science and Engineering*, Vol. 9, No. 2, pp. 1466-1472, 2020.

[23]   H. Tannady, J. F. Andry, Y. T. Suyoto, and A. Herlian, "Business Architecture of Public Guest Service for University Using TOGAF ADM Framework," *Technology Reports of Kansai University*, Volume 62, Issue 05, pp. 2421-2428, 2020.