Redesign The Heavy Equipment Company's Business Processes Based on EAP Using The Zachman Framework

Leonard Davinci, Johanes Fernandes Andry

Abstract—**Heavy Equipment Company is one of the heavy equipment rental companies in Indonesia which is engaged in services, specifically road construction, this company also provides rental of heavy equipment and buying and selling heavy equipment spare parts. To be able to improve the company's business processes for the better, the company can implement SI / IT in its business processes. The application of IS / IT must be planned carefully so that it can help the company achieve its vision and mission. Enterprise Architecture Planning (EAP) is one method that can be used to do planning in helping to take advantage of the implementation of IS / IT. In this study, EAP will be linked to the Zachman Framework to complement its planning results. This research will produce a number of recommendations for the application of EAP results that can be implemented and help run the business processes found in the company.**

Keywords—**Zachman Framework, EAP, Technology Information, Sistem Information**

I. INTRODUCTION

Heavy Equipment Company is one of Indonesia's heavy equipment companies located in DKI Jakarta province. The company is engaged in the construction of water & irrigation buildings, reservoirs, road construction with soil compaction, cut and fill, clearing, grubbing and finishing.

Heavy Equipment Company provides services for buying and selling sparepart heavy equipment and providing contracting equipment for heavy equipment transportation and land transportation. At present, Heavy Equipment Company has not maximized the use of information systems (SI) and information technology (IT) in its business processes.

The use of IT / IS becomes one of the important aspects in a company because it can improve business processes [1]. Being able to create an advantage in competitive competition and also be the main target of the effort of implementing IT / IS in the company [2].

The design development that will be carried out using information technology (IT) and information system (SI) strategies can achieve satisfactory targets. For every company engaged in the business field certainly expects profit to be a turning point to be achieved [3], [4].

By using IT / IS that supports the business processes of a company can make the existing performance in the company more in accordance with the needs of the company's business and increase the competitiveness of the company [5]. Therefore, IT / SI in the company must be in accordance with the vision and mission of the relevant company.

To be able to implement a good IT / IS and in accordance with the vision and mission of a company, must pay attention to a process of system development and careful planning by observing all the interests of each party involved with the system, be it the management as the party responsible for organizational performance, the developer responsible for the system being built, as well as the user who is responsible for the utilization of the system that is planning the design [6].

This is because, IT / SI will hamper business processes if not well planned and in accordance with the company's vision and mission [7].

An Enterprise Architecture Planning (EAP) plan can help in the process of making and planning a company so that it can be better and run according to company goals.

Enterprise Architecture Planning or EAP is one method that can be used in doing IT / IS planning in a company [8], [9].

EAP is the process of defining architectures for the use of information that supports business processes, and includes plans to implement enterprise architecture [10]. In practice, the EAP method will be linked to other frameworks that can complement it, such as the Zachman Framework [11].

Zachman Framework is a framework that can be used to determine whether the methodology used has covered all aspects of the enterprise architecture or what aspects are covered by the methodology [6].

This framework also helps design an enterprise architecture model that can help all management define thoroughly so that it has a basic organizational structure that supports access, integration, inspection, development, processing and change. As well as enabling business managers seniors and IT professionals to understand the implications of key business and IT strategies that must be established for turbulent times [12].

The Zachman Framework enables senior business managers and IT professionals to understand the implications of key business and IT strategies that must be

established for turbulent times [13].

Based on the explanation above, the researcher concludes to plan for the implementation of IT / IS by using the EAP method that is included with the Zachman Framework. Thus, it is hoped that this research can produce a good design of new business systems and processes and applications that can run in line with the goals and business achievements of Heavy Equipment Company

II. THEORETICAL BASIS

A. Enterprise Architecture

Enterprise Architecture (EA) is a science in IT which has the following meanings [13]

- EA is an explanation of the plan for building one or a set of systems.

- EA is a logical, comprehensive, and holistic approach that is used to design and implement the system and its components simultaneously, which includes management of IS / IT infrastructure.

- EA can affect management and the area of organizational technology especially in the development of SI blueprints from various disciplines both theoretically and practically.

From these definitions, enterprise architecture can be used as a reference or guideline when developing information and communication systems because enterprise architecture is a blueprint.

B. Zachman Framework

This framework suggests a logical structure for categorizing, organizing and describing a detailed picture of a company. The main objective of the Zachman framework is to create infrastructure that supports companies or organizations in the development, integration, design, management and access of organizational information systems[15].

Zachman's framework concerns information technology (IT) in an organization or company and is usually described in six rows and six columns. Rows indicate perspectives, such as Planer (Scope), owner (Company Model), designer (System Model), builder (Technology Model), Subcontractor (Detailed Representation), Actual System (Functioning Company) and columns representing six basic questions (What, How, Where, Who, When, Why) in a perspective scenario. A well-defined architecture is very helpful for new developments in existing processes and information technology systems to identify important changes.

In this context, developers need tools or instruments to help the development of IS / IT systems from architecture to implementation. UML is an instrument that can help in the implementation of the Zachman framework [16].

Following is Figure 1 which displays the table shape belonging to the Zachman framework.

Figure 1. Zachman Framework [14]

III. RESEARCH METHODOLOGY

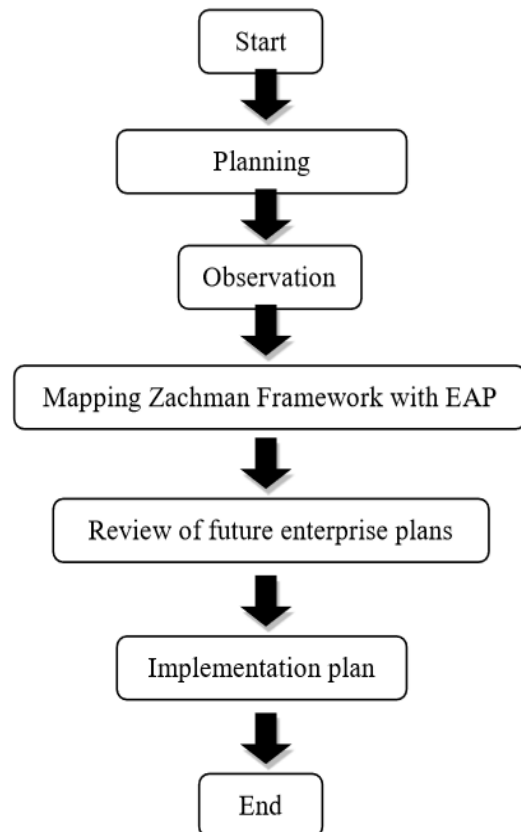This research was carried out through several stages such as those in Figure 2 below.

Figure 2. Research flow [11]

From Figure 2 it can be seen if the research stage begins with planning initialization. This stage will identify the company and collect various information such as vision and mission, which can be used in determining the appropriate enterprise architecture design for the company.

The second stage is to review the current condition of the company. This stage will conduct an analysis of current business processes using SWOT and value chains. SWOT will be used to look for weaknesses and strengths owned by the company both internal and external. Value chains will be used to map business processes found in the company today and divide them into two categories, namely main and supporting activities.

The third step is mapping the company's problems or processes into the Zachman framework matrix. The matrix used is only 2 rows and 3 columns. Due to adjustments to EAP.

The fourth stage is the discussion of enterprise planning for the future. This stage results in the design of a new business process based on Zachman's framework.

The last stage of this research is the implementation plan. This stage will discuss the order in which new business processes are implemented in companies that are subject to research.

IV. RESULT AND DISCUSSIONS

A. Planning instillation

This company was formed by using all kinds of provisions and various preparations that are mature, organized and coordinated, which form the basis of its development, especially in the business of construction services for Water & Irrigation Buildings, Reservoirs, Reservoirs, Reservoirs, and Road construction works, with work systems from the process of mapping / measuring the road body, Cut and Fill, Clearing and Grubbing, Sub Base Course / Lower Foundation, Stripping / Forming the road body, Compaction, to Finishing.

Vision and Mission

- The company will always prioritize integrated and programmed business activities to provide optimal results and employer satisfaction by establishing good relations

- Playing an active role in running the business by supporting government programs to improve the nation's economy,

- Become a company providing the best contracting services in Indonesia

- Participate in creating jobs and participate in building a quality and professional work culture.

- Prepare all the standard requirements of the company and help maintain the stability of the economy due to the free market.

B. Observation

Based on figure 3 business process models, can be seen how the business processes that have been running on a Heavy Equipment Rental Company.
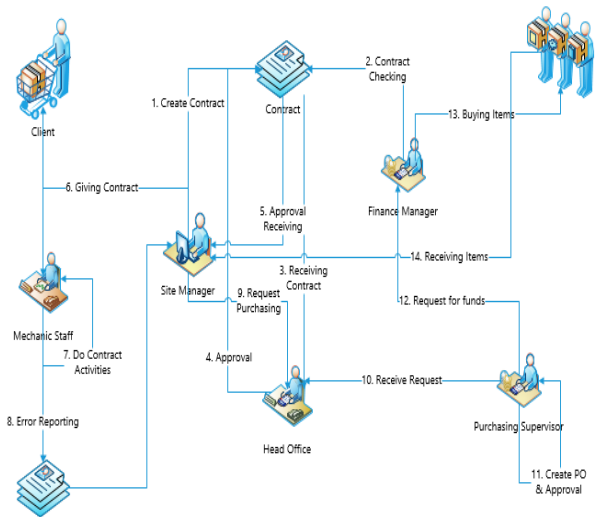

Figure 3. Business Process Model

This section explains the scenario of business processes from Figure 3. Above:

- Site Manager will make a work contract to the client.

- Finance Manager will check the contract that has been made and give it back to the Site Manager.

- Site Manager will ask the Head Office for contract agreement to be made with the client.

- After the contract is approved, the contract is given to the client and the Field Mechanic Staff does the contract work.

- If during the fieldwork there is a problem of equipment damage, running out of oil and others, the Mechanic Staff reports and submits them to the Site Manager.

- Site Manager makes purchasing requests (PR) to the head office

- The Head Office receives the PR from the Site Manager and forwards it to the Purchasing Supervisor.

- Purchasing Supervisor makes a Prerequisite order and submits funds to the Finance Manager to purchase the items needed, and is sent to the Site Manager.
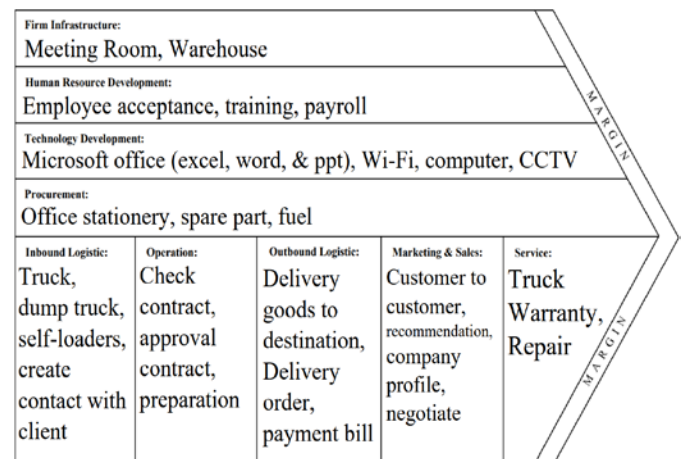

Figure 4. Value Chain

After knowing the current business processes in the company, then proceed with the analysis of business processes using the SWOT and value chains.

Primary Activities

- Inbound logistics, buying trucks, dump trucks, self-loaders, gasoline, spare parts, making contracts with clients

- Operation makes contracts to clients and checks contracts, approve contracts, prepare, and operate trucks.

- Outbound Logistics send goods to the destination send goods, make payments.

- Marketing and Sales, word of mouth customer promotion, recommendations, through an offline company profile and negotiations.

- Services, truck warranty, make repairs.

Support Activities

- Firm Infrastructure, has a meeting room and spare part warehouse

- Human Resource Management, HRD provides training to employees, selects new employees and pays employee salaries.

- Technology Development, the company uses Microsoft office computer operating software with the support of a Wi-Fi connection and has CCTV surveillance in every workspace

- Procurement, purchasing office stationery, spare parts, gasoline, trucks, dump trucks, self-loaders.

After knowing the main and supporting activities that are owned by the company, the following is the result of its SWOT analysis:

- Strength, the company has a fairly good reputation, has high expertise and experience in the contracting business, has sufficient assets, strategic location of the company, and has more than one subsidiary.

- Weaknesses, companies have not maximized the use of IS/IT in their business processes, truck maintenance is not organized

- Opportunity, the company has a good relationship between clients and suppliers, suppliers provide cheap and high quality spare part, and many services are needed by many companies to rental.

- Threat, there are heavy equipment contractor services from other companies, if they do not apply SI / IT in their business processes, they will be out of flow business.

C. Mapping Data to the Zachman Framework Matrix

After the data about the company's business processes have been collected then proceed to the process of mapping into the Zachman Framework matrix. The matrix used is only two rows and three columns of the Zachman framework, namely the planner and owner rows along with

the what, how and where columns. Here are the results of the mapping:

1. Planner

- What

Data relating to this information system include marketing (general company data, contact us message data), Tracking (client data, driver data, truck data), bill payment (transaction data in and out data debt or installments owned by the company, important event data), payroll (permanent employee data, employee performance data, payroll data), truck maintenance (truck information data, truck damage and repair data, truck repair costs).

- How

Processes that occur include marketing (company introduction, service offerings, question and answer with prospective customers), delivery of goods (recording of client data, scheduling of orders, monitoring of road orders),
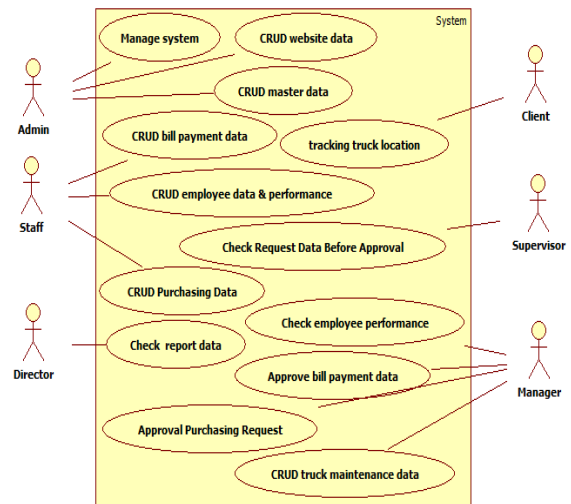
- Where

Central Jakarta, Indonesia.

2. Owner

Figure 5. Use case diagram of information system

- What

This section will discuss the use case diagram of the proposed information system. Figure 5 use case diagram of information system is a picture that displays the shape of the information system use case diagram, and the following is an explanation of Figure 5 use cas diagram of information system:

Can be known if there will be six actors who have different roles and functions and access rights. The admin type actor has functions to manage the entire information system, manage website data, and manage master data.

Staff type actors have the role to manage payment bill data, manage employee data and work performance, and manage purchasing data. Actor-type director has a role to check various data reports generated by information systems.

The client type actor has a role to monitor the location of the truck that was boiled. The supervisor type actor has the role to check the data of the purchase request of the goods before approval by another party.

The manager type actor has a role to be able to check information about the work performance of workers, approve payment bill data, approve purchase requests after being checked by other parties, and manage truck data.

• How

This section will discuss various activities that can be carried out by each actor sequentially in the information system to be built.

Admin, this actor will manage the system and various data related to the information system. Admin has the duty to make the information system run stable.

Client, actor who can track the location of the truck he rents. Staff, this actor will input data starting from payment bill data, employee data and performance, and purchase request data.

Supervisor, this actor will first check the purchase request data inputted by staff, before being approved by the actor type manager.

Manager, actor who will give or not approval for data that has been inputted by the type of actor staff (payment bill data and employee data along with performance information), and give approval to the data that has been checked by the previous supervisor. This Actor can also input data into the information system regarding truck data owned by the company.

Director, actor who only sees the results of reports of any information contained in the information system.

• Where

This section will discuss the location of the proposed information system placement. Some proposed information systems will be on public networks (company profile websites) and some will be on local networks. The following forms are displayed from the network map contained in the company at this time, figure 6 Map Network.
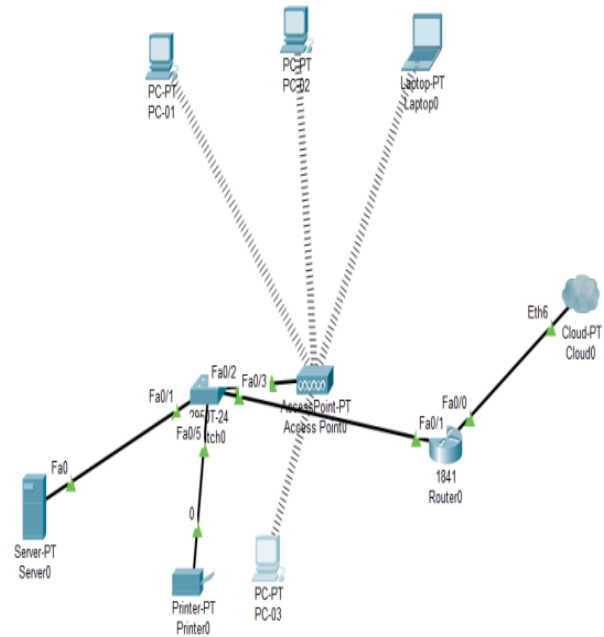

Figure 6. Map Network

D. Results of Future Enterprise Plans

Based on the results of the mapping of the Zachman Framework, it can be seen if the results of corporate Architecture Planning by utilizing Information System and Information Technology are as follows, figure 7 business architecture.
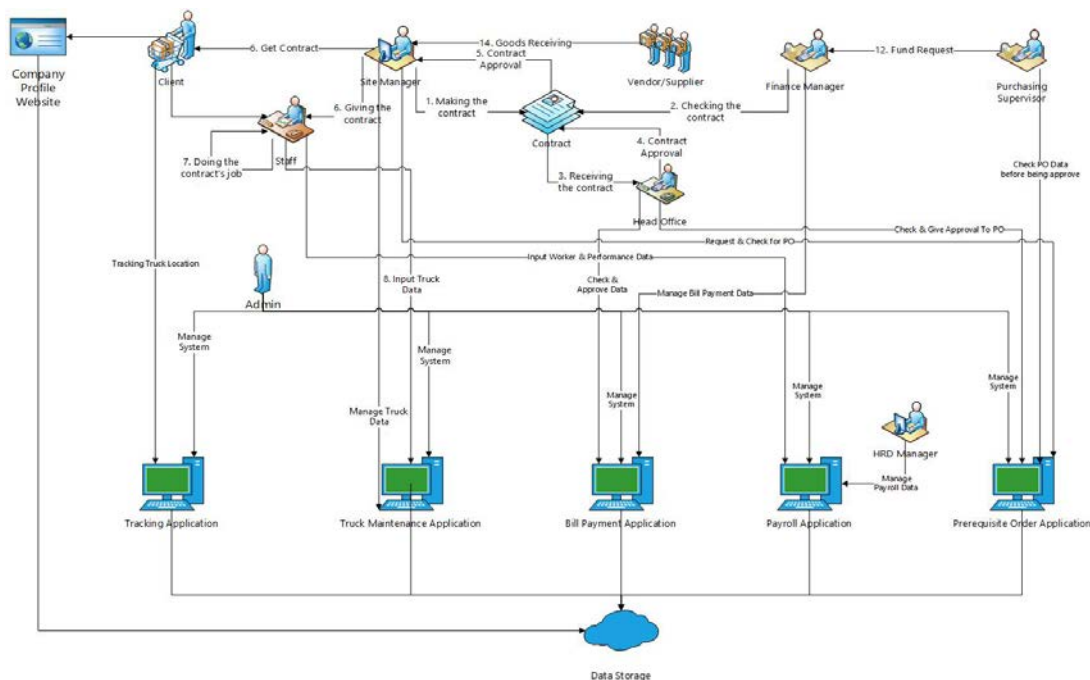

Figure 7 Proposed Business Architecture

Based on Figure 7 Proposed Business Architecture, it can be seen if there will be six applications that will help run the proposed company's business processes. These six applications are adjusted based on the six processes that have been taken previously. The following is an explanation of the role of applications in company business processes:

- Company Profile, this application will help companies in marketing, as well as providing information about services provided by the company to the general public or prospective client companies.

- Tracking, this application can help companies and clients to be able to find out the location of the truck used to deliver goods to a particular destination.

- Bill Payment, this application can be used to help record various payment bills owned by a company. And produce reports relating to company payment bills.

- Payroll, this application can be used to help manage employee data along with information about the performance of the employee's performance. This application can also be used to collect payroll reports for each employee based on the payroll period.

- Truck Maintenance, this application can be used to be able to collect data and store data about trucks owned by the company. This application can also produce information about a truck owned by a company along with reports of damage that the truck has experienced.

- Prerequisite order, this application is used to be able to assist data collection and PO data management. This application can also generate reports on various POs that have been carried out.

E. *Implementation Plan*

From the results of business process planning for the company, there will be six applications that will be implemented in the company's business processes. Implementation of this application will be carried out in sequence based on the application portfolio as follows.

Table 1 Aplication Portfolio

Strategis	Berorientasi Tinggi
Truck maintenance	Prerequisite order
Operasional Kunci	**Pendukung**
Company profile	Pay roll, Bill payment

V. CONCLUSION

From the research that has been done, it can be concluded if the Zachman framework can be used to help plan a company's architectural development.

Also, based on EA planning carried out using the Zachman framework, there are six new application designs that have been produced so that the planning of the information system that will be built can run well.

These six applications represent some parts of business processes discussed in this case study, namely Company profile,Tracking, supervision of debt or installment bill payments, payroll, prerequisite order, and truck maintenance owned by the company. In implementing it, it is suggested that the company also conducts training so that its employees can keep up with changes in the new business processes.

REFERENCES

[1] R. Hariawan, K. R. S. Wiharja, and E. G. Perdana, "Perencanaan Strategis Sistem Informasi Menggunakan TOGAF ADM (Studi Kasus Bagian Pelayanan Barang Pelabuhan Indonesia II)," *eProceedings Eng.*, vol. 1, no. 1, pp. 800–805, 2014.

[2] M. Agarina, "Pemanfaatan Framework TOGAF Untuk Perencanaan Sistem Informasi Manajemen Aset Dan Logistik Di Ibi Darmajaya Bandar Lampung (Studi Kasus : Ibi Darmajaya Bandar Lampung)," *J. Inform. Darmajaya*, vol. 15, no. 2, pp. 175–187, 2015

[3] R. Irfanto and J. F. Andry, "Perancangan Enterprise Architecture Menggunakan Zachman Perancangan Enterprise Architecture Menggunakan Zachman Framework (Studi Kasus : Pt . Vivamas Adipratama)," in *seminar nasional sains dan teknologi*, 2017, no.1

[4] R. Yunis and K. Surendro, "Model Enterprise Architecture Untuk Perguruan Tinggi Di Indonesia", in Seminar Nasional Informatika, UPN Veteran Yogyakarta, 2009. pp. 72-79.

[5] M. Afif, "Perancangan Enterprise architecture Menggunakan Metode TOGAF ADM (Studi Kasus pada PT RMM)," *STRING (Satuan Tulisan Ris. dan Inov. Teknol.*, vol. 2, no. 1, p. 118, 2017.

[6] D.Saputra, "Perancangan Enterprise Architecture Zachman Framework Untuk Jasa Layanan Pasang Baru Dan Tambah Daya Listrik Pada Perusahaan Jasa Listrik Swasta," *J. Khatulistiwa Inform.*, Vol. 3, No. 1, Pp. 11–24, 2015.

[7] R. Anggrainingsih, A. Aziz, U. Salamah, and S. Widya Sihwi, "Penyusunan Arsitektur Visi dan Arsitektur Bisnis Sebagai Tahapan Perancangan Arsitektur Enterprise Universitas Sebelas Maret (UNS) Dengan Framework TOGAF," *J. Teknol. Inf. ITSmart*, vol. 2, no. 2, p. 13, 2016

[8] R. R. Rerung, M. Informatika, P. Perdana, and M. Purwakarta, "Perencanaan arsitektur sistem informasi dinas pariwisata menggunakan model eap, "vol. 8, no.1, pp. 327-338, 2017.

[9] W. Wiyana and W. W. Winarno, "Sistem Penjaminan Mutu Pendidikan Dengan TOGAF ADM Untuk Sekolah Menegah Kejuruan, "*Regist. J. ilm.* Teknol. Sist Inf. vol. 1, no. 1, oo. 7-14,2015.

[10] Y. Miftahuddin, M. Ichwan, and M. Musrini, "Penerapan Metode EAP (Enterprise Architecture Planning) Pada Pembuatan Blueprint Sistem Akademik", Jurnal Informatika, vol. 4, no. 1, pp. 39-47, April. 2013.

[11] T. Kristanto, "Enterprise Architecture Planning untuk Proses Penglolaan Manajemen Aset Dengan Zachman Framework, " *regist. J. Ilm. Teknol. Sist. Inf.,* vol. 2, no. 2m pp.98-104,2016.

[12] Rosida, "Perencanaan Arsitektur Enterprise Menggunakan Zachman Framework," J. Inf, vol. VI, no. 2, pp. 1-15, 2014..

[13] K, Prasetya, Dedy, "Pengembangan Arsitektur Enterprise Administrasi Pendaftaran Dan Operasional Akademik SMK Bonavita Tangerang Dengan Metode Zachman Framework, *Incomtech,*vol. 6. No 1, Juni 2017.

[14] J, Leonardo and J. F. Andry, " Design Enterprise Architecture For Industry Of Textile Using Zachman Framework, "*ICTACT J. MANAG. STUD.*, vol 5. No. 2, pp. 1022,1029.

[15] Sajid, M., Ahsan, K., 2016. Role of Enterprise Architecture in Healthcare Organizations and Knowledge-Based Medical Diagnosis System. JISTEM – Journal of Information Systems and Technology Management 13 (2), 181–192.

[16] Slameto, A. A., Utami, E., Pangera, A. A., 2012. Penerapan 36 Sel Zachman Framework Dalam Perancangan Sistem Informasi Laboratorium. Jurnal Telematika 5 (2), 1–16.

J. F. Andry is a Senior lecturer in Department of Information System, Faculty of Technology and Design, Bunda Mulia University, Jakarta, Indonesia. (email: jandry@bundamulia.ac.id)

Leonard Davinci - Universitas Bunda Mulia (email: cyiu498@gmail.com)

.