

Enterprise Architecture Information System Using the Zachman Framework

Putu Widiadnyana^{a1}, Putu Veda Andreyana^{b2}

^aSTIKOM Bali Institute of Technology and Business

^bDept. Of Information Technology, Faculty of Engineering, Udayana University, Indonesia
e-mail: ¹widiadnyana@stikom-bali.ac.id, ²putuveda@unud.ac.id

Abstrak

Penggunaan teknologi informasi pada perusahaan merupakan hal yang wajib untuk menciptakan keunggulan bagi perusahaan. Perusahaan tentu saja mengharapkan inovasi agar bisa bersaing pada pasar global. Pengembangan sistem informasi perlu dilakukan untuk meningkatkan proses bisnis yang baik dan dapat menciptakan efektivitas bagi pelayanan terhadap customer. Framework yang baik menjadi kunci penting dalam perancangan agar menghasilkan sistem enterprise yang memuaskan. Gambaran sistem perusahaan dapat menggunakan framework yang sesuai dengan keperluan yaitu Framework Zachman. Framework Zachman digunakan untuk melakukan perancangan pada sistem perusahaan produksi dengan melakukan perancangan berdasarkan perspektif yang terlibat dengan sistem. Penggunaan Framework Zachman dalam perancangan sistem perusahaan akan menghasilkan rancangan dengan melibatkan perspektif perencana, pemilik, perancang, pembangun, subkontraktor dan pengguna yang akan membahas secara detail mengenai data, fungsi, lokasi, orang, waktu dan motivasi. Hasil dari perancangan sistem berupa blueprint atau kerangka kerja sistem perusahaan yang dapat memudahkan dalam proses produksi.

Kata kunci: Sistem Perusahaan, Arsitektur Enterprise, Framework Zachman

Abstract

The use of information technology in companies is mandatory to create advantages for the company. Companies of course expect innovation to be able to compete in the global market. Information system development needs to be carried out to improve good business processes and create effectiveness in customer service. A good framework is an important key in designing to produce a satisfactory enterprise system. The company system description can use a framework that suits your needs, namely the Zachman Framework. The Zachman Framework is used to design production company systems by designing based on the perspectives involved with the system. Using the Zachman Framework in designing company systems will produce designs involving the perspectives of planners, owners, designers, builders, subcontractors and users who will discuss in detail data, function, location, people, time and motivation. The results of system design are in the form of a blueprint or company system framework that can facilitate the production process.

Keywords: Enterprise Systems, Enterprise Architecture, Zachman Framework

1. Introduction

The use of information technology in a company must be able to create advantages in competitive competition and also be able to become the main target of efforts to implement Information Systems and Information Technology in the company. Every company that operates in the business sector certainly hopes for profits which is a hope that it wants to achieve. The application of information technology in business makes it easier for every business actor to create efficiency and effectiveness for the company so that the company will be able to compete in the global market. The development of increasingly complex organizations means that the need for information and data will increase, so it is necessary to develop an integrated information system that can support business processes running in organizations that provide quality data or information to reduce costs, increase productivity, and provide data sharing facilities. and information as well as improving services to customer.

Data integration in a large-scale company is called enterprise. The availability of well-formatted data in one well-managed data source is also a goal of organizational development. To make this happen requires choosing the right strategy and planning. Develop Enterprise Architecture need to develop an EA yourself framework for architecture enterprise. There are various kinds framework which can be used for architectural development enterprise one of them is using Zachman Framework. With the design of an architecture enterprise good, it is hoped that a balance between information technology and business needs can be achieved which can carry out business processes in accordance with the company's goals and targets.

PT. XYZ is a company that operates in the production sector. To compete in the business world, PT. XYZ needs to develop its business strategy, especially by using an information system that can support improving business processes in the modern era like today. Information systems have excellent capabilities in accurately processing information and disseminating it, improving marketing, saving costs and many other capabilities that can be used to support business processes. Currently, the use of information systems in the environment therefore requires an architectural design enterprise to achieve the desired business goals. This research uses a framework Zachman Framework as an architectural framework used to evaluate, design and build architecture that meets the goals of the company. Zachman Framework able to solve a problem by producing an information system or information technology plan so that it can run effectively and efficiently and can support business strategy [5].

2. Research methodology

2.1. Data collection

Data collection is a method used to obtain sources of information that are useful for research. The methods used to collect data and information related to research are observation and interview methods. An explanation of the observation and interview methods can be seen in the following explanation.

2.2. Observation

Observation is a data collection method carried out by observing the research object. Observations are carried out to examine the nature and behavior of objects accompanied by recording information. Observations are carried out to determine the weaknesses of the object, which can then become an illustration of the process being observed.

2.3. Interview

Interviews are a data collection technique that is of a nature real time. Interviews are conducted to obtain information by asking several questions that have been designed related to the research being conducted. The advantage of using interview techniques is that apart from obtaining information directly, researchers can also pay attention to the facial expressions of the interviewee or object being studied.

2.4. Literature review

Library study is an activity of obtaining information and data by reading and searching for references through books, journals and articles. Recording activities are also carried out in literature studies so that report preparation runs smoothly.

2.5. Research Flow

The research was carried out by approaching enterprise architecture Zachman Framework to design systems for the company. Zachman Framework is one of the frameworks used to plan Enterprise Architecture Planning (EAP) which functions to describe a company system based on general perspectives and questions [6].

Zachman Framework will prioritize frameworks that are conceptual and structured. This framework defines each part with descriptive writing about a company. Research with the aim of designing architectural information systems enterprise carried out by implementing systematic and structured research steps so that it can be achieved according to expectations.

The research stages used as a research reference. The first stage is literature study, then continued with data collection. The data that has been collected is processed using the Zachman method by applying 6 perspectives and 6 components in the Zachman framework, the explanation of which can be seen in Figure 1.

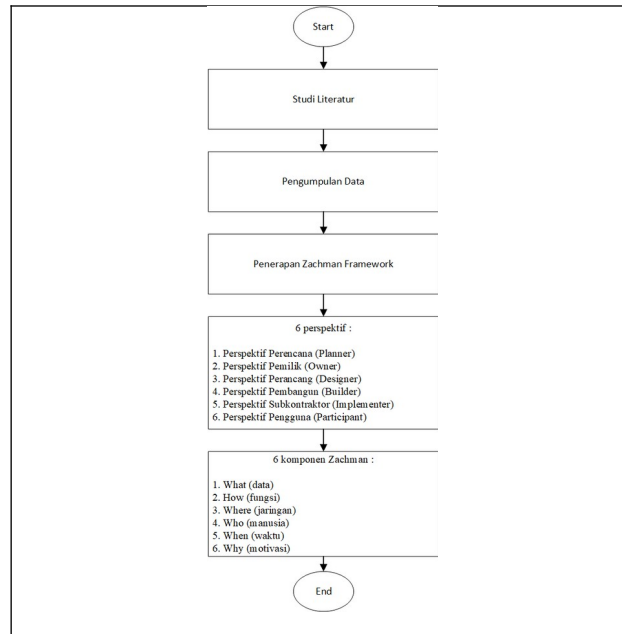


Figure 1. Research Flow

3. Literature Study

3.1. Zachman Framework

Zachman Framework is framework matrix-based to organize and classify a company's artifacts. Framework it was developed by John Zachman in the 1980s and used as a framework for enterprise architecture. Zachman Framework is widely used in the field of enterprise architecture and is considered a useful tool for organizing and understanding the complexity of modern organizations. Zachman Framework is a tool used to manage and organize information related to system development projects.

Zachman Framework consists of a matrix with six rows and six columns. Each cell in the matrix represents a different aspect of the company, and the rows and columns represent different points of view or perspectives.

	What (Data)	How (Function)	Where (Locations)	Who (People)	When (Time)	Why (Motivation)
Scope (contextual) Planner	Daftar hal-hal penting untuk bisnis	Daftar proses yang dilakukan bisnis	Daftar lokasi di mana bisnis beroperasi	Daftar kejadian /siklus yang penting bagi bisnis	Daftar lokasi di mana bisnis beroperasi	Daftar tujuan/ strategi bisnis
Enterprise Model (conceptual) Business Owner	Semantic Model	Bisnis Proses Model	Sistem Logistik Bisnis	Workflow Model	Master Schedule	Plan Bisnis
System Model (logical) Designer	Logical Data Model	Arsitektur Aplikasi	Arsitektur Sistem Distribusi	Arsitektur Human Interface	Struktur Proses	Rule Bisnis Model
Technology Model (physical) Implementer	Data Fisik Model	Desain Sistem	Arsitektur Teknologi	Arsitektur Presentasi	Struktur Control	Desain Rule
Detailed Representation (out-of-context) Subcontractor	Definisi Data	Program	Arsitektur Network	Arsitektur Keamanan	Timing Definition	Definisi Rule
Functioning System	Data	Fungsi	Network	Organisasi	Schedule	Strategy

Figure 2. Zachman Framework

Zachman Framework has a framework that helps to group and define an enterprise to be more structured. Framework focus Zachman Framework varies depending on each perspective. Zachman Framework contains components of 6 columns and 6 rows which represent questions related to enterprise. Zachman Framework includes 6 perspectives as follows.

1. Planner's Perspective (Scope Context): establishes the context, background and objectives of the information system.
2. Owner's Perspective (Business Model): designing business processes and business functions based on the owner's views.
3. Designer's Perspective (System Model): designing an information system model and realizing the owner's desired model technically and physically.
4. Builder's Perspective (Technology Model): carry out supervision to monitor technical and physical implementation.
5. Subcontractor Perspective (Detailed Representations): carry out detailed implementation of information system development
6. Consumer Perspective (Participant Enterprise): explains the real form of an information system based on the end user's perspective

Zachman Framework there are some common queries that are commonly associated with enterprise as follows.

1. What (data): explains what the project should do and what its goals are.
2. How (function): explains how the project will be carried out and how it will be implemented.
3. Where (location): describes where the project will take place and how the system is integrated with the rest of the environment.
4. Who (person): explains who is involved in the project and what their responsibilities are on each project.
5. When (time): explains when the project will be carried out and how the system is integrated into the broader schedule.
6. Why (motivation): explains why the project needs to be done and what its goals are.

By filling in the matrix with specific information about the company, Zachman Framework provides a comprehensive view of the enterprise and helps ensure that all relevant considerations are taken into account when designing or modifying it.

4. Results and Discussion

The system design obtained is based on the results of data collection and research that has been carried out to obtain results in the form of system design for a company.

4.1 Planner's Perspective (Planner)

The planner's perspective is a perspective that explains the data involved in the company system.

- 1) What (data)

Columnwhat discuss the data related to the application made as follows.

- a) Product stock data is data to determine the amount of product stock.
 - b) Purchase data is data to determine the history of product purchases.
 - c) Account data is data to find out system data.
- 2) How (function)
Columnhow discusses the processes related to the purchasing flow in the company system. The processes that occur in the company system are:
- a) Purchasing process
 - b) Reporting process
- 3) Where (location)
Columnwhere discusses the selection of locations that will be used to design the system. The system will be built using the following specifications.
- a) Processor Intel Core i5
 - b) Memory minimum 8 GB
 - c) SSD 1 TB
- 4) Who (people)
Columnwho discusses human resources which play an important role in the company system as follows.
- a) Company owner
 - b) Staff
 - c) Admin
 - d) Supplier
 - e) Consumer
- 5) When (time)
Columnwhen discusses implementation time when carrying out selling, buying and payment activities on the system.
- 6) Why (motivation)
Columnwhy discusses the vision and mission of the information system that will be designed to achieve company goals. The company's vision and mission are summarized in the following explanation.
- a) The vision of the company is "Creating a reliable, leading and highly competitive company to create an advanced company".
 - b) The company's mission is to provide products that are useful for customers by prioritizing good service for customers.

4.2 Owner's Perspective

The owner's perspective is a perspective that provides suggestions and opinions regarding the system business processes designed for the company.

- 1) What (data)
The what column discusses use case diagram data relating to the company system as follows.

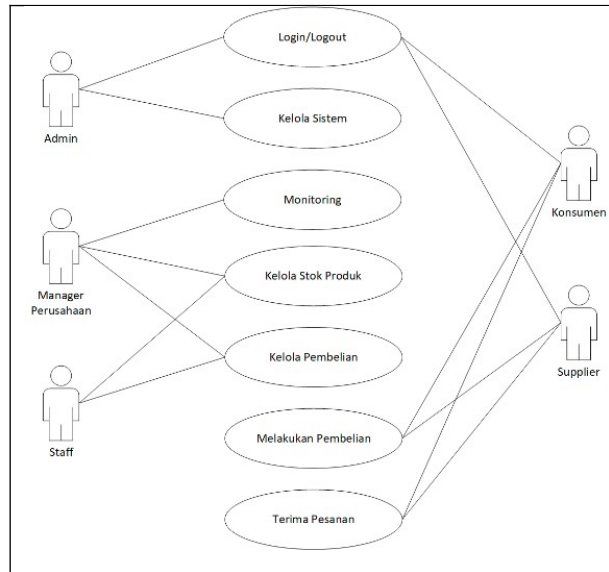


Figure 3. Use Case Diagram System Company

- 2) How (function)
Columnhow explains the process of designing information systems in companies.
- 3) Where (location)
Columnwhere explains the internet network used to design the company's system.

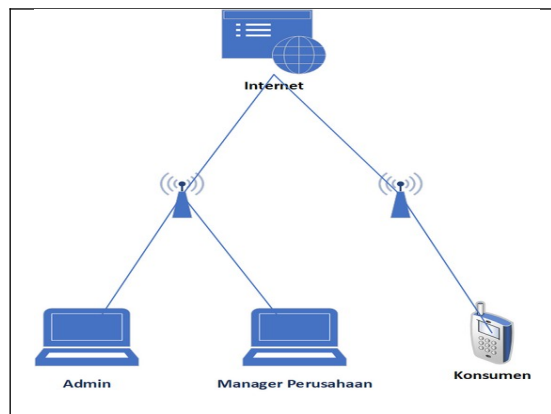


Figure 4. Enterprise Network Design

- 4) Who (people)
Columnwho explains the parties involved in the company system process.
 - a) Programmer Responsible for creating company systems by coding.
 - b) Admin is responsible for the operation and management of company systems.
 - c) The manager is responsible for monitoring the system.
- 5) When (time)
Columnwhen contains and explains the time in the form of a schedule regarding the design of the company system.
- 6) Why (motivation)
Columnwhy contains the goals to be achieved in the future along with the system that has been designed as follows.
 - a) Make it easier for users to find information about company products.
 - b) Make it easier for users to purchase a product.

4.3 Designer's Perspective (Designer)

The designer's perspective is information system modeling in the form of a system description in a logic model.

- 1) What (data)

Columnwhat contains perspectivesdesigner or the information system model that will be the basis for the system design that will be used in the form of a logic model along with other requirements must show the process flow, data elements and functions that describe the entity.Designer will provide information about the tables related todatabase for product purchase applications.

2) How (function)

Columnhow contains an overview of what activities are carried out in the product purchasing application where there are 4 interconnected actors.

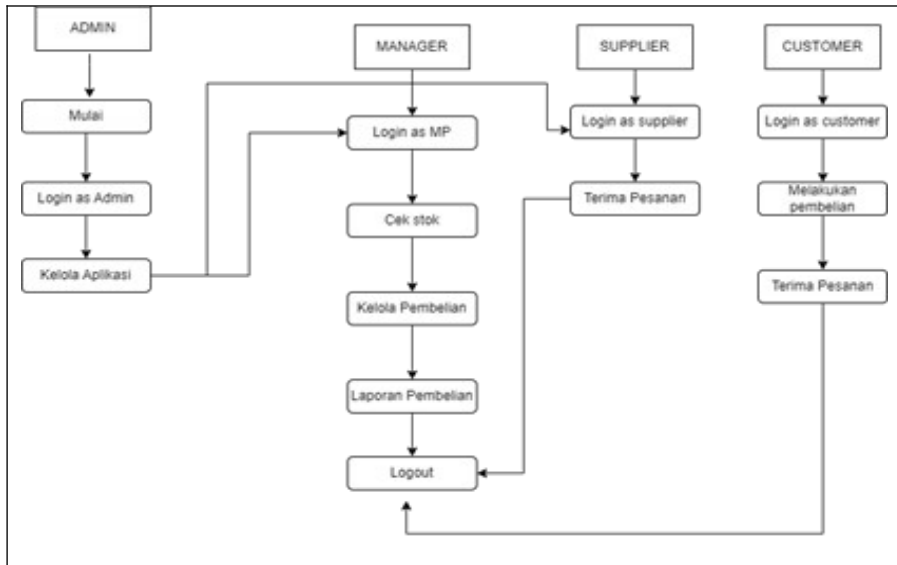


Figure 5. Product Application Activity Diagram

3) Where (location)

Columnwhere contains a logical model of the connection of nodes in a network and a description in the form of network topology. Proposed internet network design that will be used by PT. XYZ as a series of networks by addingweb server as a data source that will be used later to storedatabase information system that has been created.

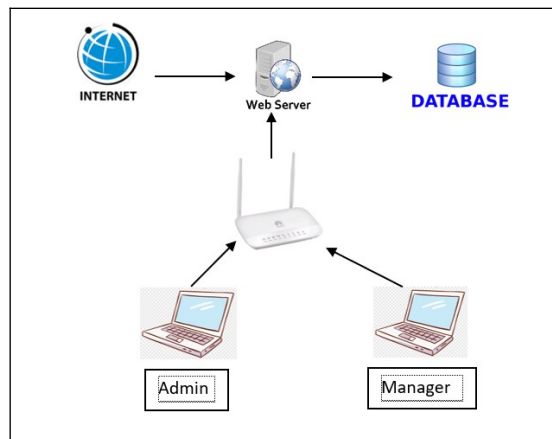


Figure 6. Proposed Network

4) Who (people)

Columnwho This designer will designmockup display for each application to be designed. What is described in this column are human resources assigned to build and manage information systems, among others

- a) Admin as a human resource is tasked with managing the system/application, receiving and inputting data, carrying outlogin/logout.
- b) Managers as human resources are tasked with monitoring, managing systems, checking stock, checking purchase reports.

5) When (time)

Column when explains the time or detailed schedule of several design things that support the formation of the desired financial information system, including:

- a) Entity determination
- b) Planning use case diagram
- c) Planning Activity Diagram
- d) Planning database
- e) Interface design

Table 1. Design Schedule

No	Information	Nov	Of the
1	Entity determination		
2	Planning use case diagram		
3	Planning activity diagram		
4	Planning database		
5	Interface design		

6) Why (motivation)

Column why explains the rules applied in the process of designing the application system to be created, namely:

- a) Account status consists of admin, manager, and staff.
- b) The value of the "ak_status" attribute is active and inactive.
- c) Only admins can perform CRUD data entry on staff.
- d) Only admins can see reporting results for those applying for work or staff reporting.
- e) Every access right user

4.4 Builder's Perspective (Builder)

Perspective builder is the initial design of the proposed information system in the form of a physical data model arrangement that must be adapted to the information system model such as devices input/output and other technology needs.

1) What (data)

Column what contains relationships between tables containing a physical data model represented as a table along with attributes that will be used to build a system that will be created with a simple description of the relationships between tables needed in this system.

2) How (function)

Column how explains the modeling of processes that occur in an information system into a sequence of diagrams containing the input to be processed along with the output produced by the system.

3) Where (location)

Column where provides a physical description of the information system requirements. These needs are in the form of hardware, software and system software (operating system).

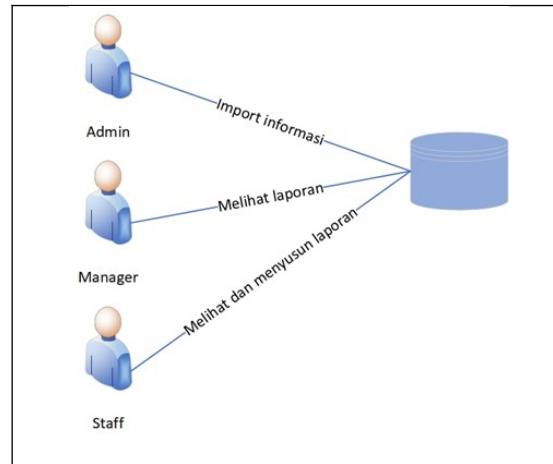


Figure 7. Data Management Network

- 4) Who (people)
Column who displays interface system application which refers to the actor or user of the system.
- 5) When (time)
Column when contains an application design schedule aimed at determining the time and target for creating an information system application starting from the creation process database, making interface design and creation of application program code. The following is the time required to create the application.

Table 2. System Design Schedule

No	Information	November				December			
1	Determination database								
2	Interface Design								
3	Program Code Creation								

4.5 Subcontractor Perspective (Detailed Representations)

The subcontractor perspective is an actor involved in delivering a particular aspect of the enterprise architecture, such as a particular product or service.

- 1) Who (people)
Column who provide information regarding each person's access rights, namely:
 - a) Admin
Admins get full control over the system, including downloading and configuring software, changing system settings, and managing other user accounts.
 - b) Manager Procurement Responsible for overseeing the production process of goods and services of an organization.
 - c) Supplier
Supplier have access rights to confirm orders from companies where orders can be in the form of raw materials, components or finished products.
- 2) Why (motivation)
Column why explains several things that must be considered in its implementation. The coding of this application includes:
 - a) Planning
Web developer will formulate the idea and objectives of the application to be created, as well as determine the features that will be used.
 - b) Design
Web developer will determine the application design that will be created, starting from the design user interface (UI), application workflow, to design database.
 - c) Coding

Web developer will write the program code that will be used to run the application. Coding is done using a programming language that suits the needs and objectives of the application being created.

- d) Testing
Web developer will test the application that has been created and ensure whether the application that has been created can run well and in accordance with the planned needs.
- e) Launching
After testing is carried out, the application will be launched and then it can be accessed and used by users.
- f) Maintenance
Web developer still have to do itmaintenance and carry out regular updates to ensure the application continues to run well and meets user needs.

4.6 Consumer Perspective (Participant Enterprise)

The user perspective describes the system's business processes based on the point of view of the user who will use the company's system.

- 1) Who (people)
The what column explains user access rights to the company's application system, namely:
 - a) Admin
 - b) Company Manager
 - c) Supplier
 - d) Consumer
- 2) Why (motivation)
The how column explains aboutStandard Operating Procedure (SOP) in the use of the company system to be built) is as follows.

Table 3. Standard Operating Procedure System

SOP	Application
Understanding	A production application is a system or program used to manage and optimize the production process in a company.
Objective	This application is usually used to manage production schedules, manage inventory of raw materials and finished products, and manage the flow of information and data related to production.
Policy	Every data entered is real, original data accompanied by correct evidence.
Procedure	First of all the user needs to ensure that the user has access to the application. If the application is available online, then the user needs to have an account and log in to the application.
Related unit	Every data entered is real, original data accompanied by correct evidence. After that, you can start running the application and use it according to your needs.

5. Conclusion

Application Zachman Framework proven to be framework which can be used to design the systementerprise with a structured method and based on the viewpoints of planners, owners, designers, builders, subcontractors and users. A system design perspective is used to address the statement column architecturewhat, how, where, who, when andwhy. The company's system architecture is designed to produce systems that have good quality and performance. Mature system design using Zachman Framework produce a system framework that is structured as expected by the owner's perspective (owner). Research using a framework Zachman Framework as a company system design, it is hoped that it can be used as a reference for designing a system based on 6 perspectives and 6 columns which are implemented in detail. System design using Zachman

Framework can be used for systems that will be designed by exploring more from the subcontractor's perspective and the user's perspective.

References

- [1] Widodo, A., P., 2010, Enterprise Architecture Model untuk Aplikasi Government, Jurnal Masyarakat Informatika, ISSN: 2086-4930.
- [2] Brianorman, Y., Fiarni, C., 2011, Perancangan Enterprise Architecture Pada Puskesmas Yang Sesuai Untuk Penerapan Teknologi Cloud Computing, Bandung, Konferensi Teknologi Informasi dan Komunikasi untuk Indonesia.
- [3] Tarmuji, A., & Hastiany. (2013). Pembuatan Enterprise Architecture Dengan Menggunakan Kerangka Kerja Zachman (Studi Kasus : Pimpinan Pusat Muhammadiyah). Jurnal Informatika Vol 7, No. 1, 711-721.
- [4] Agus Slameto, A., Utami, E., & Ali Pangera, A. (2013). Penerapan Zachman Framework dalam merancang sistem Pelaporan Kerusakan Komputer. Yogyakarta: STMIK AMIKOM Yogyakarta.
- [5] Riani, Mira Siti. 2020. "Penerapan Zachman Framework Pada Arsitektur Sistem Penggajian (Studi Kasus: Pt. Anugerah Mitra Mulia)." *Jurnal Riset Sistem Informasi dan Teknologi Informasi (JURSISTEKNI)* 2(1): 19–32.
- [6] Sugianto, Gianetha, and Radiant Victor Imbar. 2019. "Enterprise Architecture Menggunakan Zachman Framework Untuk Perusahaan X." *Jurnal Strategi* 1(1): 1–15.
- [7] Christianti, M., & Victor Imbar, R. (2007). Pemodelan Enterprise Architecture Zachman Framework. Jurnal Sistem Informasi Vol. 2 No. 2, 113 - 135. SCAN VOL. X NOMOR 3 OKTOBER 2017.
- [8] Veviyana, A. & Tarmuji, A., 2013. Pembuatan Enterprise Architecture Planning dengan menggunakan Kerangka Kerja Zachman di Majelis Pustaka dan Informasi PP Muhammadiyah Yogyakarta. Jurnal Sarjana Teknik Informatika (JSTIF), 1(1), pp.1 - 8.
- [9] Pratama, O.S., Setiawan, E.B. & Perdana, E.G., 2012. Penerapan Enterprise Architecture Planning Dalam Perancangan Arsitektur Sistem Informasi (Studi Kasus : Bagian Logistik IT Telkom). Digilib.
- [10] Neves, 2014. Pemanfaatan Enterprise Architecture Planning Sebagai Alat Perencanaan Dan Permodelan Proses Bisnis Guna Mendukung Sistem Informasi Pada Institute Of Business (Iob) Dili, Timor Leste. Matadalan.
- [11] UPN "Veteran" Jawa Timur, 2012. Rencana Strategis UPN "Veteran" Jawa Timur 2012 - 2016. Surabaya: UPN "Veteran" Jawa Timur.
- [12] Undiksha. 2017. Rancang Bangun Sistem Informasi Penggajian Karyawan. diakses pada tanggal 09 juni 2019.