# Implementation of Zachman Framework in Planning Enterprise Architecture at PT Karya Niaga Abadi (J&T)

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| ARTICLE INFO | ABSTRACT |
|---|---|
| | J&T Express Indonesia is present as a shipping service company in the form of documents and packaging / goods. By relying on the IT system in their services, they get a lot of benefits from the service and the quality of the goods/goods. In this research method using the type of research is descriptive research with data collection methods in the form of interviews and interview techniques conducted by researchers to respondents who use J&T Express services to obtain information about enterprise architecture in the J&T Express company. The technique used in collecting data is by conducting interviews with respondents who use J&T Express services and also making observations at the J&T Express company. The next step is to design Enterprise Architecture using the Zachman Framework method. The results showed that the 4 frameworks in the Zachman Framework, namely scope, business model, system model, and technology model can improve the performance and efficiency of the company in planning, implementing, and maintaining information systems used in company operations. |

## 1. INTRODUCTION

In this day and age, advances in information technology continue to grow rapidly, impacting all areas of human life, including education, business, government, and so on. In the early decades of the 1990s, the use and development of computerized applications was still rare in many departments, due to high operational costs and relatively low profits. However, with the entry of the new millennium, the situation changed. Computerized applications began to be widely applied in various fields and experienced significant development (Elisabeth, 2019). Various systems were developed using computer technology and its support, so that most departments in the organization could start developing information systems to facilitate business processes carried out jointly.

In the development of information systems today, there are several important factors that determine the proper operation of the operating system. In addition to the positive impacts generated by the advancement of information systems, there are also problems related to security and management of information technology resources (Hariman, 2018). The use of information technology has potential risks that need to be considered. Many studies show that information technology and its assets are vulnerable to physical and logical damage (Jouini et al., 2014; Abomhara & Køien, 2015; Ali & Awad, 2018; Parn & Edwards, 2019).

J&T Express Indonesia is a company that provides document and packaging delivery services. As a new company, J&T Express also utilizes information technology in providing their services. One of the advantages offered by J&T Express is the ease of picking up goods (Damayant & Indriani, 2021).

Customers do not need to go to the J&T office, but instead can contact them through an application available for Android and iOS platforms, or through the official hotline provided.

Based on research by Fortuna et al. (2020), the main goal of service companies is to provide good and optimal service in accordance with customer expectations, with the aim of building customer satisfaction. Through this, goods delivery service providers can establish a good relationship with customers, where customers give trust to the service company. The quality of service to customers is an important aspect for the company, which is reflected in the company's vision and mission. By implementing superior service to customers, companies can create satisfaction and build customer loyalty.

The availability of information has a crucial role in running a business both in organizations and companies. The more complex the business, the more important it is to have an information system that suits business needs. Information systems are used to support decision making and design business strategies that are in line with these business needs.

Penggunaan teknologi informasi di PT. Karya Niaga Abadi (J&T Express) memiliki peran yang sangat signifikan dalam mendukung tujuan, visi, dan misi perusahaan. Teknologi informasi digunakan untuk menerapkan layanan unggul kepada pelanggan, yang merupakan bagian dari strategi bisnis perusahaan ini. Untuk merancang sistem yang sesuai dengan strategi bisnis tersebut, diperlukan arsitektur perancangan sistem informasi yang disebut sebagai Arsitektur Enterprise. Arsitektur ini berfungsi sebagai panduan dalam perancangan sistem informasi.

In principle, enterprise architecture is a tool used to achieve alignment between information technology and the business run by the organization (Yunis & Surendro, 2015). This alignment can only be achieved if the organization comprehensively defines its needs. This process begins with defining the organization's business architecture, the data architecture that will be used, the application architecture that will be developed, and the technology architecture that will support the operation of these applications. Enterprise architecture plays a role in supporting information technology-based management, facilitating the development of integrated enterprise performance through technology resources, information flow, business processes, and strategic orientation (Yunis et al., 2008; Nogueira et al., 2013).

In the process of designing a system, the use of a framework can help in making it more structured. One framework that is useful in enterprise architecture is the Zachman Framework. This framework helps in mapping information system applications by considering the perspective of each element in the organization. The Zachman Framework was developed by the Zachman Institute for Framework Advancement (ZIFA), and John Zachman introduced a different approach to system development (Herdiansyah, 2017).

In addition, Zachman Framework is a theory and model in Enterprise Architecture that serves as a tool to categorize deliverables used in describing Enterprise Architecture comprehensively. This framework has been widely adopted by companies around the world. The Zachman Framework also provides a structured approach to thinking about the enterprise, especially in the context of information systems. By using the Zachman Framework, information systems can be described in more detail and requirements can be defined from many different perspectives. This allows the development of information systems that suit the needs of the organization or institution (Awaludin et al., 1978).

In this research, the Zachman Framework will be used as a framework for designing enterprise architecture at J&T Express. Zachman Framework will be used to assist companies in identifying and organizing information and understanding of enterprise architecture systematically. The result of this research will be an Enterprise Architecture design that can be implemented by J&T Express by utilizing the Zachman Framework. It is expected that the implementation of Enterprise Architecture will improve

the performance and efficiency of the company in planning, implementing, and maintaining information systems used in company operations.

The implementation of enterprise architecture can be a means to improve the efficiency of information technology when companies develop business innovations (Pangestu, 2021; Irfanto & Andry, 2017). How enterprise architecture is implemented by an organization depends on the adoption of methods or frameworks used in the development of enterprise architecture. By adopting such methods or frameworks, it is expected that organizations can manage complex systems and achieve alignment between business and information technology investments.

Enterprise refers to a group of organizations or governments that have similar goals. Meanwhile, architecture refers to a company or organization that includes a description of the building, physical structure, design, and construction methods used. Enterprise architecture is a representation of the operational system model in an enterprise, starting from the planning, design, and implementation stages. Enterprise architecture has an important significance for organizations because one of the results is to achieve alignment between information technology and business needs. With enterprise architecture, organizations can determine how to move effectively and efficiently in achieving their goals. Enterprise architecture helps organizations in designing business, information system, and technology architectures that can align business with information technology. There are four main components in enterprise architecture, namely business architecture, information architecture, technology architecture, and application architecture. In the context of these four components, the output of enterprise architecture is in the form of graphs, models, and/or narratives that describe the enterprise environment and design.

## 2. METHOD

### 2.1 Type of Research

The type of research used is descriptive research. Descriptive research is a form of research aimed at describing existing phenomena, both natural and man-made phenomena (Linarwati et al., 2016).

### 2.2 Collection Method

a. Interview, Interview is a conversation of two or more people that takes place between the interviewee and the interviewer with the aim of collecting data in the form of information. Therefore, the interview technique was carried out by researchers on respondents who used J&T Express services to obtain information about the enterprise architecture that exists in the J&T Express company.

b. Observation is an activity carried out to directly observe a certain object with the aim of obtaining a number of data and information related to that object. Therefore, data collection through observation is also carried out by researchers where this observation method is used to observe the enterprise architecture contained in the J&T Express company and researchers will make changes to the enterprise architecture of the company.

### 2.3 Research Stages

There are several stages of research that will be carried out in this study. The first stage is that we first analyze the problems found at J & T Express then we collect data and input data where the technique used in collecting data is by conducting interviews with respondents who use J & T Express services and also making observations at the J & T Express company. The next step is to design the Enterprise Architecture using the Zachman Framework method. In this study only used 4 frameworks in the Zachman Framework, namely scope, business model, system model, and technology model. Next is the design stage and the last stage is the implementation of J&T Express.
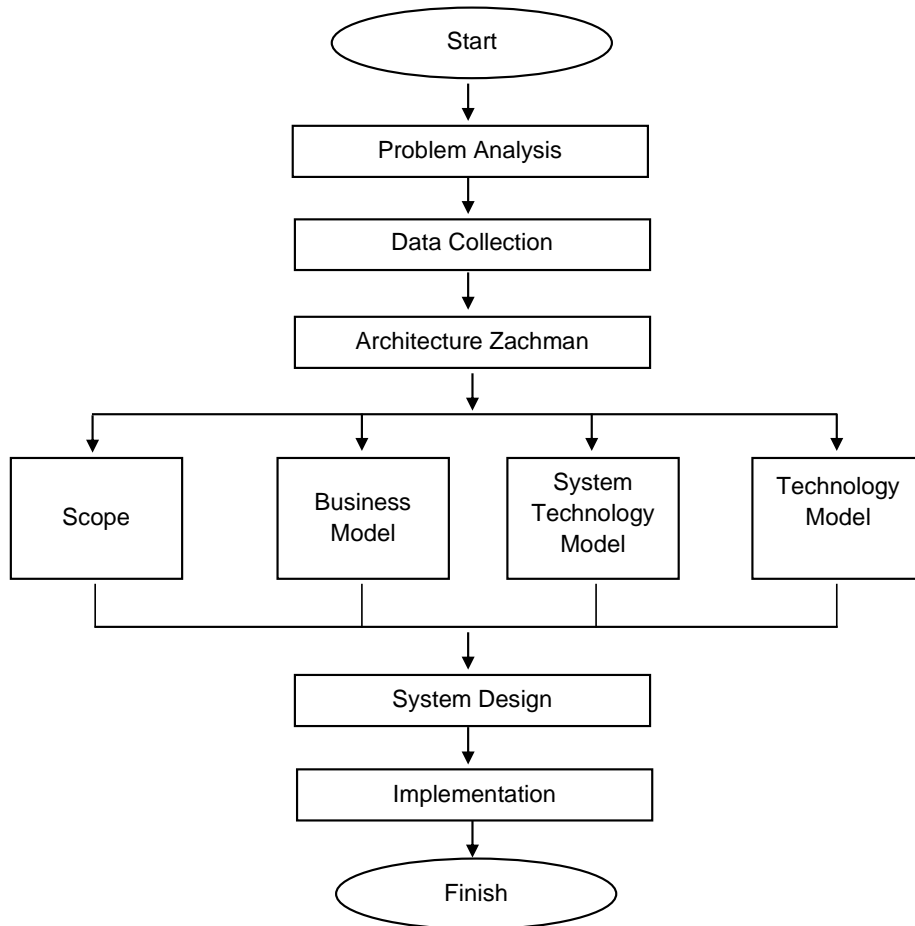
**Figure 1.** Research Stages

### 2.4. Zachman Framework

This research uses the Zachman Framework, which is one of the main components in enterprise architecture that is widely adopted around the world. Zachman Framework is able to describe the general structure of the organization and break it into complex enterprise systems. Previous research by Irfanto & Andry (2016) indicated that enterprise architecture design is very important as a basis for investment in long-term information system development. Zachman Framework is used to see and define an ongoing enterprise to be more structured and integrated with information technology development. The Zachman Framework is universal and can be modified according to organizational conditions (Aryani et al., 2022). The following is the framework of the Zachman Framework.
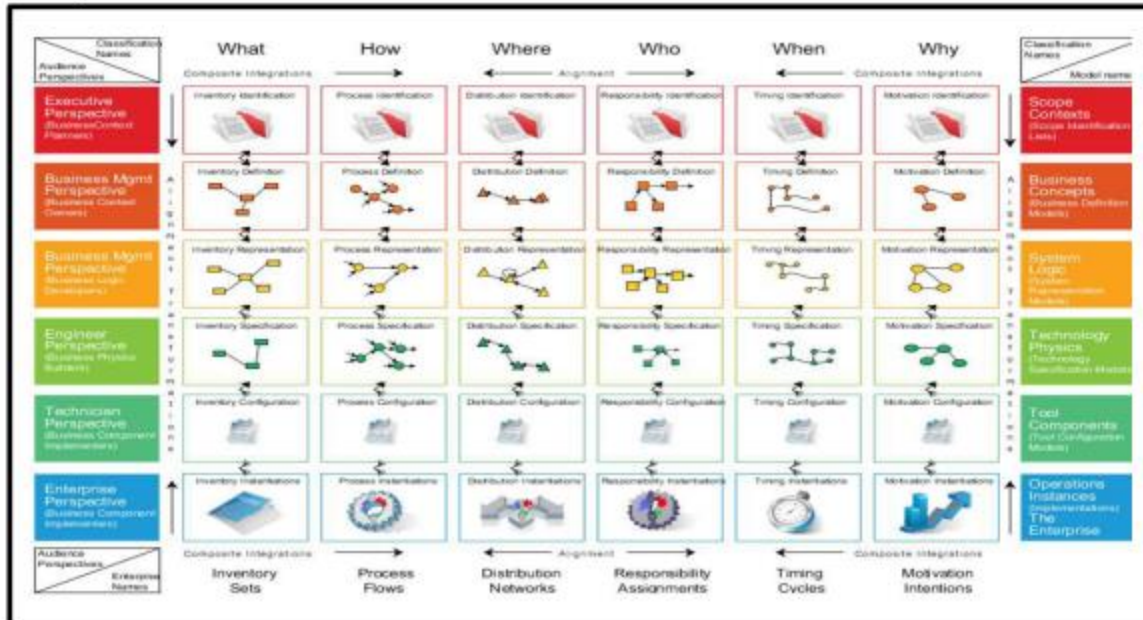
**Figure 2.** Zachman Framework

Zachman Framework consists of 6 columns and 6 rows, each column contains a representation of focus, abstract, business architecture topics, data, functional, location, network, and motivation as shown in Figure 2. Each column in Zachman Framework contains the following concepts:

a. Data (what), can be defined that data is closely related to the information that flows from one service to another in a business process.
b. Function (how), defines the function or activity. Inputs and outputs are also considered in this section.
c. Network (where), in the SOA concept the network is a technology, it can be a computer network that has an IP address or a broader concept is that it can be a network of people or users connected in an SOA.
d. People (who), this concept represents the users of the system in an organization and the metrics to measure their capabilities and performance. This perspective can relate to the user interface, the relationship between people and their jobs and responsibilities.
e. Time (when), relates to the schedule or time to design, develop and process the architecture.
f. Motivation (why), explains the motivation of an organization and its employees. In this perspective will appear organizational goals, objectives, business plans, architecture, mindset and decision-making steps in the organization.

While each row in the Zachman Framework represents a different and unique perspective as described below.

a. Planner's View, relating to the concept, background and goals of an organization.
b. Owner's View, concerned with the conceptual models of the enterprise.
c. Designer's View, this perspective is related to the model of an information system as well as being able to translate what the owner wants and a design that can be realized physically and technically.
d. Integrator's View, relates to the results of the design translated by the designer technically and physically and can be used to oversee technical and physical implementation.
e. Subcontractor's Perspective (Developer's View), which is the party responsible for carrying out development, establishing roles, necessary components and references for technical and system development.

f.  System Function Perspective (User's View), which represents the user's perspective on the implementation and the real form of the system in the field.

### 2.5. Stages of Enterprise Architecture

Here there are four stages in implementing Enterprise Architecture where the stages are as follows.
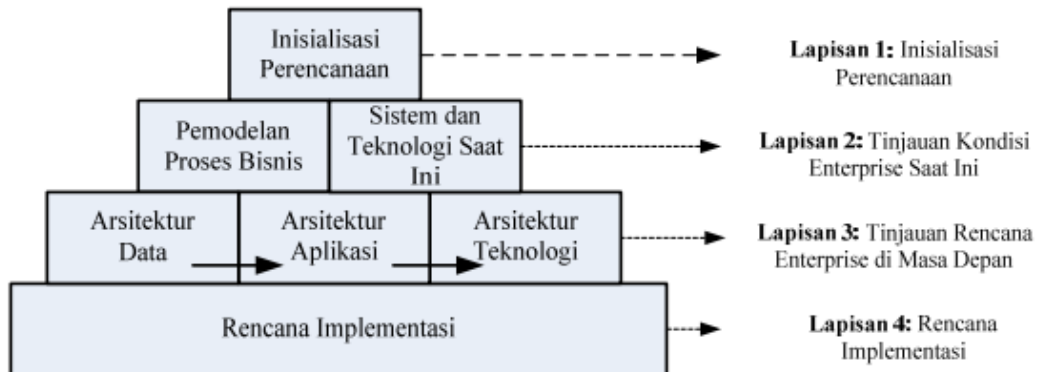


**Figure 3.** Enterprise Architecture Stages

a.  The first phase is the Planning Initiation phase, which is the stage that determines the methodology to be used, the people to be involved, and the tools to be used. The result is an Enterprise Architecture plan and management commitment to continue the next six phases.

b.  The second stage is the stage of understanding the current conditions, which at this stage consists of two parts, namely:
    1.  Current Business Modeling which means that compiling and building a knowledge base about the business and information that the business uses today.
    2.  Current systems and technology which means that defining the existing application systems and technology platforms to support the current business.

c.  The third stage is the future plan stage, where at this stage there are 3 parts, namely:
    1.  Data Architecture, which defines the main data types required by the business.
    2.  Application architecture, which defines the types of applications required to process data and support business functions.
    3.  Technology Architecture, which defines the technology platforms required to produce an environment for data management applications and support business functions.

d.  The fourth stage is the achievement strategy, where the implementation plan or migration planning stage determines the order of application implementation, implementation timeline, cost/benefit analysis, and proposes a migration path from the current state to the desired state.

## 3. RESULTS AND DISCUSSION

### 3.1. Company Initialization

In this study, researchers only focused on the business process of customer service to J&T Express and also involved data entry for shipping goods from customers. The company has the following vision and mission:

a.  The vision of this company is to advance and develop a reliable, leading and trusted risk management company for the people throughout Indonesia, as well as the welfare of underprivileged communities.

b.  The mission of this company is
    1.  Providing transportation/custody products to all corners of Indonesia by prioritizing customer satisfaction.

2. Organizing business activities that create a conducive work climate for the company community to contribute maximally for the growth and survival of the company.
3. Conducting cargo business or entrustment services and risk management in an ethical manner to maximize shareholder value.
4. To participate in national economic development efforts.
5. Strive and work with passion, grow with customers and increase capital for the benefit of shareholders.
6. Participate in assisting the government in reducing poverty by providing compensation to orphans and the poor.
7. Open employment opportunities for the wider community, especially the lower middle class with maximum income according to government needs.
8. Assisting the government in improving the people's economy by distributing goods needed by the people to all corners of the country at affordable prices.

In order to achieve the vision and mission, this research will further examine the company's business processes related to advancing and developing goods delivery services.

## 3.2. Current Business Conditions

To be able to analyze external influences, we can use the concept coined by Michael Porter known as "Porters five forces" or "Five Forces Industry". Based on the porter's five forces model of PT.J&T Express, we can find out the existence of competitive activities and cooperation activities that may be carried out with other companies. The results are described as follows:
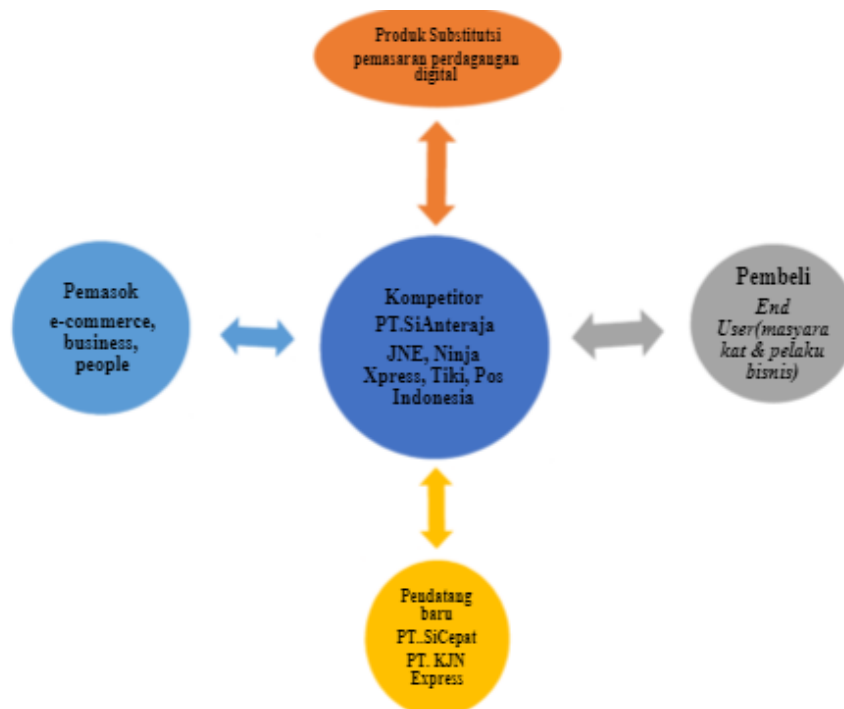


**Figure 4.** Rantai Nilai J&T Express

a. Threat of Newcomers
As a result of the development of a dynamic world economy with the existence of e-commerce, it has increased supply & demand in the field of logistics services. This has encouraged the emergence of other logistics service companies such as PT SiCepat and PT KJN Express which are considered as threats to new entrants.

b. Supplier

PT J&T Express has strong potential as a major logistics services company in Indonesia, through its superior strength as a supplier characterized by the ability to supply 1 million packages per day.

c. Buyer
In the mechanism of logistics services, people both individually and in communities and businesses have a position as buyers/endusers. So that the development of e-commerce also affects the use of logistics services.

d. Product Substance
The development of technology and the demand for the use of logistics services will encourage digital-based delivery services, especially with regard to document packages, which have little effect on the use of logistics services such as PT J&T Express, this condition has given birth to a substitute product, namely digital delivery.

e. Internal Competition
The logistics service industry in Indonesia basically has big names besides PT J&T Express, namely Pos Indonesia as an Indonesian state-owned company, JNE, Tiki, Ninja Xpress and which is currently a competitor of PT J&T Express as a logistics service provider from the private sector, namely PT SiAnteraja.

When all these activities are interrelated and function properly, the company can carry out its business processes with efficiency and effectiveness, and achieve the vision and mission that has been set. The SWOT analysis of J&T Express is as follows.

**Table 1.** SWOT Analysis

| **Strength** | **Weakness** | |
|---|---|---|
| a. Able to take advantage of existing opportunities.<br>b. Has several branches in various provinces and even regions in Indonesia. | a. Rising competition in terms of faster delivery of goods.<br>b. The J&T Express application is still underdeveloped and difficult to use | **Internal** |
| **Opportunities** | **Threat** | |
| a. Has a fast delivery period for goods.<br>b. Having a team throughout Indonesia that is professional<br>c. Have a fast courier | a. Need to improve performance in terms of delivery of goods<br>b. Pay more attention to receipts and goods to be processed. | **External** |

The systems and technology used by J&T Express are as follows.

a. Delivery Management System: J&T Express uses a digitally integrated delivery management system. This system allows users to track packages in real-time, starting from the process of picking up the package, shipping, until it reaches the recipient's hands. The system is also equipped with automatic notifications that inform the sender and recipient of the package delivery status.

b. Mobile Application: J&T Express has a mobile application that allows users to place delivery orders, track packages, and organize shipments with ease. The app is available for both iOS and Android platforms, and provides various useful features for users.

c. Distribution Network: J&T Express has an extensive and integrated distribution network. They have strategic distribution centers (hubs) in various cities and regions in Indonesia. This network allows them to efficiently manage package deliveries and optimize delivery times.

d. Package Shredding Technology: J&T Express uses automated package shredding technology to speed up the package sorting and grouping process. This technology allows packages to be efficiently identified and categorized based on the delivery destination.

e. Customer Service: J&T Express also provides digitally connected customer service. Users can contact customer service via phone, email, or through the live chat feature on their website. This customer service assists users in troubleshooting, providing information, and providing support related to package delivery.

f. Optimized Delivery Routes: J&T Express uses advanced mapping and route planning technology to ensure parcel deliveries are made efficiently. They consider factors such as distance, traffic conditions, and customer delivery needs to optimize delivery routes.

g. Package Security and Protection: J&T Express has strict security policies and technology to protect packages during the delivery process. They use accurate tracking systems and ensure packages are well secured during transportation.

### 3.3. System Model Design

In designing this system architecture model, a mapping method based on the Zachman Framework is used. The goal is to produce a system design that meets the needs. After the problems are identified, the next step is to organize the problems in the form of a Zachman Framework matrix. After the Zachman matrix is completed, its rows and columns will be described sequentially.

Furthermore, entering from the Zachman framework which involves design, which is seen based on the perspective (Scope context), Owner perspective (Business Concept), and perspective (Scope context), and Designer perspective (System Logic). From the above perspectives, it is then explained in detail based on the available columns which consist of What (Data), How (Process), Where (Location), Who (People), When (Time), and Why (Motivation).

| | DATA What | FUNCTION How | NETWORK Where | PEOPLE Who | TIME When | MOTIVATION Why |
|---|---|---|---|---|---|---|
| Scope (Planner) | Data stok barang, penggunaan part, part masuk, return part | Proses pelaporan sparepart ATM | Jalan Cendana 1, BTN Kebun Cengkeh, Ambon | Kep Cab, PJ, FE, Customer BANK | Lihat stok barang, Update data penggunaan part dan part masuk, input sparepart rusak | Visi dan Misi Logistik ASP Ambon |
| Business Model (Owner) | Use Case Diagram | Activity Diagram Admin dan SuperAdmin | Desain Jaringan Sistem yang ada atau sedang berjalan | Programer, Desainer, Administrator, Operator | Time Schedule Pembangunan proyek SIM | Tujuan atau alasan pengadaan SIM Sparepart |
| System Model (Designer) | ER Diagram | Sequence Diagram | Desain Jaringan Usulan | Rancangan Manual Interface SIM | Detail jadwal perancangan model SIM | Aturan-aturan atau batasan dalam pembuatan model SIM Sparepart |

**Table 2.** Planner Perspective

Each column will be described based on abstractions seen from the point of view or perspective of the Planner, Owner, and Designer. The explanation of these perspectives is as follows:

a. Planner Perspective

The planner perspective aims to identify the general scope of important matters related to system development in Logistics.

1. What (Data)

This column describes the data or entities related to the ATM spare parts management information system in Logistics. From the results of the analysis, the data is grouped into four parts, namely:

   a) Stock Data.
   b) Incoming Part Data.
   c) Part Usage Data.
   d) Return Part data or part returns.

2. How (Process)

This column discusses the processes that occur in Logistics regarding the reporting process for ATM spare parts. These processes include the process of reporting stock data, the process of reporting incoming part data, the process of reporting part usage data, and the process of reporting return data.

3. Where (Location)

This column discusses the main business location, namely the location where Logistics is located. The location of Logistics is located at Jl. Soekarno Hatta, Komp Kawaluyan 1 No.29.

4. Who (Actors / Human Resources)

This column discusses the human resources that play an important role in the reporting process for ATM spare parts in Logistics.

5. When (Time)

In this When column, it describes the definition of activities and the allocation of time usage that occurs in ASP Logistics at the time of the transaction.

6) Why (motivation)

The Why column talks about what Logistics is trying to achieve.

## 3.4. Technology Architecture

The Technology Architecture Phase aims to connect application components that have been defined in the Application Architecture Phase with technology components consisting of software and hardware (Harumiaty et al., 2013). These technology components can come from the market or be configured by the organization into a technology platform. The goal is to determine the type of technology required for applications that will manage data within the organization.
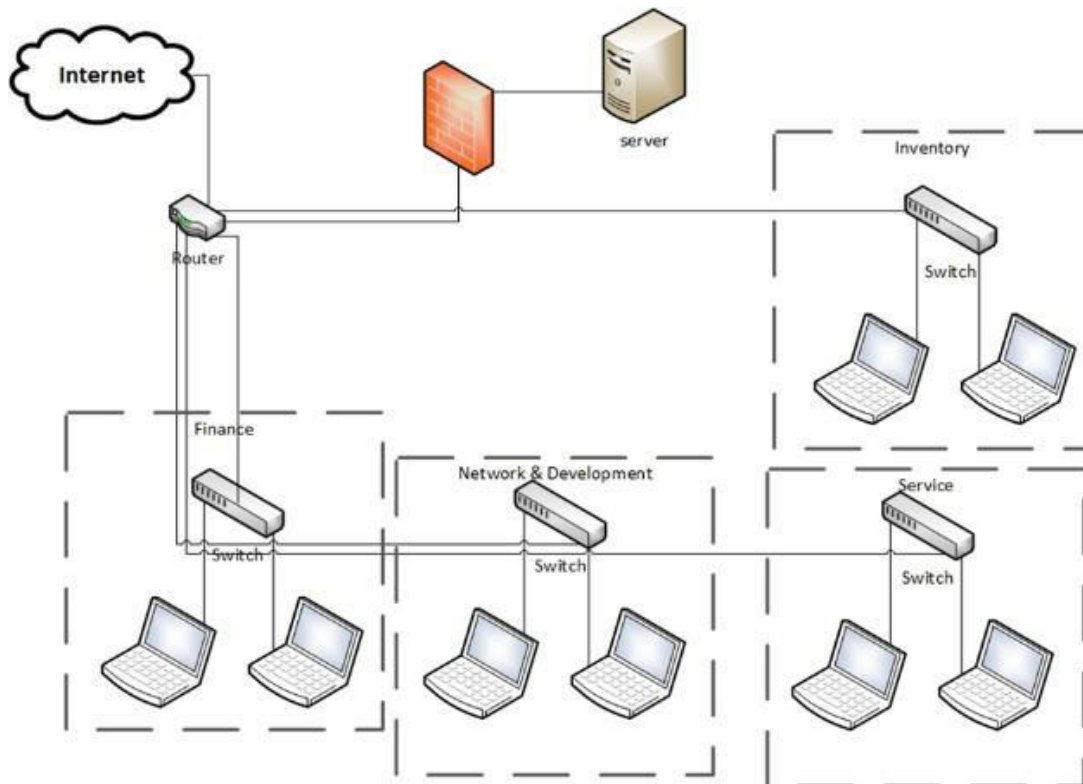
**Figure 3.** Technology Architecture

## 4. CONCLUSIONS AND RECOMMENDATIONS

The importance of information technology today is especially related to business issues. J&T Express Indonesia is one of the companies that uses delivery services in the form of documents and or packaging / goods. And also in designing its business strategy using enterprise architecture. This is necessary and also used in order to realize the alignment of information technology with the business run by the organization. Enterprise Architecture supports information technology-based management of integrated enterprise performance development across technology resources, information flows, business processes, and strategic orientation. In using this enterprise architecture tool itself, it will be more organized when the framework is called the Zachman Framework, it aims to facilitate the mapping of an information system application and also serves to categorize deliverables to fully describe enterprise architecture and is widely adopted by companies around the world.

Based on the results of his research, we can find out that there are competitive activities and cooperation activities that may be carried out with other companies ranging from the threat of new entrants, suppliers, buyers, production, and also internal competition. This happens because companies are engaged in business with the same company system. One of the advantages that must be owned can be seen from how the framework is used. In this case J&T Express Indonesia has succeeded in improving the performance and efficiency of its company.

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