

Enterprise Architecture Application and Business Process Improvement: A Case Study of Bus Terminal in Indonesia

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Abstract. Service facilities for users of land transportation services, commonly referred to as "bus terminals," are used as a transit point and entry and exit for buses and public transportation for people who will use the services of this mode. means of transportation for traveling outside the city or inter-city areas of the province. Terminal Management to provide land transportation terminal services to the public in every major city in carrying out operational activities is still a lot of work that is still in the conventional implementation process and still needs better business processes to be able to improve user service. The purpose of this study is to design an enterprise architecture (EA) for bus terminal operations and business process improvement (BPI) in providing services to people who use land transportation modes. The research methodology for designing enterprise architecture is conducted through field studies, interviews with terminal officers and management, and data from institutions related to the terminal. For the EA implementation process using the TOGAF Framework, follow the process stages, namely analysis, requirements management, preliminary, and start from the vision architecture formulation stage up to opportunity and solutions. The results of the study show that the design of the Bus Terminal Enterprise Architecture can show better business process design and can help solve complex business process problems due to the occurrence of good business processes. Enterprise Architecture is here to provide this solution by documenting, coordinating, and integrating elements of the bus terminal corporate business in order to survive and compete. TOGAF can help companies implement enterprise architecture in a more comprehensive manner and can provide information and technology system designs that can be used as guidelines in implementing application systems to support more modern bus terminal operations.

Keywords: BPI, Information System, Bus Terminal, Enterprise Architecture, TOGAF Framework

1. Introduction

Companies that carry out their operational activities often experience problems because they cannot provide good service support as expected by their users. Bus Terminal, which is used as a place for transit and the entry and exit of buses and public transportation, provides services to people who will use the services of this mode of transportation to travel outside the city or between provincial cities and around the area. Based on observations of the accelerating pace and scale of urbanization in Indonesia as well as in China, it is necessary to rationally formulate a joint development plan to increase the vitality and value of various areas and manage bus terminal facilities (Zhang, T. et.al., 2022). With the rise of technology in the present and the change in people's behavior, many people tend to be instantaneous. Indonesian people tend to rarely use buses in their transportation options, especially for long-distance travel. The travel time, bus and terminal factors that still seem simple, and bad security are various reasons people are reluctant to use long-distance buses (AKAP) as their choice. The problem of the quality of bus terminal services continues to decline, while on the other hand, there are changes in people's travel patterns in line with the improvement in the quality of education and the community's economy. Information technology that forces changes in the management of public transport is apparently not matched by road transport regulations (Herlambang, D., 2021). This is of particular concern, especially for DISHUB as the manager of bus terminals in Indonesia. Based on practical experience in several big cities, vehicle restriction policies can indeed reduce people's tendency to choose motorized vehicles for travel in the short term, but the rapid and continuous growth in the number of motorized vehicles causes a gradual weakening of this measure, especially in the long term (De Grange, L.; Troncoso, R., 2011).

Changes in the internal terminal business process must be made so that terminals and buses will be able to compete with other modes of long-distance transportation. Enterprise architecture is the right way to make changes in terminal and bus business processes. With the existence of enterprise architecture, the business process of the company or organization will be visualized so that it can be understood by many people, and then business process changes can be made if the old business process has been visualized.

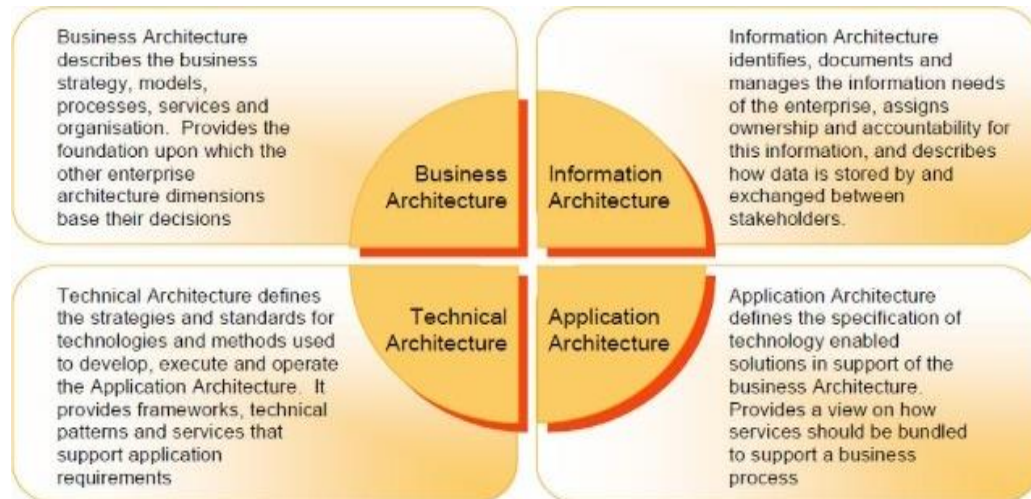
There are many models or frameworks in enterprise architecture. Each model has its own strengths and weaknesses, so a deeper understanding of each framework is needed so that we can choose the right framework for the company or organization. Design Enterprise Architecture can provide data to support media monitoring and product analysis. The IT development division works on several types of IT projects or application systems and provides several features according to customer needs. (Panjaitan, I.; Legowo, N., 2022). Of the many frameworks contained in enterprise architecture, there are two that are the most popular or most used by the enterprise. TOGAF is used to develop architecture through the following sequence: introduction, vision architecture, business architecture, information system architecture, and technology architecture. Opportunity (The Open Group, *The TOGAF*, 2018). At this time, there is TOGAF 9, which completely complements the previous version. While the TOGAF itself thinks of each stage starting from the stage of the company's vision and mission, to the methods of implementation and governance, as well as the stages to review again whether the changes need further improvement or not.

In this study, the TOGAF framework will be used because the stages of TOGAF are suitable to be implemented in terminal and bus business processes. There needs to be a change or renewal starting with the vision and mission of the company so that later it can be easily realized into a new business process. The development of bus terminal facilities is urgently needed to support government policies on high-intensity and multifunctional development around public transportation stations, complemented by a pleasant pedestrian environment design to reduce people's dependence on private motorized vehicles (Peng, Y.T.; Li, Z.C.; Choi, K., 2017).

2. Literature Review

2.1 Enterprise Architecture

Enterprise Architecture is widely used in organizations or companies with the aim of integrating business with IS / IT solutions to endure business processes and to compete (Rouhani, B.D., et al.,2014). As shown in Figure 1, the enterprise architecture is divided into 4 important parts, namely business, information, technical, and application (Aziz, S., et. al.,2005). Each section has its own final result which is decisive in its implementation (Iyamu, T.,2018).



Source: Aziz et al. (2005)

Fig. 1: Enterprise Architecture Domain (Aziz et al.,2005)

Business architecture defines a company from a business point of view, which includes a vision and mission that aim to direct the strategy to determine daily operational activities (Simon, D., et al., 2014). Information architecture aims to improve the accuracy and quality of the information so that it can facilitate the company's ability to respond to change and make decisions (Schekkerman, J., 2009). Application architecture is likened to a blueprint of each application system that will be developed, including interactions and the relationship of each application with the main business processes (Wang, X., et al., 2008). Whereas for technical architecture, define how to be able to enable and be able to support the needs of companies that come from the strategic plan to the implementation stage (Iyamu, T., 2015). Each part is an architectural discipline that is different but depends on each other (Niemi, E., and Pekkola, S., 2017). Each section certainly has different roles, responsibilities, and final results, but they are interrelated for the overall target of the company's achievement plan (Lapalme, J., Gerber, A., et al., 2016). That is why it becomes a challenge to map the activities of the company and the end results.

2.2 The Open Group Access Framework (TOGAF)

The Open Group Access Framework (TOGAF) was first developed for the purpose of assisting the defense department in 1995 based on the Technical Architecture Framework for Information Management (TAFIM) (The Open Group Architectural Framework, 2005). The Open Group Access Framework (TOGAF) is a framework that is discussed in detail, and there are support tools for developing the architecture of the company's technology information (Nama, G. F., T., & Kurniawan, D., 2017).

TOGAF provides a detailed method on how to develop and implement an enterprise architecture called the Architecture Development Method (ADM). TOGAF ADM contains several phases or cycles through various domain architectures that allow the architect to ensure that a complex set of

requirements has been adequately handled (The Open Group, 2009).

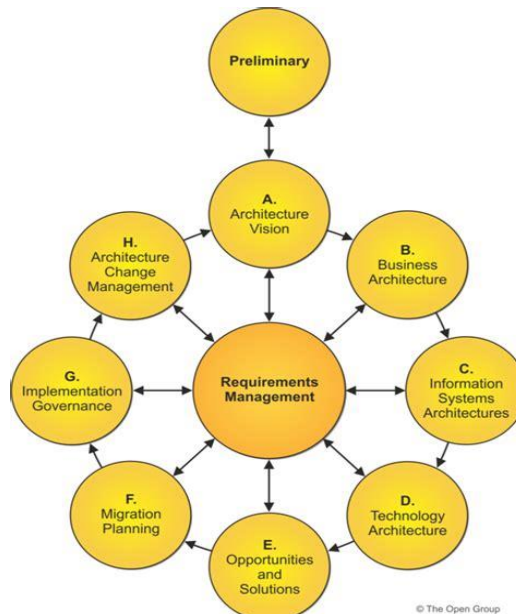


Fig. 2: TOGAF ADM (The Open Group, (2009).

Based on Figure 2, that TOGAF ADM consists of 8 main phases which are supplemented by 2 important supporting phases. The following is an explanation of each phase.

a. Phase Preliminary

In this phase is the preparation and the beginning to determine the framework and principles, which aims to confirm the commitment of stakeholders, the determination of the framework and methodology that will be used in the development of enterprise architecture.

b. Phase Requirement

In this phase, it is carried out to investigate the needs of the company and document the needs of stakeholders. The purpose of this phase is to provide the process of managing architectural needs throughout the phase of the ADM cycle, identifying the needs of the company, storing, and then sending them to related phases (Nama, G. F., T., & Kurniawan, D.,2017).

c. TOGAF ADM

- Phase A: Architecture Vision

This phase defines the vision and mission, organizational or business goals, and defines the organizational structure, and also maps all strategies that must be done (Nama, G. F., T., & Kurniawan, D., 2017).

- Phase B: Business Architecture

In this phase describe the current business process, then look for weaknesses of the current business process, so that it can define the business processes to be developed .

- Phase C: Information System Architecture

This phase emphasizes how information systems architecture must be built, which includes data architecture and application architecture that will be used by companies (Nama, G. F., T., & Kurniawan, D., 2017).

- Phase D: Technology Architecture

In this phase is defined what technology is needed to process data. The first step is to determine what technologies will be used to select existing technologies.

- Phase E: Opportunities & Solutions
This phase emphasizes the benefits obtained from enterprise architecture. Evaluate the loopholes of enterprise architecture which include business architecture, data, application architecture, and architectural technology to further develop these strategies as solutions (Nama, G. F., T., & Kurniawan, D., 2017).
- Phase F: Migration Planning
In this phase, plans are made to move existing business processes to the latest business processes. Analyze the costs of profit and risk costs (Yuliana, R., & Rahardjo, B., 2016).
- Phase G: Implementation Governance
This phase aims to make the latest architecture that has been made capable of being managed properly. Provide architectural supervision for implementation. Prepare and issue architectural contracts (Implementation Governance Board). Ensure that the implementation process is in accordance with architecture.
- Phase H: Architecture Change Management
In this phase it provides ongoing monitoring and change management processes to ensure that architecture can respond to company needs and can maximize the value of architecture for business (Yuliana, R., & Rahardjo, B., 2016).

Based on these stages, the writing is just sulking until phase E alone, due to the fact that the phases F to H have entered the stage of implementation as well as how to perform management. Due to the integration, planning a bus terminal in Indonesia is a new form of applying the basic concepts of finding solutions based on the problems that frequently occur in various terminals in Indonesia.

Business processes can be interpreted as a series of activities carried out in coordination within the organizational and technical environment. This activity will produce business goals where the business processes of a company will be related to the business processes of other companies. (Pratama, I.I. at al., 2018).

The definition of the terminal is "a place of stopping or transit," which can be explained as a base for public motorized vehicles that regulates the arrival, entry, and departure of the terminal, where there is a process of raising and lowering people and/or goods and changing access modes of transportation. (Fathoni, Moh.I., et al., 2021).

In addition, the terminal is also the place where regulatory activities occur, including the operation of the passenger and goods transportation systems, as well as performing the control function by supervising terminal operational activities so that they can run smoothly, orderly, and comfortably.

According to the book *Towards Road Traffic and Transportation* of the Directorate General of Land Transportation, the function of land transportation terminals can be viewed from three angles: the function of the terminal for passengers, the function of the terminal for the government, and the function of the terminal for operators or entrepreneurs.

Terminal type, according to the Regulation of the Minister of Transportation of the Republic of Indonesia Number 132 of 2015, Article 2 concerning Terminals, classifies terminals into three types, namely Type A, Type B, and Type C Terminals. As for terminal class, according to PM 132 of 2015, article 9 paragraph 1, terminal Type A and Type B passengers are classified into classes based on the intensity of the vehicles served, which consist of three classes, namely class 1, class 2, and class 3. Where the classification of terminal classes is found in Directorate General Regulation Number SK.6251/AJ.104/DRJD (2017) based on the criteria: 1) level of transportation demand; 2) integration of transportation services; 3) origin and destination of transportation; 4) types of transport services and number of routes; 5) main facilities and terminal support facilities. (Fathoni, Moh.I., et al., 2021).

3. Research Methodology

The methodology used in this study follows the steps in the TOGAF ADM framework by conducting literature studies and field studies by collecting data from various sources, starting with collecting primary data, which is data obtained directly from the field by conducting field observation surveys and interviews with the UPTD Terminal manager, Angkot drivers, bus conductors, and related parties. Secondary data collection is data obtained from related agencies such as the City Government of Surabaya, the Department of Transportation, and UPTD Terminal Purabaya Surabaya.

The research methodology in designing enterprise architecture is conducted by conducting interviews with terminal officers and users, and for the EA implementation process using the TOGAF Framework, follow the process stages, namely analysis, requirements management, preliminary, and will start from the vision architecture formulation stage to opportunities and solutions.

The methodology used in this study uses the TOGAF ADM cycle, which consists of eight main phases, including the following phase: a) Architecture Vision, b) Business Architecture, c) IS Architecture, d) Technology Architecture, e) Opportunities and Solutions, f) Migration Planning, g) Implementation of Information Technology Governance, h) Architectural Change Management, and complemented by two important supporting phases, namely Preliminary and Requirement Management, to complete the enterprise architecture development phase. Data collection begins with field studies and literature studies, followed by a qualitative analysis of previous research, journals, and books related to this research. The next step is to interview stakeholders managing the company's infrastructure. Furthermore, TOGAF ADM is used to design the business intelligence system architecture in the company. This methodology is presented in Figure 2 and the iteration of the ADM Cycle (The Open Group, The TOGAF, 2018).

TOGAF ADM provides a step-by-step, tested, and repeatable process for developing architectures. This activity is carried out in an iterative cycle from the definition and realization of sustainable architectures to matching the vision of the company with the needs of information systems that enable organizations to change their company in a controlled manner in response to business goals and opportunities (The Open Group, The TOGAF, 2018).

3.1 General Condition of Bus Terminals.

Along with the growth of the population in a city in Indonesia, the development of that population requires transportation facilities following the increase in urbanization. This causes the ability of the terminal to serve passengers to become an obstacle at the bus terminal. To overcome this, it is necessary to apply a queuing system at the terminal bus.

The existing terminals have several types of terminals, including type A, type B, and type C, in accordance with the conditions of the facilities, location, and means of access for vehicles in and out of the terminals, which are spread across all provinces and major cities.

The terminal is one of the components of the urban transportation service system, functioning as a node for changing modes of transportation for the mobility of people in areas around provincial cities to carry out travel activities to work, office areas, trade centers, industrial centers, tourism, schools, and various other objects.

The bus terminals used as case examples in this study are in two provinces, namely in East Java, where the popular Purabaya-Surabaya bus terminal is often known as the Bungurasih terminal. The Purabaya-Surabaya Terminal, which is the largest terminal in Surabaya City with a type A terminal class located in Bungurasih, Waru, and Sidoarjo, has an area of around 12 ha. Purabaya Terminal is one of the UPTD terminals in Surabaya under the auspices of the Surabaya City Transportation Agency. The operational performance carried out by the terminal is quite good, where the use of computer technology has been implemented. And continue to strive to improve service by using the terminal management information system. (Fathoni, Moh.I., et al., 2021).

While the second example is in West Java Province, for example, the Leuwipanjang terminal is a type A terminal in Bandung. This terminal has facilities for AKDP and has been operating for more than 20 years. The Leuwipanjang Terminal is located in the corridor of Jalan Soekarno Hatta, Bandung City, which is a trade and service area with high activity. As a type A terminal, Leuwipanjang plays a role in managing the trips of all passenger public transport (AUP).

Besides that, Leuwipanjang Terminal also has links with surrounding cities, especially for transportation services. However, currently, mass transportation services are faced with the problem of shifting roles. The performance of the Leuwipanjang terminal in providing transportation services has not been optimal. The management of the terminal by UPTD Terminal Leuwipanjang is trying to improve to provide better services and support movements in the city of Bandung. Therefore, it is necessary to review the services provided. So that it can be known the problems faced, especially for city transportation and Damri buses that serve movement within the city. (Angestiwi, T., and Rakhmatulloh, A. R. 2013).

The Purabaya-Surabaya bus terminal seeks to improve service. Therefore, it is necessary to develop a management information system that can integrate and provide facilities for making reports that can be well organized and integrated within the UPTD environment. In accordance with Ministry of Transportation Regulation No. 132 of 2015 concerning the Implementation of Road Transport Passenger Terminals in Chapter IX, which describes Information Systems, the Purabaya-Surabaya Terminal seeks to improve operational performance and also terminal services in the current industrial era. (Fathoni, Moh.I., et al., 2021).

The image below is a flow diagram of the framework and cross-functional diagram, which is explained in Ministerial Regulation No. 132 of 2015 concerning terminals:

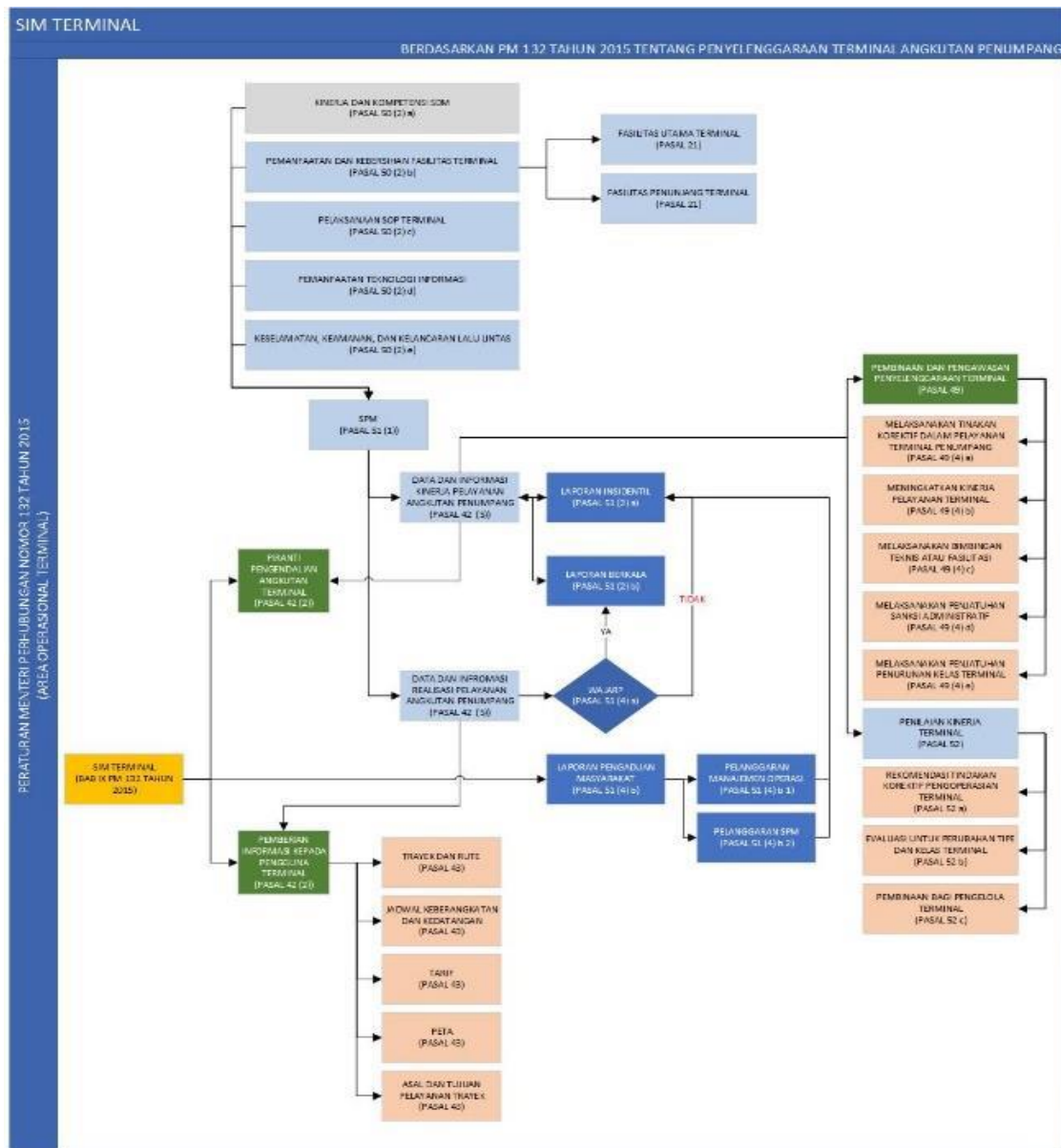


Fig. 3: SIM Terminal Framework Diagram (Ministerial Regulation No.132 of 2015)

4. Result and Discussion

In the business process of terminals in Indonesia, things that have been renewed only arrived at the stage of the ticket sales business process. In the business process of ticket sales can be remotely (AKAP), can already buy it through online. While other business processes, especially those in the terminal it self are still traditional. The following are the results of the Indonesian bus terminal architecture using TOGAF ADM.

a. Phase Preliminary

As explained in Chapter 2, this phase discusses the determination of work and knows the stakeholders or organizational structure of the company. The following is the organizational structure of the bus terminal in Indonesia.



Fig. 4: Terminal Organizational Structure

b. Phase Requirements Management

In this phase, the needs of relevant stakeholders will be documented. The following documentation needs of stakeholders by using a matrix or table.

Table 1: Matrix or stakeholder need table

No	Functional Area	Business Function	Business Process	Data or Information Requirement	IS/IT Support and Application
1	Head Terminal	<ul style="list-style-type: none"> • Compilation of work plans. 	<ul style="list-style-type: none"> • Develop and evaluate an annual work plan. 	<ul style="list-style-type: none"> • Annual business plan. 	<ul style="list-style-type: none"> • Information System Dashboard.
			<ul style="list-style-type: none"> • Sharing knowledge with relevant departments. 	<ul style="list-style-type: none"> • Quarter and annual reports. 	<ul style="list-style-type: none"> • JIRA..
		<ul style="list-style-type: none"> • Management, supervision and control of terminal activities. 	<ul style="list-style-type: none"> • High level operational monitoring. 	<ul style="list-style-type: none"> • Departmental KPIs.. 	
			<ul style="list-style-type: none"> • Ensure all operational terminals run according to existing procedures. 		
			<ul style="list-style-type: none"> • Urge all departments to carry out operations according to procedures. 		
			<ul style="list-style-type: none"> • Evaluating annual reports. 		
		<ul style="list-style-type: none"> • Terminal management control, evaluation and reporting. 	<ul style="list-style-type: none"> • Coaching the entire reporting unit team. 		
2	Office Administration Officer	<ul style="list-style-type: none"> • Finance report 	<ul style="list-style-type: none"> • Record financial statements 	<ul style="list-style-type: none"> • Data on Sales Results 	<ul style="list-style-type: none"> • Information System Dashboard
		<ul style="list-style-type: none"> • Sales Reporting 		<ul style="list-style-type: none"> • Data Bus Arrival & Departure 	
		<ul style="list-style-type: none"> • Bus reporting 			
3	Arrival Registered	<ul style="list-style-type: none"> • Reporting in and out of buses 	<ul style="list-style-type: none"> • Take notes on reports on and off buses 	<ul style="list-style-type: none"> • Bus Arrival & Departure Data 	

No	Functional Area	Business Function	Business Process	Data or Information Requirement	IS/IT Support and Application
4	Traffic Control	<ul style="list-style-type: none"> • Bus management, guidance and technical services within the terminal 	<ul style="list-style-type: none"> • Carry out coaching, fluency, security and order while at the terminal 		
5	Civil Servant Investigator (PPNS)	<ul style="list-style-type: none"> • Reporting criminal acts in the financial services sector 	<ul style="list-style-type: none"> • Receive reports, notices, or complaints from someone about a crime in the financial services sector 		
			<ul style="list-style-type: none"> • Conduct research on the truth of reports or information relating to criminal offenses in the financial services sector 		
6	Motor Vehicle Testers	<ul style="list-style-type: none"> • Implementing organizational guidance and management of Motorized Vehicle Testing 	<ul style="list-style-type: none"> • Carry out facilitation of motor vehicle inspection 		
			<ul style="list-style-type: none"> • Carry out the preparation of test facility facilitation materials 		
			<ul style="list-style-type: none"> • Carry out maintenance of test equipment infrastructure 		
			<ul style="list-style-type: none"> • Completion of the testing process by providing evidence of passing the periodic tests to each motorized vehicle that has been declared passed 		
7	Information Technology Officer	<ul style="list-style-type: none"> • Collaborate with vendor development 	<ul style="list-style-type: none"> • Monitor every vendor's work 	<ul style="list-style-type: none"> • Coding vendor 	<ul style="list-style-type: none"> • KMS
		<ul style="list-style-type: none"> • Maintenance of IT Infrastructure 	<ul style="list-style-type: none"> • Monitor IT devices 	<ul style="list-style-type: none"> • Report performance resources infrastructure IT 	<ul style="list-style-type: none"> • Dashboard IT
		<ul style="list-style-type: none"> • Procurement of IT infrastructure 	<ul style="list-style-type: none"> • Replacing aging IT devices 	<ul style="list-style-type: none"> • Request problem 	
		<ul style="list-style-type: none"> • Troubleshooting 	<ul style="list-style-type: none"> • Solve problem 		
8	Customer Service	<ul style="list-style-type: none"> • Client problem services 	<ul style="list-style-type: none"> • Help solve client problems 		
			<ul style="list-style-type: none"> • Accept criticism and suggestions 		
9	Electrical Technician	<ul style="list-style-type: none"> • Management of low voltage electricity distribution installations 	<ul style="list-style-type: none"> • Overcoming interference with electrical equipment and accessories 		
			<ul style="list-style-type: none"> • Monitoring existing parameters to prevent disruptions from occurring and maintain more fatal damage. 		
10	Mechanical Engineer	<ul style="list-style-type: none"> • Management of mechanical system installations 	<ul style="list-style-type: none"> • Monitor, test and maintain the results of mechanical system installations 		
11	Cleaning Services	<ul style="list-style-type: none"> • Management of cleanliness, neatness and beauty activities 	<ul style="list-style-type: none"> • Maintain cleanliness, tidiness and beauty of the terminal environment 		
12	Health workers	<ul style="list-style-type: none"> • Health management 	<ul style="list-style-type: none"> • Supervise and help unhealthy passengers 		
13	Security Officer	<ul style="list-style-type: none"> • Security and order management in the environment / work area, especially physical security 	<ul style="list-style-type: none"> • Maintain and supervise the security and order in the environment 		
			<ul style="list-style-type: none"> • Prevent the carrying of prohibited items 		

c. Phase A: Architecture Vision

Knowing that this phase is to define the vision and mission of the business objectives, it can be

found that the latest vision for the development of this architecture is "the realization of the communication services of information and communication that are safe, comfortable, dynamic, competitive, and able to support economic growth."

With the acquisition of this new vision, the mission and the goals to be achieved can be determined, and then we can go to the next phase. The latest missions for the development of this architecture are:

- Ensure the implementation of land transportation services in the context of equitable development and economic growth.
- Improving the quality of human resources (HR) in the fields of transportation, communication, and information technology to realize professional human resources
- Developing services in the fields of transportation, communication, and information technology that are quality, competitive, and reach all levels of society
- Developing a land transportation system that is safe, comfortable, and dynamic
- Improve supervision and control in the framework of order and smooth service in the fields of transportation, communication, and information technology..

d. Phase B: Business Architecture

In the business architecture, mapping is done on existing business processes and identifying weaknesses in the business process for business processes to be developed. Existing business processes have three parts, namely ticket sales, departures, and arrivals. For ticket sales business processes, because online sales have already been implemented, the business process will not be changed for now. Whereas for the other two business processes, there were many weaknesses that required an update of the business process.

The business process changes into one main business process and three business sub-processes. For the main business process, namely the business process of departure until arrival, the new business process is added to the examination at the terminal entrance, then check-in and put baggage, then enter the bus with a QR code, carry out baggage collection at the destination terminal, and last check when exiting the terminal. In the process of checking in and putting luggage on the bus, entering the bus with a QR code, picking up baggage, and checking when the destination terminal exits becomes a separate sub-process.

Here is the latest design of business processes:.

● Business Process Departure-Arrival

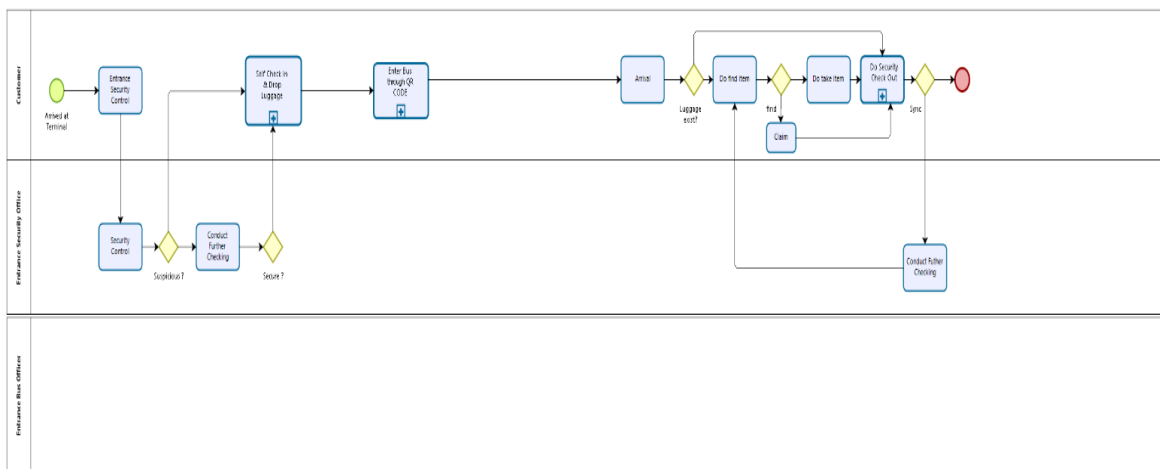


Fig.5: Departure Business Process - Arrival

Passenger processing business at the arrival terminal: it is explained that passengers arriving at the terminal will be immediately processed by the security control officer, carry out further checks to self-check baggage drop, then enter the bus via a barcode at the arrival terminal. Checking the items that match and taking his belongings with the inspection of security officers and carry out further checks and finish.

● Business Process Check-In & Luggage Barcode

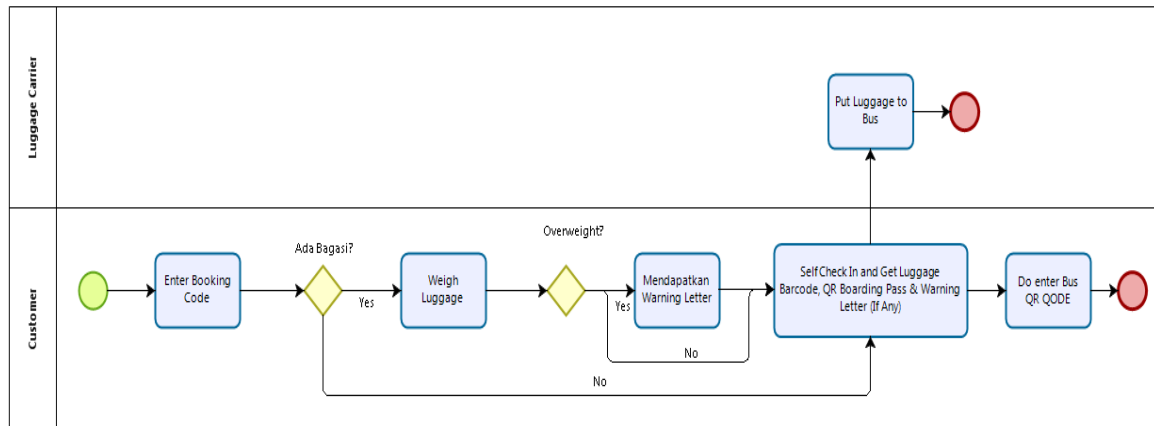


Fig. 6: Business Process Check-In & Luggage Barcode

Business processes for checking in and checking baggage:

Prospective passengers who will bring their luggage place an order code, whether the passenger is carrying goods or not; if there is baggage, the weight of the goods will be weighed; if the goods exceed the provisions, they will get a warning letter; then they do an independent check-in and get a baggage barcode, QR boarding pass, and warning letter if there is one; then they put the luggage on the bus, enter the QR Code bus, and the process is complete.

● Business Process Enter Bus

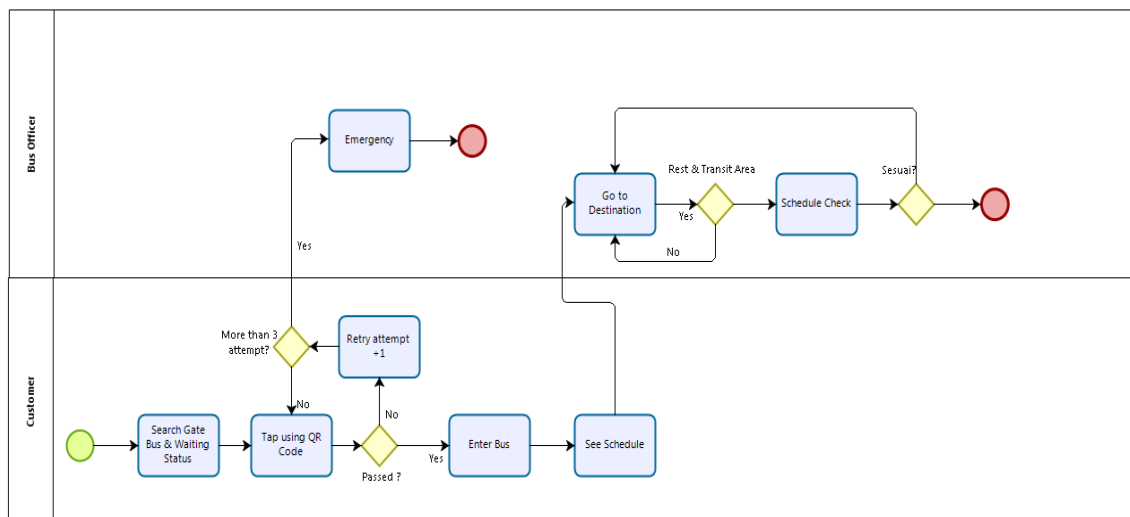


Fig.7: Business Process Enter Bus

Passengers who will enter the bus do a search for the bus door and wait for the status to tap using the QR Code to find out if the conditions have passed or not. If they are not complete, they will try again, and if they try up to 3 more times, they will enter an emergency. If the entry requirements have

been met, you will enter the bus to see the departure schedule for the destination location, then check the departure schedule for the destination city. Finished.

● Business Process Security Check-Out

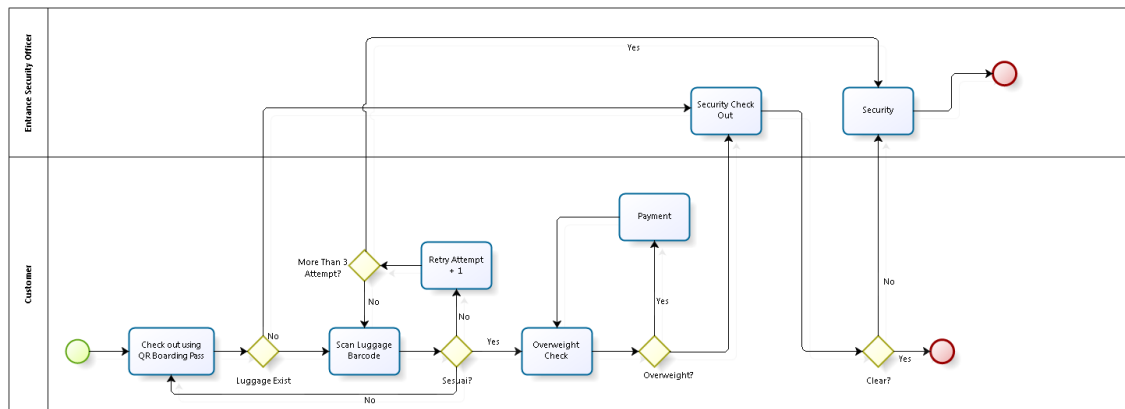


Fig.8: Business Process Security Check-Out

Exit inspection security process business: Passengers check out using the QR Boarding pass. If it passes, it will scan the baggage code and check excess baggage. If it exceeds standard luggage, you must pay additional fees through the exit security officer and if it is clear, it will be completed, if not, it will be completed by the officer security.

e. Phase C: Information System Architecture

In this phase, it will be determined how to build the application architecture that will be used and how an entity from the terminal is interconnected. The following are the results of the IS architecture:

1. Use Case

a. Use Case Departure-Arrival

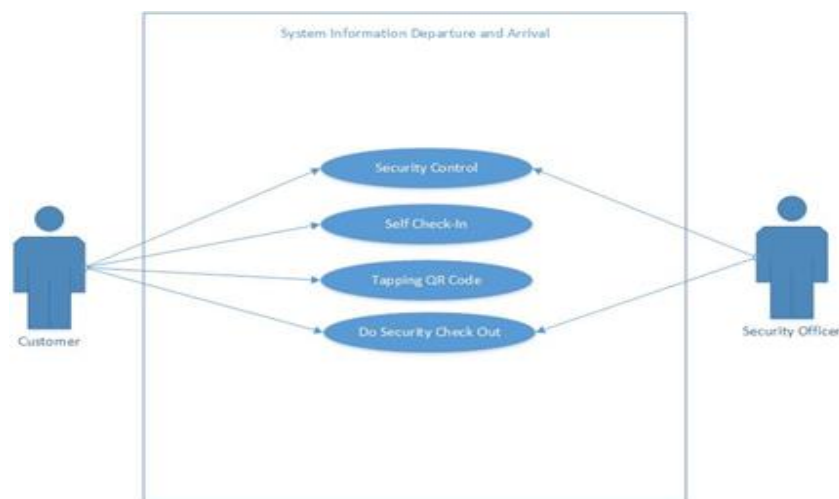


Fig.9: Use Case Departure-Arrival

In Figure 9, use a case diagram. Use Case Departure-Arrival explains the description of the system menu that can be carried out by the user, which includes the two users involved, namely the passenger and the security officer. The passenger will make security control, self-check in, tap a QR code, and do security check out to provide departure and arrival information.

In the IS Architecture Step, we will explain some of the data design for the application system data that will be created. First, a use-case diagram will be described. and security officer as security control and Do security check out.

b. Use Case Check In and Luggage Barcode



Fig.10: Use Case Luggage Barcode

In Figure 10, Use case diagram for luggage barcode, explaining the description of the system menu that can be carried out by the user, which includes two users involved, namely the passenger and the luggage officer. The passenger will make a booking code, self-check-in, get a luggage barcode, get a QR boarding pass, and the luggage clerk will get a warning letter.

c. Use Case Enter Bus

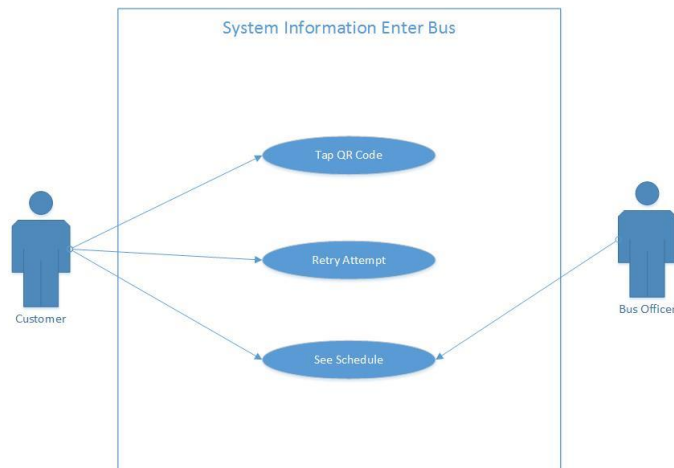


Fig.11: Use Case Enter Bus

In Figure 11. Use case diagram for Enter Bus, explaining the description of the system menu that can be done by the user, there are two users involved, namely the Passenger and the Bus Officer. Passengers will tap the QR code to enter the bus, Retry Attempt if there is a possibility of failure in taping and the Bus Officer can see schedule information.

d. Use Case Security Check Out

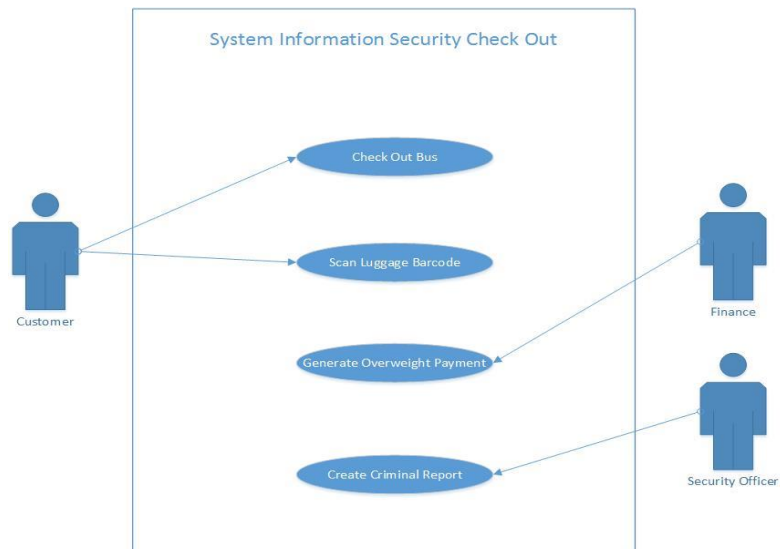


Fig.12: Use Case Security Check Out

In Figure 12. Use case diagram for Security Check Out Enter Bus, explaining the description of the system menu that can be done by the user, there are three users involved namely Passenger, Finance, Security Officer. Passengers can checkout Buses, Scan Luggage barcodes, and Finance can make Generate Overweight payments, and Security Office can Create Criminal Reports.

2. ERD (Entity Relationship Diagram)

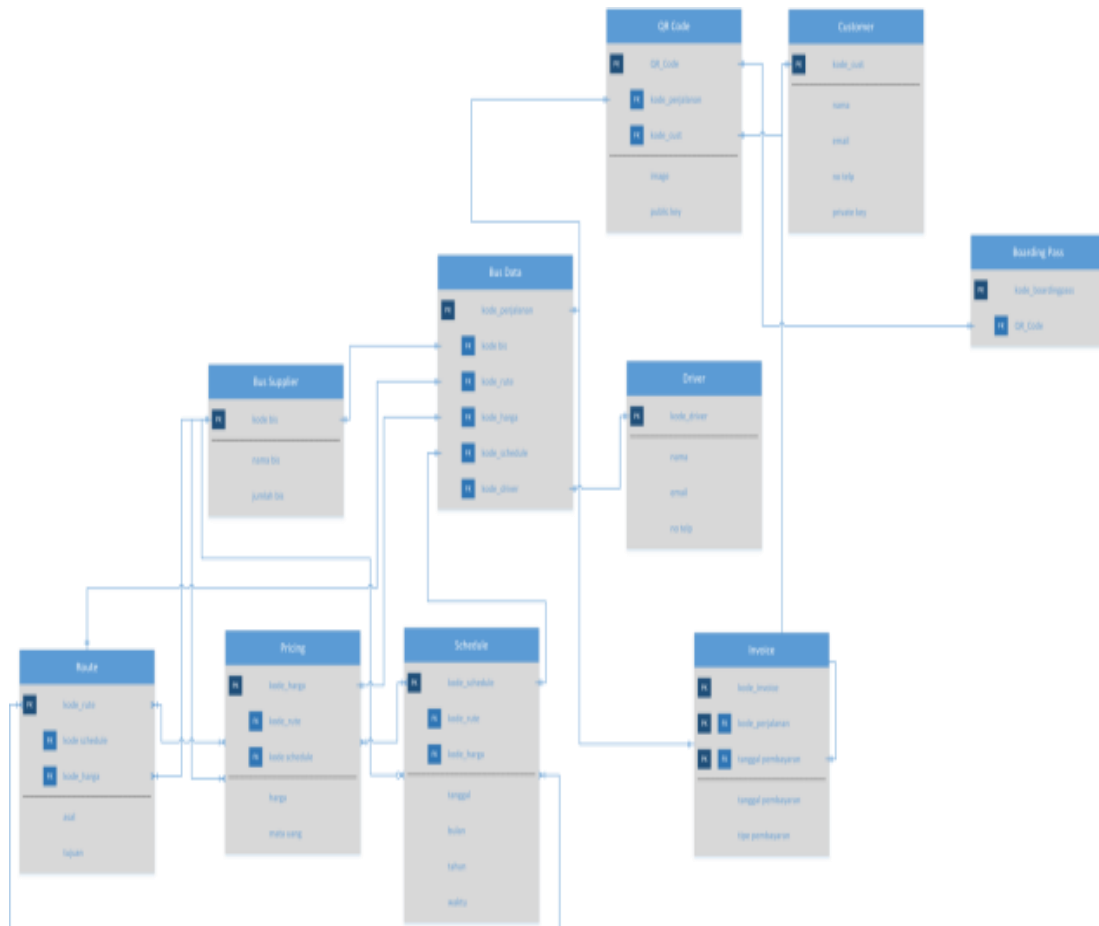


Fig.13: ERD (Entity Relationship Diagram)

In Figure 13. ERD Diagram of the Terminal Application system, which explains the design of an entity relational diagram that shows the relationship between entities, namely QR code, Customer/passenger, Bus supplier, Bus Route, Driver, Boarding Pass, Mode, Pricing, schedule, Invoice.

f. Phase D: Technology Architecture

After creating an IS architect, it can be continued by doing an architect on the technology that will be used. Before creating the architecture for the future, it's good to first look at the architect technology that is currently. Here's the current technology architecture.

a. Current Technology Architecture

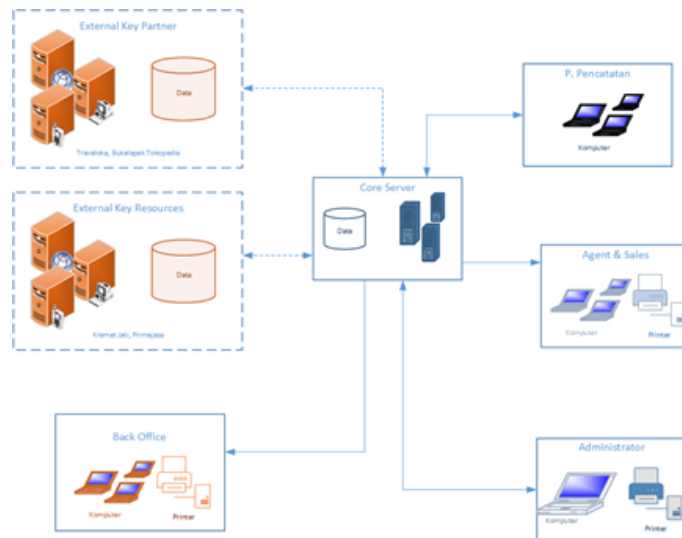


Fig.14: Current Technology Architecture

At the Technology Architecture Figure 14 stage, Technology Architecture Current, an overview of the computer network topology will be explained which includes PCs, clients, servers, devices, hardware, database software used to store data in data storage stored in the data center, data will be shared by all users connected to the network described in the Technology architecture.

b. Future Technology Architecture

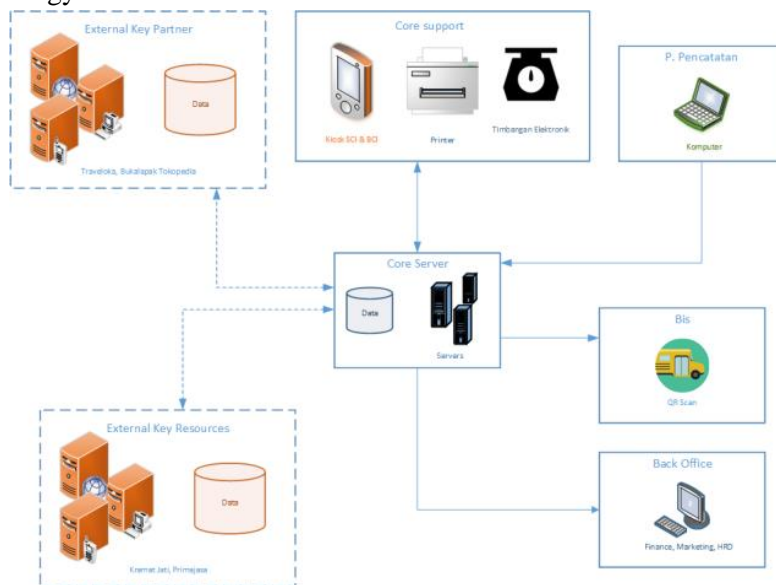


Fig.15: Future Technology Architecture

At the Technology Architecture Figure 15 stage, Future Technology Architecture, an overview of the proposed computer network topology will be explained, which includes laptops, PCs, clients, servers, devices, hardware, and database software used to store data in the data center. Data will be shared with all stakeholders, including users in the back office, front office, and bus fleet, which is equipped with a QR scanner and connected to a network that is described in the Technology Architecture.

g. Phase E: Opportunities & Solutions

After creating an enterprise architecture design for the future, it is possible to know what opportunities and solutions can be generated from the design. A benefit diagram will be used in this phase to make it easier to read the available opportunities and solutions. Following are the results of the benefit diagram:

Table 2: Benefit Diagram

No	Business Process	Benefits
1	Departure-Arrival	<ul style="list-style-type: none"> • Make entry to be more secure and orderly • Make it easy for passengers to check in • Facilitate managers in monitoring and reporting
2	Check-in and Luggage Barcode	<ul style="list-style-type: none"> • Passengers cannot carry items that exceed their capacity
3	Enter Bus	<ul style="list-style-type: none"> • Only people who have access enter the bus • Security on the bus is maximized • Able to see the progress of the trip • Drivers and Assistance Drivers can check the number of passengers more accurately
4	Security check Out	<ul style="list-style-type: none"> • Passengers cannot get off the bus carelessly. • Able to assist security forces in investigating prohibited items

5. Conclusion

Based on the results of this study, there are several things that can be obtained: produce an enterprise architecture design that can be used to align the government's mission in providing transportation services to people who use bus transportation with government policies in managing bus terminals, encourage people to use public transportation, and reduce the use of motorized vehicles.

Proposed new business processes that are more optimal for each activity based on the needs of users of land transportation modes in the bus terminal environment can also improve the business processes of the old bus terminals in Indonesia.

The results of the enterprise architecture design can visualize the required application system design in accordance with the information needs of bus terminal stakeholders.

The limitations encountered in this research are in implementing the TOGAF framework only up to phase 5 (opportunity and solution) and not using all of the TOGAF phases.

The next research proposal is to implement the TOGAF framework as a whole and add to the scope of the discussion the use of GPS tracking installed on each bus so that it can be monitored by the terminal and related bus companies.

References

- Aziz, S., Obitz, T., Modi, R. and Sarkar, S. (2005), *Enterprise Architecture: A Governance Framework. Part I: Embedding Architecture into Organisation*, InfoSyS Technologies, Bengalurun.
- De Grange, L.; Troncoso, R. (2011) *Impacts of Vehicle Restrictions on Urban Transport Flows: The Case of Santiago, Chile*. *Transp. Policy*, 18, 862–869.
- Fathoni, Moh.I., Widorismono, Jumaeli, E. (2021) “Pengembangan Sistem Informasi Manajemen Terminal Purabaya-Surabaya, Dalam Menunjang Pelayanan Di Era Industri 4.0” *Jurnal Penelitian, Diploma thesis, Politeknik Transportasi Darat Indonesia – STTD*.
- Herlambang Deddy (2021) *Terminal Bus dan Angkutan Umum Perlu Perubahan Radikal*. (<https://www.kompas.com/properti/read/2021/06/21/210000721/terminal-bus-dan-angkutan-umum-perlu-perubahan-radikal?page=all>).
- Iyamu, T. (2015), *Enterprise Architecture from Concept to Practice*, Heidelberg Press, Victoria.
- Iyamu, T. (2018) *Implementation of the enterprise architecture through the Zachman Framework*. *Journal of Systems and Information Technology*, Vol. 20, No. 1, pp. 2-18.

Lapalme, J., Gerber, A., Van der Merwe, A., Zachman, J., Vries, D.M. and Hinkelmann, K. (2016), "Exploring the future of enterprise architecture: a Zachman perspective", *Computers in Industry*, Vol. 79, pp. 103-113.

Nama, G. F., T., & Kurniawan, D. (2017). An enterprise architecture planning for higher education using the open group architecture framework (togaf): Case study University of Lampung. 2017 Second International Conference on Informatics and Computing (ICIC), pp.1-6.

Niemi, E. and Pekkola, S. (2017), "Using enterprise architecture artefacts in an organisation", *Enterprise Information Systems*, Vol. 11 No. 3, pp. 313-338.

Panjaitan I. & Legowo, N. , (2022) Measuring Maturity Level of Scrum Practices in Software Development Using Scrum Maturity Model, *Journal of System and Management Sciences*, Vol. 12 No. 6, pp. 561-582

Peng, Y.T.; Li, Z.C.; Choi, K.(2017) Transit-Oriented Development in an Urban Rail Transportation Corridor. *Transp. Res. Part B Methodol.* 103, 269–290.

Pratama, I. I. , Pramono D, and Setiawan N. Y., (2018) "Perbaikan Proses Bisnis Menggunakan Metode Business Process Improvement (BPI) (Studi Kasus Pada Bagian Pelaksana Urusan Logistik UTD Palang Merah Indonesia (PMI) Kota Malang)." *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer (J-PTIHK) Universitas Brawijaya* 2(12):6705–12.

R. Yunis, K. Surendro, and E. S. Panjaitan. (2010) "Pengembangan Model Arsitektur Enterprise Untuk Perguruan Tinggi," *JUTI: Jurnal Ilmiah Teknologi Informasi*, vol. 8, no. 1, p. 9, , doi: 10.12962/j24068535.v8i1.a70.

Rouhani, B.D., Mahrin, M.N., Nikpay, F. and Rouhani, B.D. (2014), "Current issues on enterprise architecture implementation methodology", *New Perspectives in Information Systems and Technologies*, Vol. 2, Springer International Publishing, Berlin, pp. 239-246.

Schekkerman, J. (2009), *How to Manage the Enterprise Architecture Practice*, Trafford Publishing, Bloomington.

Simon, D., Fischbach, K. and Schoder, D. (2014), "Enterprise architecture management and its role in corporate strategic management", *Information Systems and e-Business Management*, Vol. 12 No. 1, pp. 5-42.

The Open Group Architectural Framework (2005). Welcome to TOGAF. Available: www.opengroup.org/architecture/togaf7-doc/arch/.

The Open Group, "TOGAF™ version 9 (2009) Enterprise edition study guide". Van Haren Publishing, Zaltbommel-NL.

The Open Group, *The TOGAF® Standard, Version 9.2*. (2018) The Open Group.

Wang, X., Ma, F. and Zhou, X. (2008), "Aligning business and IT using enterprise architecture", 4th International Conference on Wireless Communications, Networking and Mobile Computing, IEEE, Dalian, pp. 1-5.

Yuliana, R., & Rahardjo, B. (2016). Designing an agile enterprise architecture for mining company by using TOGAF framework. 2016 4th International Conference on Cyber and IT Service Management, pp. 1-6.

Zhang, T.; Yan, Y.; Chen, Q.; Liu, Z. (2022) Evaluation Method of Composite Development Bus Terminal Using Multi-Source Data Processing. *Land* , 11, 1757. <https://doi.org/10.3390/land11101757>.]