The Integrated Information System Implementation Strategy in Korlantas Polri Based on the Zachman Framework Approach

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Abstract

Traffic Police Corps (Korlantas Polri) is the executor of the main duties of the Indonesian National Police in the areas of security, safety, order and smooth traffic. Korlantas has some information that can be accessed by the public, namely information on congestion, accidents, traffic flow status, vital objects, road conditions, data and visual images from CCTV, public service conditions, and traffic infrastructure. However, these data are stand alone and not integrated with their respective applications and systems. The purpose of this study is to analyze the strategy for implementing an integrated information system at Korlantas Polri and what steps can be taken to integrate the existing system. This study uses the Zachman Framework which is adapted to Enterprise Architecture Planning (EAP) and qualitative data collection methods by interviewing stakeholders who are involved in managing information systems at Korlantas Polri. The results obtained are the need for a data warehouse by implementing an AI based integrated database system, Geospatial Information System, Business Intelligence and DSS, as well as Smart Visualization to visualize existing data. Then standardize the need for equipment and support for improving the ability of personnel in the IT field.

Keywords: enterprise architecture planning; zachman framework; implementation strategy

1. Introduction

Information Technology (IT) refers to a set of technological tools and resources employed to oversee, process, and manipulate data with the objective of generating relevant information [1]. Utilizing IT is a prolonged investment for any organization, government included, to enhance the efficiency and efficacy of the operations it performs. In recent years, governments and institutions have realized the importance of enterprise architecture (EA) as a viable tool and approach to improve the processes and activities of an organization [2]. Several governments in various countries have initiated and adopted EA to manage a number of information systems and Figureinformation technology (IS/IT) in their environment [3]. The application of technology in government management can have a positive impact on reducing costs, service time, improving quality, transparency and administrative accountability [4].

EA describes the basic infrastructure of an organization that can be utilized to arrange hardware, software and networks to meet organizational goals. Based on literature studies conducted on various existing frameworks, EA can align the objectives, purpose, and targets of the organization with the essential technical or IT framework that is required to facilitate business operations [1],[5],[6],[7]. Increasing the perception of all personnel in the organization that implementing EA is necessary to achieve better implementation of EA [8].

The Government of Namibia in Africa uses EA to overcome gaps such as lack of uniformity, integration challenges that hinder processes and activities in providing socio-economic services to the community in the hope of increasing the growth of socio-economic services in the country by utilizing the framework [9]. However, most government organizations prefer to design EA in their own way without using frameworks such as TOGAF, Zachman Framework and FEA so that the results obtained are not studied extensively and in depth [10].

One of the biggest challenges in IS implementation is determining and understanding the factors that influence differences from frameworks [11]. Although basically various frameworks in the application of IS have the same goal, they have different concepts. Differences in frameworks can be seen based on the number of artifacts per model used and the impact of the complexity of their implementation [2][12].

Therefore, some frameworks cannot be applied in government [13]. Most frameworks focus on the private sector which is fundamentally different from the needs of government [14]. In addition, the challenges in technology development in government are the development of new technology and communications, the amount of data that increases continuously and the data formats are different [15].

IS is designed and built with various supporting IT platforms and tools. In general, systems are built separately from one another cause low levels of availability, consistency and effectiveness of data provision [5]. One of the most appropriate IT implementations to overcome this is to implement integrated IS. The planning for the development of integrated information systems can be accomplished by utilizing enterprise architecture frameworks such as Zachman, FEAF, and TOGAF.

Korlantas is one of the Polri sub work units in the traffic sector with the main tasks and functions of formulating strategic policies, formulating traffic systems and methods, building partnerships and cooperation both domestically and abroad, and organizing coordination with other stakeholders in the traffic sector [16]. In supporting the activities that are the main tasks and functions of Korlantas, an integrated system is needed that can help facilitate personnel in carrying out their duties and the community in obtaining services [17]. In the service and management of IT, Korlantas is assisted by a sub-work unit, namely the Department of IT (Bag TIK) Korlantas Polri. Figure 1 is the organizational structure of Korlantas Polri.
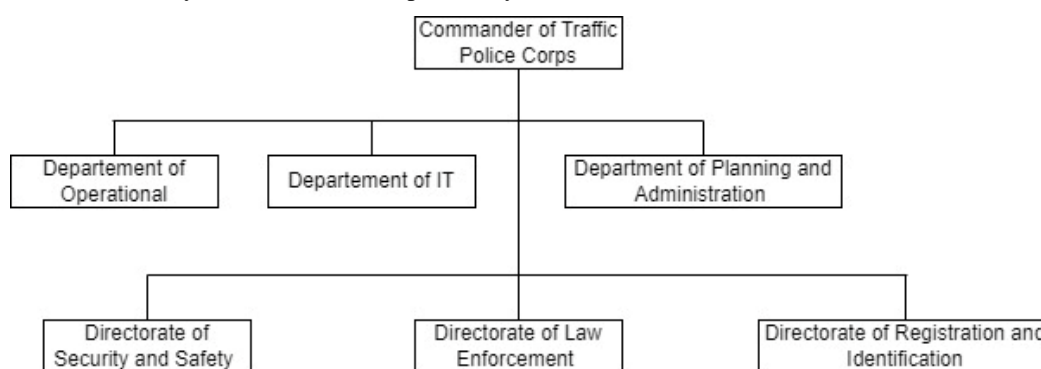

Figure 1. Organizational Structure of Korlantas Polri

The policy for the governance of government data to produce precise, current, integrated, and responsible data, which can be accessed easily and shared between central and regional agencies, is laid out in Presidential Regulation (Perpres) Number 39 of 2019, which is called Satu Data Indonesia. This policy also involves adhering to data standards, metadata, data interoperability, and utilizing reference codes and master data [18]. The policy for the governance of government data to produce precise, current, integrated, and responsible data, which can be accessed easily and shared between central and regional agencies, is laid out in Presidential Regulation (Perpres) Number 39 of 2019, which is called Satu Data Indonesia. This policy also involves adhering to data standards, metadata, data interoperability, and utilizing reference codes and master data [19]. Korlantas Polri is one of the state governments in Indonesia which also play an active role in realizing and running the Satu Data Indonesia program.

2. Research Methods

The diagram of the research method can be seen in Figure 2.
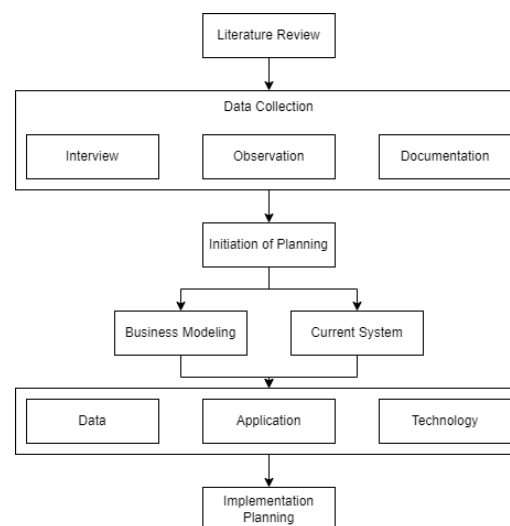

Figure 2. Research Methods Diagram

This research begins with a study of related literature and followed by data collection for analysis of current conditions. Then next stage is initiate the research step planning for EA planning. The final stage is to analyze and provide recommendations for an integrated IS implementation strategy in Korlantas.

2.1 Study Literature

Similar research related to organizational architecture system integration planning can be found in several previous studies. Anthony pointed out that the government is required to be able to carry out digital transformation such as integrating different systems, integrating EA from various systems to support flexibility and improve services to the community [20]. The Agriculture Office of Jombang Regency in Indonesia integrates existing applications to assist the process of implementing information systems in building good e-government with a Service Oriented Architecture approach [21]. In implementing EA, a framework is needed in order to have clear guidelines by comparing 4 popular frameworks such as the Zachman Framework, TOGAF, FEAF and Gartner [22]. According to Rebecca, the Zachman Framework can be used as a basic framework in software systems engineering research in the government sector [23], Then there is research that helps make IS/IT planning more mature and better using the Zachman Framework adapted to EAP [24].

EA consists of infrastructure and strategies such as business processes, technical and information architecture. To support the use of Zachman's framework, an EAP method is needed in planning activities such as understanding the current conditions and designing future organizational visions, by describing the supporting architectures data, information and business process. In addition, EAP is also related to aligning IT implementation strategies with business so that planning can be implemented properly and correctly [25].

The EAP method is a method used in the development of Enterprise Architecture and can be used to plan data quality [26]. EAP has been used to support business policies in achieving the vision and mission of local government to create alignment between the needs of government administration, business and technology used [27]. EAP can be used to compile IT and business process requirements in the education sector [28].

From these problems, it can be inferred that there is a need for an integrated system implementation strategy to support the achievement of the goals of Korlantas Polri. This is aimed at effectiveness in designing an integrated EA that can be used by the leadership of Korlantas Polri in managing and providing services to the community digitally.

2.2. Data Collection

Qualitative methods were used to collect data which involved gathering two types of data: primary and secondary. Primary data was collected through direct observation while secondary data was collected through reviewing related research literature and internal documents. The data was then validated by interviewing 6 Korlantas personnel and their conformity with internal documents. Table 1 shows the criteria used in determining the interviewees for the validation process.

Table 1. Criteria for interview sources

No.	Criteria	Symbol	Desc
1	Education	C1	Have an educational background of min. S1 Information Technology
2	Experience	C2	Has a period of service min. 3 years in the traffic sector
3	Status	C3	Active personnel in Korlantas Polri

2.3. Planning Initiation

In order to commence the primary EAP tasks, a preliminary phase is undertaken which involves recognizing the regulations that are enforced by Korlantas Polri. These regulations are essential in determining the extent of the analysis and planning process, whether it will encompass the entire organization or specific parts. Following this, the subsequent step involves scrutinizing the vision and mission of Korlantas Polri.

2.4. Current Conditions and Business Models

The objective of this stage is to gain an understanding of Korlantas' architecture, technology and business functions. This entails analyzing the business models to recognize the organizational structures, business functions using value chains, and breaking down business functions and linking them to specific organizational units. It is crucial to note that the implementation of IS/IT can lead to changes in business processes [24]. After that, system and technology observations were applied.

2.5. Design Architecture

The purpose of this stage is to recognize and develop architectures for data, applications and technology. [29]. The data architecture stage defines entities related to business functions by listing data entities. The application architecture is used to list the potential of IS and its definition, create a relationship matrix of candidate IS with business functions and organizational units, use case diagrams, sequence diagrams, and analyze the impact of the planned IS. Technology architecture, namely defining the technology platform needed to support IS implementation and manage predetermined data.

2.6. Implementation Plan

This stage determines the strategies that can be carried out to apply each design and analysis that has been performed. At this stage, we can determine the priority scale of the IS to be integrated.

3. Results and Discussions

3.1. Data Analysis

The data obtained was compiled using the Zachman Framework approach by utilizing 6 perspectives which can be seen in Table 2, Table 3, Table 4, Table 5, Table 6 and Table 7.

Table 2. Perspective Planner

No.	Indicator	Result
1	What	Data is divided into 3, namely managed data, public and private.
2	How	The main processes are procurement of SBST materials, issuance and extension of national and international driver's licenses, management of vehicle and accident data.
3	Where	Data management has been centralized in the Korlantas data center, but some are still being managed in their respective regions (Polda, Polres).
4	Who	Each sub unit has responsibility for applications that are operationalized under the supervision of the Department of IT.
5	When	Data management transactions can occur when there are parties who want to integrate/check Korlantas data and when the community uses the application.
6	Why	Vision: Create security, safety, order and smooth traffic (kamseltibcarlantas). Mission: Create kamseltibcarlantas through excellent public services and law enforcement, improve and manage resources in a professional and accountable manner, and optimize IT traffic that is integrated between stakeholders.

Table 3. Perspective Owner

No.	Indicator	Result
1	What	Law Number 22 of 2009 concerning Road Traffic and Transportation and Regulation of the Indonesian National Police Number 6 of 2017 concerning Organizational Structure and Work Procedures of Organizational Units.
2	How	Subsater submit SI submissions to the Planning Section, present the concept to the Department of IT, then the Department of IT provide recommendations for follow-up submissions.
3	Where	Shown in Figure 1.
4	Who	Commander of Traffic Police Corps, Department of IT, Department of Planning and Administration and other Korlantas units.
5	When	Information system implementation takes approximately 6 months to 1 year of development and requires annual maintenance in the future.
6	Why	Can control investment in IT projects in Korlantas, an integrated system to facilitate communication, increase the effectiveness and quality of systems and data, better IT governance in Korlantas Polri.

Table 4. Perspective Designer

No.	Indicator	Result
1	What	Vehicle Data, Accident Data and Driver Data connected to Satu Data Korlantas

No.	Indicator	Result
2	How	Korlantas systems are interdependent on one another, such as data on drivers and related vehicles as well as accident data and SBST material needs.
3	Where	The IT architecture that supports Korlantas to integrate between systems is in several separate places or is not centralized.
4	Who	The system in Korlantas is a public service system which means that users consist of huge community
5	When	The schedule for analysis and description of existing information systems at Korlantas can be done at the end of the year.
6	Why	The limitations given in the design of the system are access rights, data fields that can be shared, and access validity

Table 5. Perspective Builder

No.	Indicator	Result
1	What	Vehicle data and related driver data are based on ID number as well as accident data and related vehicle data and driver data based on ID number, police number and chassis number.
2	How	The sub unit requests integration with the Department of IT and the Department of IT assists in coordinating and supervising the integration process.
3	Where	The storage server is placed in the Korlantas data center with the server provided by the system owner.
4	Who	The interface used for each system is a website and mobile (android).
5	When	The system design schedule is carried out at the beginning of the year and system development is carried out until the end of the year (in the same year).
6	Why	The system built must comply with the minimum standards of application at Korlantas, all code and system documentation are provided in full, the researcher conducts a penetration test or assessment before the system is launched.

Table 6. Perspective Implementer

No.	Indicator	Result
1	What	Technical data and detailed data implemented in the database used..
2	How	The program code used is open source.
3	Where	Overall network configuration at Korlantas is managed by the Department of IT.
4	Who	The management of system access rights in Korlantas is based on user tasks and functions. There is an admin from a user with full access to help with troubleshooting.
5	When	Observation and analysis of needs, presentation of analysis results, submission of development requests, IT project development, penetration testing by Department of IT, completion of IT project development, and system launching to the community.
6	Why	Process business rules related to technology specifications.

Table 7. Perspective Enterprise

No.	Indicator	Result
1	What	Vehicle data is the main data system in Korlantas.
2	How	Shows examples of application designs in Korlantas.
3	Where	The process of sending and receiving data is overseen by the Department of IT.
4	Who	The system in Korlantas is used by designated users under the supervision of the Department of IT.
5	When	Scheduling the system process design is carried out a year before the project's budget year, by conducting an assessment and survey first.
6	Why	The development of an IT investment project must first make a presentation to the Department of IT for subsequent follow-up.

3.2. Business Model Analysis

The Value Chain approach is used to outline the Business Model, which segregates each Korlantas business function into two types: primary and supportive activities. Primary activities are those business functions that constitute the principal objective of Korlantas, whereas supportive activities are carried out to facilitate the implementation of primary activities. The results of the value chain model can be seen in Figure 3.

Figure 3. Value Chain

This Value Chain has a change from before, where the application of IS/IT was not significant enough, whereas currently every main activity process uses IS/IT which makes ICT one of the main activities in Korlantas Polri.

Researchers use the results of the value chain analysis to break down business functions into specific business activities and resource cycle models. This breakdown is then correlated with relevant organizational units using a matrix to determine the responsible and accountable unit for each business function. The aim is to create a knowledge base that can be utilized to establish architectural plans.

The next step is to identify data and applications in Korlantas Polri to provide an overview of business entities and data in Korlantas. Identification results can be seen in Figure 4.

The next step is application identification to determine the application candidates needed by Korlantas. The results of the analysis are shown in Table 8.
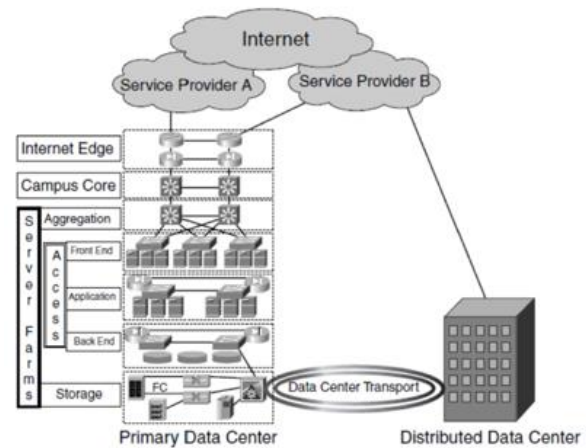

Figure 4. Architectural Data

Table 8. Entity Candidates

Code	Implementing Element	Desc
S1	Directorate of Registration and Identification IS	Manage data related to Registration and Identification of traffic and vehicles.
S2	Directorate of Law Enforcement IS	Manage data related to traffic law enforcement.
S3	Directorate of Security and Safety IS	Manage data related to traffic security and safety.
S4	Department of Operational IS	Manage data related to traffic operations.
S5	Department of Planning and Administration IS	Manage administrative data.
S6	Department of IT IS	Manage data related to traffic information and communication technology.

Organizational units and application candidates are linked in a matrix format to evaluate application support for each unit. The matrix results indicate that every organizational unit has a specific role in implementing applications as per their duties and authorities. Similarly, application candidates are linked to business activities through another matrix to identify the scope of each potential application for business activities. The outcome of this analysis reveals that nearly all business activities are addressed by all application candidates, and as a result, eight application candidates are recommended for implementation.

The ultimate stage involves evaluating the effect of creating application recommendations on the current applications, particularly the legacy evolution system. The impact of each prospective application will be assessed based on four categories, which include: maintaining the system without any changes and continuing with routine maintenance (R), eliminating the system entirely (SR), revamping the system to enhance maintainability (RE), and replacing the entire system with a new one (RA) [30]. The results of the impact analysis carried out can be seen in Table 9.

Table 9. Application impact analysis

Implementing Elements	SI Candidate	Impact	Desc
S1	SBST Korlantas, SIM Korlantas, App Rekom BPKB, Gateway SIM Online App, Registrasi SIM Internasional, ERI/RC Korlantas, Online SIM, SINAR, SIGNAL, Digital Physical Check, E-Avis, Digital Archive, SBST Online, Publishing Reporting System SIM, RC Korlantas	R	Current system maintenance.
S2	Korlantas Map, E-ticket, IRSMS, ETLE Nasional, ICELL, E-Turjawali, SpeedCam, Traffic Attitude Record	R	Current system maintenance.
S3	Speed Audit, IRSMM, Jurnal Korlantas	R	Current system maintenance.
S4	Sislaporops, Website Korlantas, K31, Blog NTMC, CC	R	Current system maintenance.
S5	PNBP Recap, Personel	R	Current system maintenance.
S6	ETLE RTMC/TMC, Vmeet, Intelligent Traffic Analyst, Standby, Satu Data, CCTV Streaming, Siskomlap, VMS Web Milestone NTMC, GISData RTMC, GPS Tracking, Smart Power	R	Current system maintenance.

The technology principles are established after taking into account various factors such as advancements in information technology, business models, data architectures, existing systems and technologies, as well as the requirements and discoveries of business actors within the organization. The technology architecture can be seen in Figure 5.
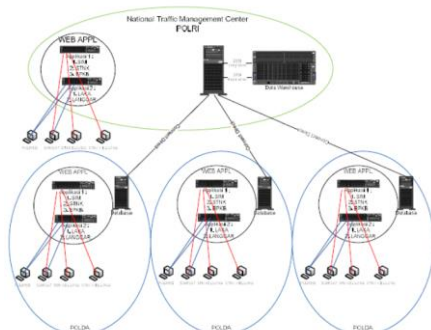

Figure 5. Technology architecture

3.3. Implementation Strategy

The first step is to determine priorities for integration of existing applications. During this stage, the priority of application integration recommendations will be established by taking into account various conditions outlined in Table 11 as selection criteria. The objective is to ascertain the priority for the creation of SI recommendations. The selected criteria to attain this objective are urgency, working time, cost, technology (ease of use), and autonomy.

The subsequent phase involves gathering data via interviews with informants to determine the priority ratios between criteria and applications based on each criterion. The researcher will then identify priority values from the priority ratio data using the eigenvalues concept.

Table 1. Application integration priorities

Prioritas	Code	SI/Aplikasi
1	S6	CCTV, ETLE RTMC/TMC
2	S1	ERI/RC Korlantas, SIM online, SINAR, SIGNAL, SBST
3	S2	ETLE Nasional, E-Turjawali
4	S3	IRSMM
5	S4	Blog NTMC, Contact Center, Website Korlantas
6	S5	Personel

Next is the integrated system implementation strategy in Korlantas. The strategies offered are presented in Figure 6.

The results of the research show the need for a data warehouse for database integration, but in other hand each data has its own standard, therefore the need for an AI Based Integrated Database System to obtain good and structured data. Then, complete data is needed so that Geospatial Information System technology is needed to support this operational implementation. After that, Business Intelligence and Decision Support System (DSS) are also needed to improve NTMC's performance. With so many dan vary data owned by Korlantas Polri, it needs proper visualization so that data can be easily analyzed and so on. Therefore, Smart Visualization is the right strategy for this.

Then in addition to supporting system operations, it is also necessary to provide standardized servers and periodic maintenance to meet the target of an integrated system that can accommodate all existing data from each system, standardization of operating systems and software on devices that are interconnected in the integrated system that will be developed. as well as maintenance of hardware, networks and other supporting devices at Korlantas Polri.

Figure 6. Systems Integration Strategy

4. Conclusion

The results of the study show that to support the performance improvement of existing systems, an integrated system is required. The next step is to get five new systems that can support the integration process of each system for each Korlantas sub work unit. Continuing with the previous recommendations, Korlantas Polri can carry out standard hardware upgrades to support IS and provide socialization of the new system to personnel so that they can operate better.

Although in this research is already proving that there is an improvement while system is integrated, there is a room for further research to carried out by analyzing more information systems and applications that exist in Korlantas Polri and their correlation with other information systems that are broader within the scope of Korlantas Polri. In addition, it can also conduct studies with comparisons or a combination of other framework approaches and other methods of conducting data analysis.

Acknowledgement

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