

Design of Architecture Enterprise Information System in Government Instance Using Framework Gartner

(Case Study: Population and Civil Registry Office Tasikmalaya)

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Abstract. Architecture enterprise planning nowadays is an important process in information technology development and information system to upgrade the quality, effectiveness, efficiency and accountability of an organization. E-Government (Electronic Government) is a kind of Government management based on electronic. Gartner framework architecture enterprise also explain four primary architecture points, they are: business, information, technology, and solution. Every point replace the concentration which relevant with all who involved. The result of this research is an architecture enterprise blueprint Population and Civil Registry Office Tasikmalaya which cover business architecture, data architecture, and technology architecture appropriated with business process in Dinas Kependudukan dan Pencatatan Sipil Kab. Tasikmalaya environment.

Keyword: Information System Architecture, E-Government, Gartner Framework

1 Introduction

E-Government or electronic-based government management at this time has become one of the focuses in the development and implementation of governance throughout the world. Indonesia is one country that implements e-Government [1]. The National Strategy for e-Government Development which contains the development of reliable and trusted service systems, and is affordable by the wider community, structuring the system and government work processes the center and autonomous regional government holistically, the use of information technology, the development of human resource capacity accompanied by an increase in the e-literacy of the community, and the implementation of systematic development through realistic and measurable stages.

The e-Government services at the Population and Civil Registration Service (Disdukcapil) of Tasikmalaya Regency have not been interactive because the existing services are in the form of delivering information through a website that can only be accessed by Districts and one Village in Tasikmalaya District. Enterprise architecture is a framework that can help align organizational business needs and their application, one of the frameworks of enterprise

architecture is Gartner. Gartner is research using technology with covert fact-finding capacity. Serves as a guideline to determine which architecture is right for use [2].

The Population and Civil Registration Service (Disdukcapil) is one of the government agencies that has an important role in Indonesia. Services provided to the community are supported by information technology systems and infrastructure, including in KTP-electronic services. Despite the fact, there are still some obstacles or shortcomings in their implementation. The research objectives are as follows:

1. Conduct an analysis of the existing system or currently being used in Disdukcapil, Tasikmalaya Regency.
2. Make a design of an information system proposal that can be implemented by Disdukcapil as a supporter of operational activities.

The benefits that can be taken from this study include:

1. Evaluate the information system at Disdukcapil, Tasikmalaya Regency, specifically on the electronic KTP system and the Population Administration Information System (SIAK).
2. Produce a framework that is integrated and meets needs and is easily developed by relevant parties (stakeholders).
3. Providing an overview of the preparation of enterprise architecture that is very important in carrying out information system integration in supporting business processes to achieve organizational goals.
4. Can provide a clear picture of the business process at Disdukcapil, Tasikmalaya Regency.

2 Methods

2.1 Enterprise Architecture Framework

Enterprise Architecture Framework (EA framework) or enterprise architecture framework is an architectural framework which defines how to organize structures and views associated with enterprise architecture.

There are three main components to the enterprise architecture framework:

1. View: provides a mechanism for communicating information regarding linkages.
2. Methods: provide discipline to obtain and organize data and build views to be able to help integrity, accuracy and completeness.
3. Training: supports application of methods and use of equipment.

Criteria are needed to reference the usual time ranges used using the methodology before starting to use the methodology and to build solutions that provide high business value. Japp Schekkerman in 2008 stated in a table several criteria from several Frameworks, including Zachman, TOGAF, FEA, and Gartner. This is useful for determining what needs are needed in the company or organization, then adjusted to the criteria that best fits the needs of the company or organization. The methodological summary ranking criteria can be seen in Table 2.1.

Table 2.1 Criteria and Ranking Summary of Methodology [3]

<i>Criteria</i>	Zachman	TOGAF	FEA	Gartner
Taxonomy completes	4	2	2	1
Process completeness	1	4	2	3
Reference model guidance	1	3	4	1
Practice guidance	1	2	2	4
Maturity model	1	1	3	2
Business focus	1	2	1	4
Governance guidance	1	2	3	3
Partitioning guidance	1	2	4	3
Prescriptive catalog	1	2	4	2
Vendor neutrality	2	4	3	1
Information availability	2	4	2	1
Time to value	1	3	1	4

Table description:

The rating of each methodology is set as: 1 (Very poor) = less; 2 (Inadequate) = inadequate; 3 (Acceptable) = accepted; 4 (Very good) = very good.

The description of the above criteria is as follows:

1. Taxonomy completes. Referring to how well you can use the methodology to classify various architectural artifacts.
2. Process completeness. It fully refers to how the methodology guides you through a step-by-step process to create an enterprise architecture.
3. Reference guidance model. Referring to how the methodology is useful in helping to build a set of reference models.
4. Practice guidance. Referring to how many methodologies help you digest the company's architecture mindset to your organization.
5. Maturity Model. Refer to how many methodology guides give you in assessing the effectiveness and maturity of different organizations in your company in using enterprise architecture.
6. Business Focus. Referring to whether the methodology will focus on using technology to drive business value, where business value is specifically defined as costs reduced and / or income increases.
7. Governance guidance. Referring to how many methodologies help in understanding and creating effective governance models for enterprise architecture.
8. Partitioning guidance. Referring to how well the methodology will lead into effective autonomous partitions of the company, which is an important approach to managing complexity.
9. Prescriptive catalog. Refer to how well the methodology guides you in preparing a catalog of architectural assets that can be reused in future activities.
10. Vendor neutrality. Refers to how likely you are to be locked into a particular consultant by adopting this methodology.

11. Information availability. Refer to the amount and quality of free or cheap information about this methodology.
12. Time to value. Referring to the possible length of time you will use this methodology before you start using it to build solutions that provide high business value.

After knowing the methodological ranking criteria and summaries, following Japp Schekkerman also made a comparison table of the characteristics of enterprise architecture, so that before taking or choosing a framework, it can be precisely determined as needed. As in this study, the Gartner framework for Disdukcapil government agencies was chosen because it was adjusted to the needs in the field. These criteria are as shown in Table 2.2 below.

Table 2.2 Comparison of Characteristics of Enterprise Framework Architecture [3]

Enterprise architecture framework	Characteristic
TOGAF	Enterprise architecture development methodology, History in defence, Open standard, Neutral, Broad acceptance, Holistic perspective, Process/planning tool.
Zachman	Positioning framework, Categorizing deliverables, Limited usefulness EA, History in manufacturing, Broad acceptance, Limited holistic Perspective, Planning tool.
FEAF	Enterprise architecture reference framework, History in enterprise architecture planning, US Gov standard, Broad US Gov acceptance, Holistic Perspective, Planning and communication tool.
Gartner Framework	Strategy, Planning and communication tool.

2.2 Gartner

According to Gartner, enterprise architecture is about uniting three elements, namely business owners, information specialists, technology implementers. Enterprise architecture in Gartner's view is about strategy not about technique. This is focused on purpose. One vision that has major consequences is the architecture of business, information and engineering.

The Gartner framework Enterprise Architecture also explains the four primary angles of architecture, namely business, information, technology and solutions. Each point of view represents a concentration that is relevant to a series of stakeholders. The following is an explanation from Gartner's point of view:

1. Business Architecture, which defines and describes the current and future conditions of the business activity model (processes, assets, and organizational structure)
2. Information Architecture, which defines and describes the current and future conditions of Value chain information, key artifact information (concepts), and information that is running.
3. Technology Architecture, which defines and describes the current and future conditions of the technology infrastructure and platform technology that are mandatory for architectural solutions and enables rapid workmanship, solutions to development and innovation.
4. Solution Architecture, which combines and integrates the perspectives of stakeholders who often change, divide tasks and reunite perspectives, architectural solutions are specific enterprise solutions, and choices from various perspectives [4].

After knowing the point of view of the Gartner framework, in Figure 2.1 the following is the model process.

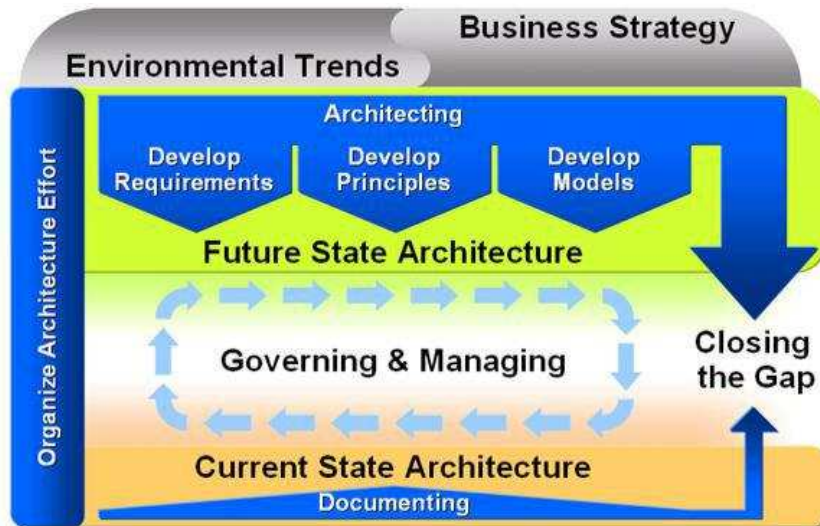


Figure 2.1 Process of the Gartner Enterprise Architecture Model [5]

The Gartner enterprise architecture process model is an important and credible complement, a vendor-neutral enterprise architecture framework. So if an organization chooses to adopt a different framework the model introduced here still adds significant value to the architecture discipline.

The Gartner enterprise architecture model consists of a major part of the trend from the environment and business strategy. This means that the Gartner enterprise architecture model runs dynamically. Then focus on the process or the next architectural step, the settings, and the correct architecture steps, so that errors can be resolved when all steps are done correctly. For more details, the following is an explanation of Figure 2.2, which is as follows:

1. Environmental Trends

Every company operates in the context of dynamic internal and external environmental conditions that will affect the company's future condition. Some examples of these conditions are:

- a. Economic climate The economic climate here means the condition of the economic average in the Kab. Tasikmalaya which influences population administration. This happens because economic problems are never separated from all aspects of life, so that if the economic climate is stable then the opportunity for carrying capacity towards government agencies is even greater.
- b. Consumer market demand Consumer market demand in the Gartner framework applied in Disdukcapil, Kab. Tasikmalaya here is the need for population administration for various other needs related to population administration.

- c. Other regulations and legalities
One of the government regulations regarding orderly population administration is contained in Government Regulation Number 37 of 2007 concerning the implementation of Law Number 23 Year 2006 concerning Population Administration. The Law of the Republic of Indonesia Number 23 of 2006 concerning population administration, is a form of legality from the state, which means that it has legal powers that affect the internal and external environment in Disdukcapil, Kab. Tasikmalaya.
- d. Geographical
The next factor in the environmental trends is geographical, geographical conditions of Kab. Tasikmalaya which is mostly hills is also an external factor from the orderly administration of population which is the vision of Disdukcapil Kab. Tasikmalaya.
- e. Political conditions
Conducive political conditions in a government area also support and become external factors that influence the orderliness of population administration in the Kab. Tasikmalaya.
- f. Culture
Culture is a way of life that develops, and is shared by a group of people and is passed down from generation to generation. In this case the culture also has external influences on the stages in the Gartner framework.
- g. Labor
The competent workforce in this stage is also an external influence, so that if the workforce is competent, then it is only necessary to equip it with the appropriate technology in Disdukcapil.
- h. Technology
Integrated technology is currently needed to optimize Disdukcapil District's performance and services. Tasikmalaya, according to the purpose of this study. Then an analysis of technology is needed now to determine the technology that will be developed in the future.

Trends in these environmental conditions clearly affect business strategy, the next enterprise architecture, development, procurement and operations produced. Environmental trends are often implicit in business strategies.

2. Business Strategy

Many organizations face complex and severe challenges in assessing and articulating the changes needed to implement business strategies at a more detailed (operational) level. It is the basis for executive legitimacy and credibility is based on the ability and willingness to articulate and share the company's mission, strategy and objectives.

3. Organize Architecture Effort

In general, enterprise architecture is intended to influence and support investment decisions and organizational changes. Enterprise architecture programs that are managed correctly and managed well are important things to achieve and communicate and promise benefits. Architectural efforts must be carried out with correct coverage, utilization of resources, goals and achievements must be communicated effectively. While the development of enterprise architectural artifacts, such as principles, models and standards, usually attracts a lot of attention.

The time limit for each iteration through the enterprise architecture Process Model must be set at the beginning of the iteration. It should not be more than one budget cycle (usually a year). Therefore, the enterprise architecture team must be careful and pragmatic about what parts of planning can be completed in each iteration to provide measurable values.

Architecting consists of three processes, including:

a. Develop Requirements

It has always been a best practice to develop enterprise architecture in business mode. Architectural requirements directly from the company's business strategy. Most enterprise architecture teams will find that they can develop a set of technical architecture requirements that are far stronger and justifiable after obtaining business information requirements (according to recommendations) from business strategy statements. Furthermore, the act of connecting and tracking requirements across points of view is more focused and focused. Requirements must direct architecture to what supports the business.

b. Develop Principles

The principles of conceptual architecture must reflect the collective and general direction that the organization seeks. The principle of guiding that position statement communicates based on the elements, truths, rules or qualities that the company must show to realize its objectives. Principle is a management tool used to provide boundary conditions for individual decision making because leaders cannot be in several places at the same time when a decision is made. Once adopted, the principle must be immediately used to guide consistent decision making.

c. Develop Model

Many architectural efforts have failed because they began with modeling, rather than establishing a set of business-based needs and conceptual principles to direct modeling efforts. The symbol "Develop Model" in the enterprise architecture process model represents a detailed search of domains in the development of architectural content in each viewpoint within the enterprise architecture framework, as the developer guide to the model to be used.

Designing the future of enterprise architecture is the heart of the whole process The aim is to translate business strategies into a set of prescriptive guidelines for use by organizations (business and Information Technology) in projects that implement change. Future State Architecture produces the following division of labor:

- a. Requirements are the urgent needs of the enterprise
- b. The principle is to provide high level guidance for decision making
- c. The model is to describe future architecture in more detail for guide more detailed decision making.

4. Current-state Architecture-Documenting

The organization complements the analysis of future conditions as an impetus for change and to ensure investments support business strategy requirements. The purpose of documenting the latest architecture is:

- a. Give an initial baseline to compare future conditions
- b. Helps identify dysfunction, duplication, complexity and dependence
- c. Facilitating continuous updating of infrastructure documentation
- d. Presenting it as reference material

5. Gap Analysis

Gap analysis is a step in the enterprise architecture process that seeks to identify differences between the specifications of the current state and developed countries from the results of enterprise architecture. A gap analysis describes supply in terms of architectural models and compares them with future country-specification models derived from enterprise architecture processes. The following key inputs are needed (although not exclusively) to identify, analyze and propose recommendations:

- a. Requirements for business solutions from a vision of general needs
- b. Principle of conceptual architecture
- c. Future specifications
- d. Future architectural models and artifacts
- e. Current architectural documentation

6. Governing and Managing

Governance refers to organizational processes and structures, together with related enterprise inputs as company guidelines. There are several potential governance processes or points of contact for architecture with other management disciplines. However, the two most important things are related to the arrangement of the structure and content of the enterprise architecture artifacts and the connection of project portfolio management with the compliance of the enterprise architecture.

3. Result and Discussion

3.1 Initialization

The progress of information technology has penetrated rapidly to various developed countries in supporting fast and appropriate decision making. The importance of information technology is also felt especially in public services that require speed, accuracy and accuracy of data so that activities in services become easier and faster.

3.2 Environmental Trends

Environmental Trends is a description of internal and external environmental conditions. This description comes from the Disdukcapil profile document in Tasikmalaya Regency. The current internal environmental conditions are using information technology and information systems that are quite developed. Among them are already able to make electronic ID cards, and use SIAK. In fact, there are still many problems that arise in the process, including the lack of practical use of SIAK, which is only fully accessible at the Disdukcapil Office. So that it is less efficient if there are people who live far from the Disdukcapil Office, and there are requirements that are lacking. While the problems of electronic KTP are still errors in NIK, as well as people who have multiple NIKs due to errors in data entry or data changes.

External environmental conditions that hinder the continuity of services include, access to SIAK which is sometimes suddenly interrupted, inadequate facilities and infrastructure, and the ability of human resources (HR) to provide services to the community.

3.3 Business Strategy

The business strategy in this research methodology was carried out using SWOT Analysis and architectural mission vision. SWOT Analysis (Strengths Weakness Opportunities Threats) is a strategic planning method used to evaluate strengths, weaknesses, opportunities and threats in a business process.

The next stage of business strategy in this research is to determine the vision of enterprise architecture that is tailored to the vision and mission of Disdukcapil, Kab. Tasikmalaya to improve service performance to residents. SWOT table, illustrated in table 5.1.

Table 5.1 SWOT Analysis of Disdukcapil of Tasikmalaya Regency

Strengths		Weakness	
1.	Legal foundation	1.	Limited facilities and infrastucture
2.	Institutional structure	2.	Limited number of human resources
3.	Work ethic and work climate conducive	3.	Limited HR capabilities
4.	Free service fees	4.	Limited budget
5.	The existance Sistem Informasi Administrasi Kependudukan (SIAK) and making e-KTP	5.	Utilization is not optimal
6.	Use of Information Technology	6.	Coordination is not optimal with work unit
		7.	Unavailibility of UPTD in remote area of far from Disdukcapil
Opportunities		Threats	
1.	Government policy	1.	Distance / accessibility of the population
2.	Strengthening institutions sub-district	2.	Lack of population awareness for orderly population administration
3.	Building an integrated information technology network	3.	Geographical and tofographic conditions
4.	Raising awareness community to be orderly population	4.	Means of transportation
5.	Administrative requirements population	5.	Mobility

-
6. Increasing collaboration between institutional
 7. Continuous ergonomic growth go up
-

1. Vision of Enterprise Architecture

At the methodology stage using the Gartner framework, the next is the enterprise architecture planning Disdukcapil is not separated from the vision which is the ultimate goal of this planning. The vision of enterprise architecture planning is as follows:

- 1) Make an E-Government system architecture plan that fits the end user needs and business needs in Disdukcapil, Tasikmalaya Regency, so as to produce an enterprise architecture that can improve performance and efficiency in the process of service to the community.
- 2) Creating an integrated system plan that is expected in the future to be integrated with other systems that already exist or which have not yet been built, become new information systems that can complement the existing system, so that KTP-electronics can be integrated with community needs related to population administration , among others, can be integrated with health services, education, or in the interests of the election so that there is no double voter.
- 3) This enterprise architecture can provide and provide information needed both by internal organizations and external (community).
- 4) The concept in this architecture is web and smartphone based, where the selection is based on flexibility that is not limited to the computer operating system used. Whereas based on smartphones, considering that many people are currently using smartphones.
- 5) Can produce several benefits including internal and external service processes faster without long queues because they are done electronically, report documents can be in the form of softcopy that is easily distributed and stored in an integrated database that can be accessed at any time.
- 6) Minimizing errors in population administration data.

3.4 Current State Architecture

This stage is the stage where analysis of the main business processes, identification of the main information system, and mapping of processes or business functions will be carried out. The first step to be taken is to use a Value Chain. In this study using a Value Chain [6], because using this model has also met the mapping and overall depiction that runs in Disdukcapil, Kab. Tasikmalaya. Here is the Value Chain at Disdukcapil, Tasikmalaya Regency, which is in Figure 5.2.

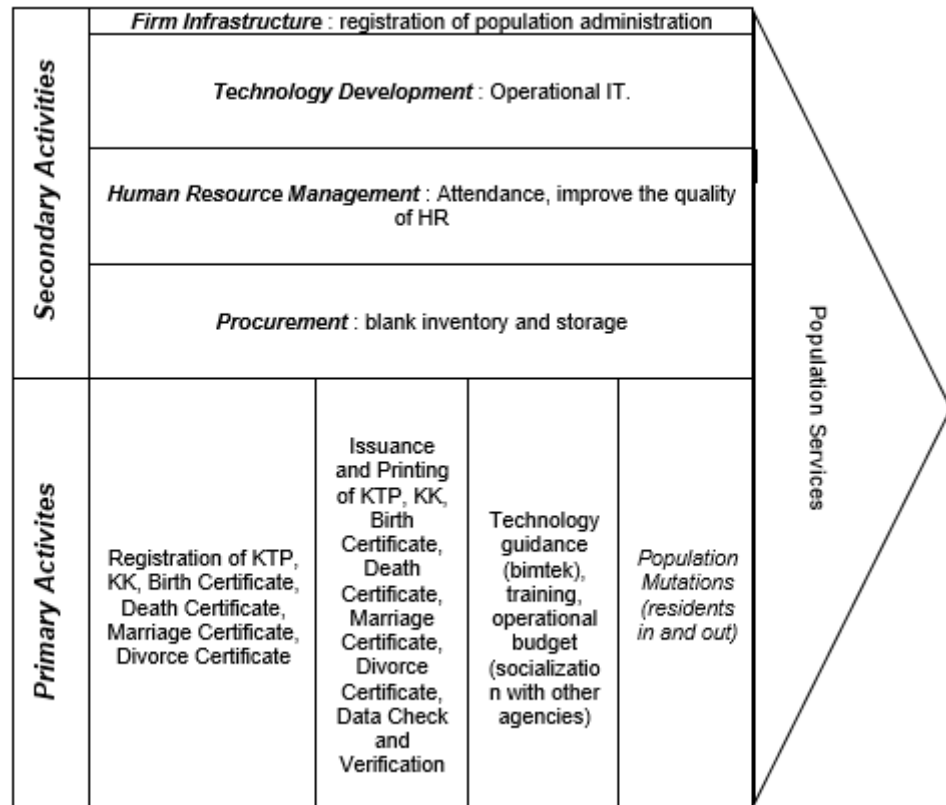


Figure 5.2. Value Chain Disdukcapil of Tasikmalaya Regency

3.5 Existing Systems in the Disdukcapil Environment of Tasikmalaya Regency

At this time, in the Disdukcapil Environment of Tasikmalaya District, the Population Administration Information System (SIAK), Beard (Biometric Card), and B-Enroll (Biometric Enroll) were implemented. Some of these systems are still being used, and still fulfill the business functions of Disdukcapil in Tasikmalaya Regency.

3.6 Future State Architecture

In this section, we will discuss Future State Architecture or future architectural planning. Starting with the creation of business architecture, an information system architecture consisting of data architecture and application architecture. After that, continued with technology architecture.

Stage Future State Architecture in the Gartner framework is an important step, because it is a planning step from the results of the analysis of the previous stages. At this stage it is also the "heart" of the whole process. The aim is to translate business strategies into a set of prescriptive

guidelines for use by organizations (business and information technology) in projects that implement change.

3.7 Information System Architecture

Disdukcapil enterprise architecture planning in this phase is done by dividing the two stages, namely data architecture modeling and application architecture modeling. The implementation is not fixed on the data architecture first, but can prioritize the application architecture which then continues to the data architecture. Information system architecture is a plan or mapping of information needs within an organization. Information system architecture consists of data architecture, as well as application architecture.

3.8 Technology Architecture

Technology architecture is needed in planning information system architecture, which will be used to support reliable information systems. In this stage, technological alternatives are needed to determine the use of technology. Technology architecture is all aspects including hardware, software, and network devices and other facilities needed for development.

3.9 Opportunities and Solutions

Opportunities and solutions that have been planned and designed in advance aim to produce an information system architecture that fits the needs of Disdukcapil, and is easy to apply. In supporting this, several strategies are needed, according to the characteristics of Gartner who have excellence in strategy. These strategies include:

1. Practice Guidance
The implementation guide here is in accordance with the points of excellence of Gartner, which is a must there are modules or clear sequences in implementation in the field in realizing the results of this plan. In this strategy, it is also necessary to develop the quality of human resources to be able to keep up with technology that is increasingly dynamic following the needs and rapidity of technology.
2. Business Focus
The business focus in the Disdukcapil environment in Tasikmalaya Regency is to provide excellent service to all residents. Excellent service here means starting from fast, effective, and informative services if residents who need services still do not understand population administration.
3. Time To Value
Disdukcapil is a service that focuses on service to residents, hence the time here is very valuable, so that the time available is effective and all are well served. The next process is to list the gap analysis so that the planning that has been carried out can be applied optimally. The following details are shown in Table 5.2 regarding Gap analysis.

Table 5.2. Results of Gap Analysis

No	Business and Policy Architecture IT at this time	Analysis /Proposal Solution	Architectural Target Business and Future Policy
1	In carrying out business processes both the main and the supporters, still not optimal	Add or increase HR capabilities	existing technology can be utilized optimally, and can run dynamically according to the needs and technological developments
2	services to residents who live in areas that have far-reaching locations have not all been fulfilled	develop and apply the planning proposal that was made in this study	create a technology architecture that can be accessed on a mobile basis to check population administration
3	service queues that are not effectively efficient	create a new application or information system	create a registration information system for services, so there is no accumulation at the counter

3.10 Migration Plan

The stages of this migration plan are to plan the transition process from the old system to the new system, so that the application of this information system is directed towards its implementation. The results of this study can be a direction in the planned migration at Disdukcapil, its application is based on business architecture, application architecture and technology architecture that has been carried out. This stage of the migration plan is the final stage in planning an enterprise information system architecture that applies e-Government by using the Gartner framework. The migration plan consists of:

1 Application Portfolios

The next step in the migration plan is to identify applications that are included in the strategic, high potential, key operational and supporting categories, for more details, can be seen in Table 5.3 below.

Table 5.3. Application Portfolios

Strategic	High Potential
service registration application	population mutation application
application checks service status	application for making mutation letters
fingerprint recording application	bimtek application and socialization
iris recording application	employee attendance application
signature recording application	
Recording data processing application	
population data reporting application	
Operational Key	Supports

This portfolio is a migration plan based on the research methodology used using the Gartner framework. Application development in Disdukcapil, Kab. Tasikmalaya, based on the order of priorities and needs.

2 Application Roadmap

From the results of mapping the application portfolio, and collaborating, it can be determined and arranged in order of steps to implement and the time allocation needed. The background of the compilation of this application roadmap, based on the results of research and observations in the field (Disdukcapil of Tasikmalaya District) which cannot be directly applied, but must go through the process of proposing both the activity plan and the budget needed. For more details, can be seen in Table 5.4.

Table 5.4. Application Roadmap

Theme	Stage 1 system development		Stage 2 system development		System utilization for performance improvement		System utilization for services between agencies or agencies	
	2019		2019		2021		2022	
Data or Information	Stage 1 data integration	data	Stage 2 data integration	data	construction of a data warehouse		development of the quality of human resources	
Application	optimize and develop application portfolios that are key operations	and	optimize and develop an application portfolio that becomes a strategic group	an	optimize and develop an application portfolio that becomes a high potential group		optimize and develop an application portfolio that becomes a support group	
Technologi	technology improvements that are not compatible		replacement of unused technology	of	implementation of technology architecture that has been designed in the initial stages		implementation of all technology architectures that have been designed	

6 Conclusions

Based on the result of the research that has been done, conclusions can be taken as follows:

- 1) This study uses the Gartner framework in information system architecture planning at Disdukcapil, Kab. Tasikmalaya is tailored to the needs and vision and mission of the organization and can be applied
- 2) From the mapping results, this plan has 11 business processes, 11 applications, 17 data classes, and its implementation can be carried out in approximately 3 years.
- 3) Application of enterprise architecture in Disdukcapil Kab. In general, Tasikmalaya only optimizes existing architecture, but for its development, Disdukcapil must be dynamic in business architecture, data architecture, and technology architecture to meet the service needs of the population to be more optimal.
- 4) Integration of system architecture with other agencies or agencies is also a strategic step in the development of E-Government. This can facilitate the population in managing everything related to population, for example for registration of hospital services, election data collection, and so forth.
- 5) The application portfolio of the results of this study is not a benchmark in its implementation, but rather in making a design that can be used as a guide so that it is more directed.

Based on the research that has been done, suggestions can be given as follows:

- 1) In implementing this design there must be good coordination of all related parts, because the key to success using the Gartner framework is that all stages are done correctly.
- 2) This study uses the Gartner framework, but is limited and does not cover the governance and management of information technology, so it is expected that in the future if this research will be developed it should include governance and management of information technology that is not specifically discussed in this study.

Acknowledgements

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