

Enterprise Architecture Functions for Villages in Indonesia: a Perspective on Indonesia's Village Law



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Abstract: Enterprise Architecture (EA) is often used by organizations as a tool to support for achieving organizational goals. The EA supports achieving organizational goals because of its functions. This paper discusses the results of literature review for the EA function. There are at least three reasons for using EA in organizations: its complexity, external force to change, and the alignment of business with Information Technology (IT). Furthermore, this paper also discusses how the EA functions can offer benefit for the Village Law. The Village Law is a legal product in Indonesia that is used as a legal umbrella to build Indonesia. A proper EA function perspective is needed to build a village supported by information technology.

Keywords : Function of Enterprise Architecture, Enterprise Architecture, Reduce Complexity, Anticipate Change, Alignment, The Village Law.

I. INTRODUCTION

The EA is known as a model to describe the utilization of information technology (IT) in achieving organizational goals [1]. In the context of enterprise architecture as a model, IT acts as an enabler in achieving organizational goals. Besides, IT also serves to bridge the gap between the current organizational conditions and future organizational conditions to be addressed. The EA has functions to solve organizational problems. Then, the EA functions are used as the basis for preparing the EA of a village.

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The village development in Indonesia is regulated under the Law No. 6/2014 on Villages [2]. The Law regulates how villages are built and tools needed to build villages. In connection to IT, article 86 of the Village Law mandates the government and local governments to develop village information systems.

Some village applications that have been developed and implemented include: sideka.id, jogloabang.com, mitradesa.id, and lumbungkomunitas.net. These applications use a systemic approach that supports village data administration, such as population data and service data to the community. In the context of systemic approach, applications play a role in helping with administrative tasks. In order to achieve the village goal to use IT as an enabler, the better approach is EA.

Therefore, the objective of the study is to investigate how the enterprise architecture functions play a role in the development of villages in Indonesia.

II. METHODOLOGY

1. Conducting Systematic Literature Review

The literature review was done to get the information on how EA functions were applied to solve organizational problems in achieving goals. The activities done were collecting academic papers and studies that can be used to answer research questions.

2. Preparing EA Village using The Open Group Architecture Framework (TOGAF) framework.

EA functions derived from literature review were required to construct the EA villages in Indonesia. The EA framework applied in this study is The Open Group Architecture Framework (TOGAF). TOGAF has a component called architecture development method (ADM). The ADM is a method of how EA develop, implement, and perform maintenance for the organization [3].

III. SYSTEMATIC LITERATURE REVIEW

A. Identifying the need for review and research question

This literature review aims to discover the tendency of the EA function for the organization. The EA is a model used to describe the use of information technology for the organization. The EA initially serves to reduce the complexity of information technology utilized by the organization and anticipate changes that occur in the organization. The EA has expanded its functionality to the organization.

This scope of the literature review was to describe the tendency of the EA functions for the organization.

B. Searching and selecting strategy applied

The literature search is the activity of selecting from literature database and entering the keywords according to the research question. The selected literature databases were:

- ScienceDirect (www.sciencedirect.com),
- Proquest (<http://www.proquest.com>),
- Google Scholar (<http://scholar.google.com>),
- Emerald Insight (<http://www.emeraldinsight.com>),
- IEEE Xplore (<http://ieeexplore.ieee.org>)

The search facility used in the literature database was "advance search". The keywords entered into the advanced search facility were "enterprise architecture" AND "function" OR "impact" AND "organization". The keywords entered in the advanced search facility were "enterprise architecture" AND "function" OR "impact" AND "organization".

The studies obtained were selected on the basis of the research question. The steps taken for selecting the studies were: (1) Choosing both title and keywords of studies that contain "enterprise architecture", those which did not have the "enterprise architecture" in their title and keywords were removed, (2) Choosing the studies that have the word "function" OR "impact" in their abstract, those which did not have the word were removed, (3) Reading the selected studies.

C. Documenting the search

Literature search results were limited to papers published in 2012 -2017. Academic papers from the list obtained were then filtered (on the basis of title and keyword), and the results were as many as 303 papers. Next, those 303 papers then were selected (on the basis of the abstract) into 96 papers. Then, the 96 papers were selected (on the basis of the introduction part of the study) into twenty papers. More details are shown in table 1 below.

Table 1 Selected paper details

Literature Database	Studies		
	Studies Found	Prospective Studies	Selected Studies
ScienceDirect	58	12	6
Proquest	66	27	4
Google Scholar	56	24	4
Emerald Insight	36	11	3
IEEE Xplore	87	22	3
Total	303	96	20

D. Conducting demography analysis

Demographic analysis was conducted on 20 selected papers. It covered twelve journals and eight proceedings. Most of the paper was obtained from Elsevier publisher: three journal papers [4], [5] and [6], and two paper proceedings [7] and [8]. Three proceedings were published by IEEE, [7], [8] and [9]. In total, there are eleven journals and nine proceedings.

There are 66 authors from nineteen countries. The most prolific author is Nur Azaliah A. Bakar from Universiti Kuala Lumpur, Malaysia, who published two papers. The second most prolific authors are from the State of Colombia and Netherland, in which their paper consists of six authors: [4] and [10]. There are four papers that involve authors from

several different countries. The collaborators are: (1) Switzerland, South Africa, and Austria [5], (2) USA and UK [6], (3) USA and Germany [11], and (4) Namibia and South Africa [12]. Finland published two papers.

The organization that applied EA the most is the government, which was found in five papers [4], [13], [7], [14] and [15]. Next, the utilization of EA functions applied in health organization and financial organization (banking) was found in two papers. While the use of EA by automotive organizations, cement, small medium enterprise, IT consultant, retail, and education, was found in four paper [15], [16], [17] and [8]. Figure 1 shows the quantity of organizations applying the EA framework.

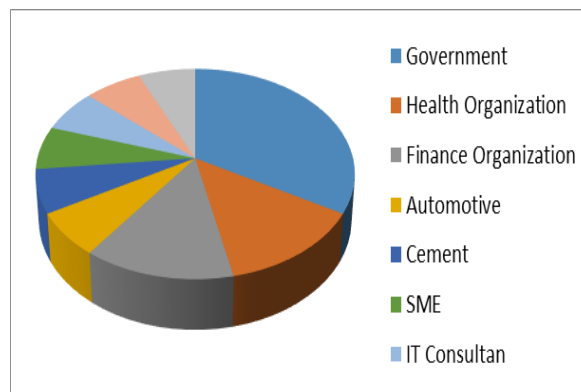


Figure 1 Quantity of organization applying EA framework

The functions of EA raising in government organizations consist of reducing complexity, bringing business and IT into alignment, and anticipating change. Among five papers on government organizations, four papers discussed reducing complexity [4], [14], [7] and [15], two papers discussed alignment issues [4] and [13], and two papers discussed change [4] and [15]. Figure 2 shows the three major EA function in government. There were two papers discussed alignment issues for health organizations [18] and [19], and factory industries [20] and [12]. The finding is quite interesting since there are four papers that discuss the issue of change for non-profit organizations [5], [21], [11] and [10].

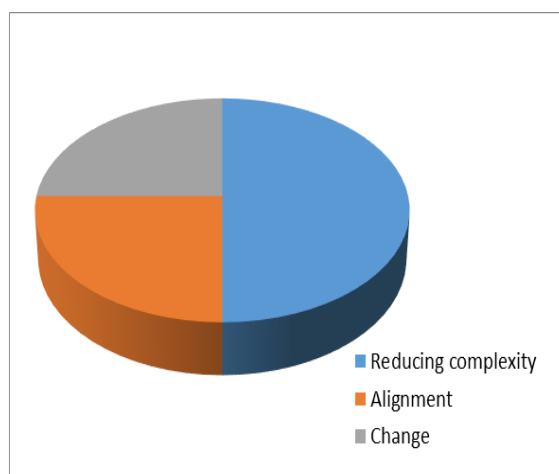


Figure 2 The functions of EA in government

Among the twenty selected papers, there are nine (9) EA frameworks references: Zachman, TOGAF, FEAF, Gartner, DODAF, TEAF, E2A, EAP, MODAF. The most commonly used EA framework for reference is the Zachman framework [4], [5], [6], [21], [11], [7], [8], [18] and [22] and TOGAF framework, found in nine papers [4], [5], [6], [11], [7], [14], [17], [18] and [22].

Among twenty selected papers, EA functions were found in fourteen papers. Table 2 below presents a quantitative tabulation of EA functions as referenced by twenty selected papers.

Table 2. Paper referenced for the EA function

No.	EA function	Number of papers
1	Reducing complexity	8
2	Anticipating change	7
3	Aligning	9
4	Being comprehensive	1
5	Ensuring IS	1
6	Harmonizing	1
7	Improving communication	1
8	Integrating	4
9	Being interoperability	1
10	Optimizing Investment	1
11	Being systematic	1
12	Rigidity	1
13	Viability	1
14	Applying standardization	1

IV. INDONESIA'S VILLAGE LAW

According to the Village Law, a village is a unity of legal community which has the territorial boundaries to regulate and administer government affairs and the interests of local communities [2]. Data from Village, Disadvantaged Regions, and Transmigration Ministry mentions there are 73,093 villages in Indonesia, which are classified into the following categories: Very Disadvantaged Villages: 13,453 villages or 18.25%, Disadvantaged Villages: 33,592 villages or 45.57%, Developing Village: 22,882 villages or 31.04%, Advanced Village: 3,608 villages or 4.89 %, Independent Village: 174 villages or 0.24% [23].

The legal basis of regional and village development is the Indonesian Village Law no. 6/2014. The Village Law is a legal umbrella for the implementation of village governance towards strong, advanced, independent and democratic village communities. There are 6 points of policy directives and strategies on village development stated in the Government's Mid-Term Development Plan or in Indonesian 'Rencana Pembangunan Jangka Menengah Nasional' 2015 - 2019 (RPJMN 2015-2019) [24].

Three of the six RPJMN 2015-2019 points are:

1. Developing human resources, culture, and socio-cultural capital of village communities,
2. Strengthening the village government and village communities,
3. Managing natural resources and sustainable environment,

conducting spatial arrangement of rural areas, and realizing food self-sufficiency.

The Village, Disadvantage Regions and Transmigration Ministry (VDRTM) is the most likely government agency to carry out the constitution's mandate. Related to the main tasks and functions, VDRTM formulates the directives of village policy as follows [25]:

1. The aim of the village policy directive: improving the welfare and life quality of the village community.
2. Strategic objectives: reducing the number of Disadvantage Villages at least 5,000 villages or increasing the number of Independent Villages at least 2,000 villages.
3. The directive from the President of the Republic of Indonesia in relation to the Village Law:
 - a. Focusing on village development, especially in 1,138 villages in border areas,
 - b. Supervising the Village.
4. Priority focus:
 - a. Monitoring the implementation of the Village Law especially for rural development, empowerment of rural communities, and rural development.
 - b. 74,093 villages and especially 39,086 disadvantage villages and 17,268 underdeveloped villages.

In order to implement the village policy directives, the VDRTM issued the following regulation [25]:

1. Ministerial Decree no. 2/2015 on Guidance and Mechanism in Making Decisions on Village Negotiations.
2. Ministerial Decree no. 4/2015 on Establishment, Arrangement and Management, and Dissolution of Village-Owned Enterprises.

V. THE EA FOR VILLAGES IN INDONESIA: USING TOGAF

The EA functions as a solution to village development

The EA offers the village an IT development solution with several benefits: reducing complexity, anticipating change, and aligning IT with organizations. Reducing complexity is related to how village officials conduct managerial activities in order to build a village. Anticipating change is related to the information age where rapid environmental change takes place, both in the business environment and technological environment. The EA of the village should anticipate changes that occur in order to help villages follow the change dynamics. Aligning business with IT is related to the efficiency and effectiveness of information technology as a tool to implement the Village Law.

TOGAF: The EA of villages in Indonesia

One component of TOGAF framework is the Architecture Development Method (ADM). Figure 3 is the steps in ADM.

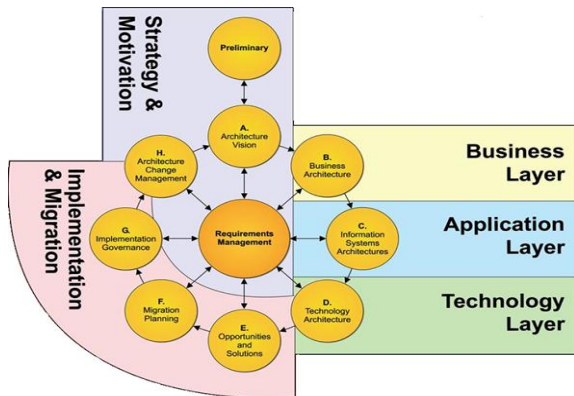


Figure 3 ADM [3]

In this study, EA for villages in Indonesia applies ADM TOGAF by selecting stages A, B, and C. Selection at this stage is made for efficiency reasons. Selecting the A, B, and C stages of ADM TOGAF is sufficient to prove that the EA functions reducing complexity, anticipating change, and aligning business with IT have been implemented in village development.

Stage A. Architecture Vision

Article 4 of the Village Law states that village development arrangements are aimed at, among others, encouraging initiatives, movements, and participation of village communities for the development of village potentials and assets for mutual prosperity; establishing a professional, efficient and effective, open, and accountable Village Government; and improving public services for villagers to accelerate the realization of their welfare.

The solution of architecture vision is utilizing IT as an enabler to achieve village goals. To support IT perform as an enabler, the role or function of the Chief of Information Officer (CIO) is placed within the organizational structure of the village. The function of EA in the architecture vision stage is to anticipate change. Through the CIO role, IT can also be used as an enabler to anticipate change.

Stage B. Business Architecture

Article 7 of the Village Law states that it is necessary to arrange the village that aims to realize the effectiveness of the implementation of village governance, to accelerate improvement on the welfare of village communities, to improve acceleration in the quality of public services, to improve the quality of village governance, and to improve village competitiveness. The function of EA in the business architecture stage is to reduce complexity.

Architecture development can be shown as follows:

1. Organizational Structured Development

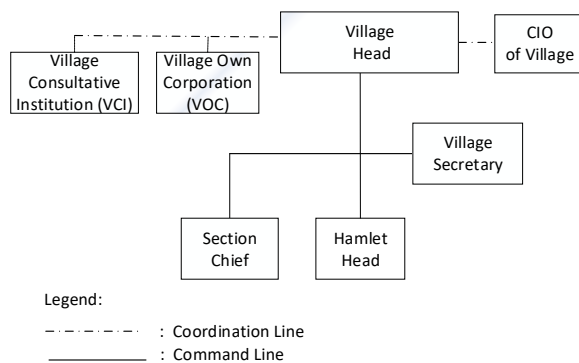


Figure 4 Organizational Structure of Village

As seen in Figure 4, village institution consists of Village Head, Village Consultative Assembly (VCA), Village-Owned Enterprises (VOE), Village Secretary, Head of Sections, Hamlet Head, and Chief of Information Officer (CIO). The village head is responsible for ensuring the village objectives are achieved successfully. Village heads along with VCA make regulations on the implementation of work programs. The village secretary is the assistant to village head who serves on the village government administration. Head of Sections is the assistant to village head who performs duties of the working scope of the village. There are usually several scopes of work in the village, such as development, finance, and government. Hamlet is a smaller area within a village. The head of a hamlet is called the hamlet head, who is the assistant to village head who serves as a leader in developing his territory.

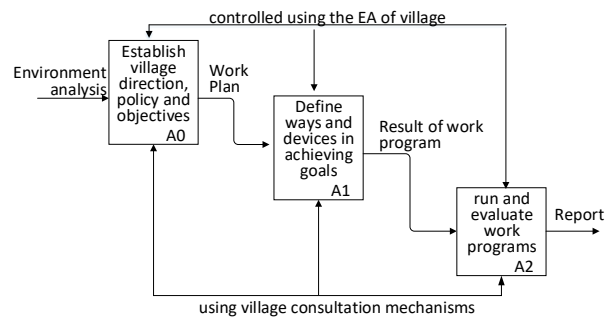


Figure 5 Business function development Stage C. Information System Architectures (aligning IT with business)

Based on article 7 of Village Legislation, as mentioned in stage B, the information system architecture model introduced acts as an enabler to:

- develop human, cultural, and socio-cultural resources of village communities,
- strengthen village government and village communities,
- manage sustainable natural resources and environment, conduct spatial arrangement of village areas, and realize food self-sufficiency.

The function of EA in the information system architecture is to align IT with business.

VI. CONCLUSION

Image classification will benefit from classifiers with high accuracy. While a vast number of deep neural nets have been proposed, little has been said about building new models based on ensemble technique of existing classifiers. Our experiment on Cifar10 shows that ensemble classifier using probability voting technique involving VGG16, VGG19, and Resnet56 models can increase the performance of the respective individual classifier. The future step of this experiment is to explore other techniques to build ensemble classifier using more testing datasets or classifiers for transfer learning.

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