Comparative Study of E-Government Enterprise Architecture by Secondary Attributes of 3 Asian Countries

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ABSTRACT

By Waseda University International e-Government Ranking, announced in 2012 the state of Singapore, Korea and Indonesia ranks first, third and thirty three in the implementation of e-government [6]. This study aims to conduct a comparative analysis of the implementation of e-government Enterprise Architecture in Korea, Singapore and Indonesia based on secondary attributes. Stages of the research conducted is reviewing literature on TOGAF framework, define the attribute comparison, analysis of EA implementation in each country and do a comparison of the EA of three countries. EA Framework in Korea and Singapore are different. EA in Korea more emphasis on the efficiency and quality of service. EA in Singapore more emphasis on collaboration between government and society. Indonesia tried to realize Indonesia Digital where all district / municipal will implement e-government.

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1. INTRODUCTION

Enterprise Architecture (EA) is the unity of principles, methods and models used in the design and realization of organizational structure, business processes, information systems and infrastructure of an enterprise. EA describes the essence of the business and the evolution of information technology. There are several roles of the EA. The first role is to provide an overview of how information technology can support the enterprise in achieving the vision and mission of the business strategy. The second role is to provide the opportunity for the enterprise to run a better business. The third role is to support business strategies that are constantly evolving, the fourth role is to direct and motivate the development of information technology activities [1].

By Waseda University International e-Government Ranking, announced in 2012 the state of Singapore, Korea and Indonesia ranks first, third and thirty three in the implementation of e-Government [6]. This study aims to conduct a comparative analysis of the implementation of e-government Enterprise Architecture in Korea, Singapore and Indonesia based on secondary attributes. Additionally, it will be known excess of EA implementation in Korea and Songapore so that the two countries could lead to motivation for other countries to develop the EA in accordance with the conditions of each country.

2. LITERATURE REVIEW

TOGAF Architecture Development Method [ADM] gives an overview of how to create an EA of a particular organization in accordance with business needs. TOGAF is the scope of application of products and services that are in the domain of business and industry, technical infrastructure based on open system building blocks, including the definition of EA business process architecture, application architecture, data architecture, and technology architecture [1]. The phases of the EA development method using the TOGAF framework is as follows: Preliminary: Framework and Principles, Architecture Vision, Business Architecture, Information Systems Architecture (formed from the Data Architecture and Application Architecture),

Technology Architecture, Opportunities & Solutions, Migration Planning, Governance and Architecture Implementation Change Management[1]. TOGAF architecture has three main parts of the EA Business Architecture, Information Systems Architecture and Technology Architecture. Comparison of e-Government EA based on three types of architecture that has been discussed in previous research. The current study did EA comparisons based on attributes other than the three attributes.

3. RESEARCH METHOD
To carry out this research, conducted several research stages as follows:
a) **Review of the literature**
   To conduct literature review may take a few resources. The information collected from several sources, namely: the books that discuss EA, research articles which can be downloaded from the internet, the official website of the government of each country and other sites that contain information about the implementation of EA, EA implementation brochures.
b) **Determine secondary attributes to compare EA.**
   At this stage of the study will be related to one of the EA framework that is currently widely used is TOGAF. With a review of the stages of preparation of the EA will be able to know the secondary attributes of an EA. The secondary attribute that will be used to compare the EA of the three countries.
c) **Analysis of EA implementation in each country.**
   At this stage, the EA implementation will be analyzed in each country based on the secondary attributes.
d) **Comparative analysis of the EA implementation of the two countries.**
   At this stage will be analyzed the EA implementation comparisons between the three countries based on the secondary attributes step by step.

4. RESULTS AND DISCUSSIONS
4.1. Identification of Secondary Attributes
   Based on the TOGAF framework there are nine stages of development of the EA implementation. Previous research has been done on the comparison of the three architectures that business architecture, information systems architecture, and technology architecture. The attributes that will be used in this comparative study are preliminary (framework and principles), architecture vision, opportunities and solutions, migration planning, implementation governance, and change management architecture.

4.2. EA implementation in Korea
a) Preliminary: Framework and Principles
   Government Enterprise Architecture consists of direction EA, EA and the EA product activity. EA Direction is made up of several elements such as Legislation & Guidance, Enterprise Requirements, Architecture Principle, and EA Strategy. Under the EA Direction, EA activity is determined by the preparation Architecture Model, EA Life Cycle and BBIB. EA Activity produced EA product consisting of architecture product and supporting products. These stages can be seen in Figure 1. Development of Government-wide EA due to several things: i) the occurrence of redundant IT investments that occurred due to IT management managed by agency-level ii) lack of alignment between the agency's IT projects and national IT direction iii) there is no process or system for the management of IT resources with the scale government-wide.[3]
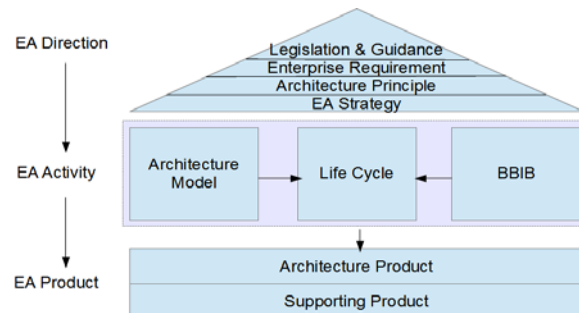

Figure 1. Government-wide Enterprise Architecture Framework [3]

b) Architecture Vision
   Vision of e-Government framework of the Korean government is enhancement of service quality and efficient government. [2].

c) Opportunities & Solution

Some policies related to the implementation of GEA, among others: i) all of the e-Government projects should be based on EA ii) all of the Agency's CIO should develop and use EA iii) public sector IT projects should be based on EA.[2]

d) Migration Planning

EA development phase is i) EA program include in the "31 e-Government Inisiatives" (The Government Innovation Committee, August 2003) ii) EA pilot project for central government (December 2004-June 2005) iii) EA Law Legislated : "Law for Effective Acqusitions and Operations of Governmental Information System" (December 2005) iv) EA supporting agency appointed: National Information Society Agency (August 2006) v) Government-wide EA Program executed (November 2008-December 2010).[2]

e) Implementation Governance

Ministry of Public Administration and Security (MOPAS) gives shape to the EA policy and operates the legislation. National Information Society Agency (NIA) perform the research needed to establish the EA policy, training and consultation for the agencies.

f) Change Management Architecture

To realize the Government EA performed the following activities i) define and revise the standard Government EA, reference models, maturity models and guidelines ii) dissemination and spread adoption of the best EA through conferences and academic seminars iii) survey and evaluation of the maturity level status of the Agency EA iv) collect information from agencies architectural v) provides statistics and the executive summary of the government-wide IT projects, information systems, hardware, software and other IT resources ongoing vi) analysis of data redundancy and information system area that enables integration across the public sector.[2]

4.3. EA implementation in Singapore

a) Preliminary: framework and principles

Government EA consists of four main architecture such as business architecture, information architecture, application architecture, and technical architecture. Other architecture required to support Government EA such as EA governance, EA processes, practices, techniques and principles, EA methodologies, models and standards. Government EA can be seen in Figure 2.[3]
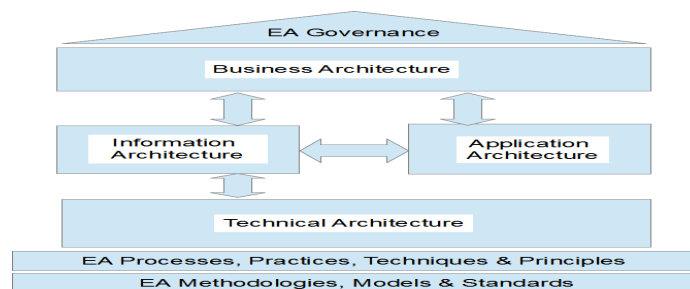

Figure 2. Whole of Government (WOG) Enterprise Architecture [3]

b) Architecture Visiona Collaborative Government that Co-creates and Connects with Our People". [5]

EGovernment vision of the Government of Singapore is "To be a Collaborative Government that Co-creates and Connects with Our People". [5]

c) Opportunities & Solution

eGov2015 has three major trends facing government are: i) Advances in ICT so that allows for connectivity unprecedented, ii) Increasing the multi-faceted and dynamics issues, iii) community have better education and information. . [5]

d) Migration Planning

eGov2015 (2011-2015). The Singapore e-Government Masterplan 2011-2015 (or eGov2015) usher in a new era, in which the government aims to move from a "Government-to-You" approach to a "Government-with-You" in the delivery of e-government services. The aim is to facilitate the establishment of cooperation and interaction between government, community and private sector to achieve greater value creation for Singapore and society.[7]

eGov2010 (2006-2010). eGov2010 is five-year Master Plan of the Singapore Government that utilizes ICT to continue the mission of satisfying the customers and citizens. There are four strategic focus in this master plan are: increasing the scope and completeness of e-Services, increase mindshare of citizens in e-Engagement, capacity building and synergy in government, and enhance national competitive advantage.[7]

eGAP II (2003-2006). Build businesses that previously achieved in the e-Government Action Plan first, eGAP II aims to achieve three different results are happy customers, citizens and government networks connected. [7]

eGAP I (2000-2003). E-Government Action Plan (eGAP) to fulfill the vision of making Singapore one of the leading e-Government in the world. Established six strategic program, namely: Electronic Services Delivery, Knowledge-based Workplace, Technology Experimentation, Operational Efficiency Improve-ment, Adaptive and Robust Infocomm Infrastructure, and Infocomm Education.[7].

Civil Service Computerization Program (1980-1999)

Civil service computerization program originally started with a focus on improving public administration through the effective use of ICT. Improvements involving automation of work functions and reducing paperwork for internal operational efficiencies greater. [7].

e) Implementation Governance.

E-Government implementation involves three parties as follows: the Ministry of Finance (MOF), Infocomm Development Authority (IDA), and the Agency CIO.

Ministry of Finance (MOF). Ministry of Finance as the owner of the e-Government. as the owner, MOF set policy directions using Information and Communication Technology (ICT) in governance, provides funding for programs and projects e-Government, leads the overall government ICT initiatives. [7]

Infocomm Development Authority (IDA). IDA acts as the Government Chief Information Officer. Role of IDA is providing technology advice, prepare a master plan and project management services to government agencies and the MOF, identification and draft program and e-Gov projects, driven development and implementation of programs and projects of e-Gov.[7]

Agency CIO. Each government agency also pointed to the agency CIO is responsible for agency-specific ICT, infrastructure and services within their own organizations. Agency CIO helped Permanent Secretaries of Ministries.[7].

f) Change Management Architecture

Management changes were made consisting of three main activities, namely a) the re-engineering process of intra-government effort to create an efficient, responsive and tailored government according to the needs of citizens b) inter-process government re-engineering in an effort to realize an efficient government, the increasing cooperation and without limit c) re-engineering legacy technologies, processes, skills and mindset.[4]

4.4. EA implementation in Indonesia

a) Preliminary: Framework and Principles

Some principle of ICT implementation that need to be considered are (1) increase the flow of goods, services and information (2) reduce logistics costs (3) reducing the high cost (4) achieve equitable access across the region, and (5) realize synergies between centers of economic growth.[8]

b) Architecture Vision

Vision of ICT development is Informative Indonesia towards prosperous society through the sustainable development of communication and information that populist and friendly environmentally within the framework of the Unitary State of the Republic of Indonesia.[10]

c) Opportunities & Solution

To achieve the Vision Indonesia in 2025, formulated three basic strategies, namely (1) the development of economic potential through economic corridors, (2) improving national connectivity, and (3) strengthening skill of human resources and national science and technology. 4 main elements forming the national connectivity include the National Logistics System, the National Transportation System, Regional Development and ICT. [10]

d) Migration Planning

National ICT Roadmap 2010-2020 is divided into four stages, namely: Indonesia Connected (2010-2011), Indonesia Informative (2012-2014), Indonesia Broadband (2015-2018) and the Indonesian Digital (2019-2020). Some targets can be achieved at this Indonesia Connected stage are the whole village have telephone access, formed the National ICT strategy 2010-2014, the establishment of the National Information Security Team and E-Government Master Plan, the entire district have internet access, institutional strengthening, strengthening commitment to the provision of human resources and strengthening ICT human resources. . At the Indonesia Informative stage, expected target is the entire

capital of the province connected fiber optic network, the entire county / city have broadband access, improved e-services, e-health and e-education for all. At the Indonesian broadband stage, expected target is increased above 5 MB broadband access, increasing the nation's competitiveness and innovative. At the Indonesia Digital stage, the expected target is all districts / cities have e-government and the Indonesian competitive.[10]

e) Implementation Governance

National ICT Governance structure consisting of the Executive Government Institutions, ICT and Management Task Force Unit, Business Process Owner. ICT organization consists of the National ICT Council, National CIO, Institutional Executive, Institutional CIO, Institutional ICT Committee, Task Force of ICT Institutional Management and Task Force of Institution Business Process Owner. [9]

f) Change Management Architecture

To support the successful of change management implementation in ICT is done by way of monitoring and evaluation of success indicators in any governance process. Monitoring and evaluation of independence carried out both internally and externally. Internally, each government institution to evaluate a regular review of the achievement of the indicators of success for each of the governance process. Externally, it is possible the holding of an evaluation of the achievement of the indicators of success of a government institution.[9]

4.4. EA implementation comparisons between the three countries

This section will discuss EA comparison of Korea, Singapore and Indonesia. Description of the comparison based on a comparison of each attribute support. Table 1 shows a comparison Preliminary: Frameworks and Principles. Korea used EA Framework emphasizes the EA direction, the EA activity and the EA product. While EA Singapore grouped into EA governance, business architecture, information architecture, application architecture, technical architecture, EA processes, practices, technique and principles, and EA methodologies, models and standards. Indonesia does not have a National EA framework.

Table 1. Comparison of Preliminary: Frameworks and Principles

Korea	Singapore	Indonesia
a) EA Direction consists of Legislation & Guidance, Enterprise Requirements, Architecture Principle, b) EA Strategy consists of the preparation of the EA activity architecture models, EA Life Cycle, BBIB c) EA product consists of product architecture and supporting products.	a) business architecture b) information architecture c) application architecture d) technical architecture e) EA governance f) EA processes, practices, technique and principles g) EA methodologies, models and standard	Indonesia does not have a National EA framework but Indonesia have some principles that should be done in the development of ICT

Table 2 below shows the comparison of architecture vision. Korean architectural vision is more emphasis on enhancement of service quality and efficient government. Korea emphasizes that all projects must be based on the EA implementation and EA socialization. Singapore is more emphasis on increasing collaboration between government and society. Indonesia is more emphasis on sustainable development of communication and information.

Table 2. Comparison of Architecture Vision

Korea	Singapore	Indonesia
enhancement of service quality and efficient government	a collaborative government that work together and connect with the community	Informative Indonesia towards prosperous society through the sustainable development of communication and information that populist and friendly environmentally within the framework of the Unitary State of the Republic of Indonesia.

Based on Table 3 shows that Korea requires all e-Government project based on EA projects. ICT development in Singapore and Indonesia was committed to the achievement of connectivity.

Table 3. Comparison of Opportunities & Solutions

Korea	Singapore	Indonesia
all of the e-Government projects should be based on EA, Agency's CIO should develop and use EA, all projects IT sector public must be based on EA	ICT advances that allow connectivity, increasing the multi-faceted and dynamics issues, people have better education and information	the development of economic potential through economic corridors, improving national connectivity, strengthening skill of human resources and national science and technology

Table 4 below shows the comparison of Migration Planning. EA Korean migration process is to make the EA program package, a central government as a pilot project for the implementation of EA, make regulations, appoint responsible and EA program execution. EA migration process in Singapore is an improvement of public administration through ICT, the target of the world's leading EGOV implementation, and develop programs to improve customer satisfaction and community. Indonesia split 4 stages of ICT development for Indonesia Digital realization that all districts / cities have implemented e-government.

Table 5 shows a comparison of Implementation Governance. EA Korea formed an organization to implement the organization's EA ranging from the national level down to the local level. EA management organization structure in Singapore is simpler compared to Korea. Similarly, the two countries involving the Ministry of Finance in the management of this EA. Based on Table 5 shows that Korea and Indonesia have ICT management structure in the form of a hierarchy ranging national level to the institutional level. While the Singapore involve Ministry of Finance in the implementation of EA.

Table 4. Comparison of Migration Planning

Korea	Singapore	Indonesia
EA program include in the "31 eGovern-ment Inisiatives", EA pilot project for central government, EA Law Legisla-ted: "Law for Effective Acqusitions and Operations of Governmental Information System", EA supporting agency appointed: National Information Society Agency, Government-wide EA Program executed	Civil Service Computerization Program to improve public administration through ICT, eGAP I with a vision to make Singapore as one of the world's leading EGOV, GAP II, which aims to make customers happy, connected communities and government networks, ICT Egov2010 which aims to satisfy customers and the public, Egov2015 using a "Government with you"	National ICT Roadmap 2010-2020 is divided into four stages, namely: Indonesia Connected (2010-2011), Indonesia Informative (2012-2014), Indonesia Broadband (2015-2018) and the Indonesian Digital (2019-2020).

Table 5. Comparison of Implementation Governance

Korea	Singapore	Indonesia
The president's council on information strategies, Ministry of Public Adminis-tration and Security, National Informa-tion Society Agency, Related Agencies (Prime Minister's Office, Ministry of Finance), Central Admistrative Agencies, Local municipaites, Other public agencies	Ministry of Finance (MOF), Infocomm Development Authority (IDA), Agency CIOs	the National ICT Council, the National CIO, Institutional Executive, Institutional CIO, Institutional ICT Committee, Task Force of ICT Institutional Management, Task Force of Institution Business Process Owner.

Table 6 below shows the comparison of Change Management Architecture. Change management in Korea emphasized the definition of EA, socialization, monitor the implementation of EA, and avoid data redundancy. Change management in Singapore consists of intra-process reengineering government, inter-government processes and legacy technology, processes, skills and mindset. Change management in Indonesia is done by monitoring indicators of success in any ICT governance processes.

Table 6. Comparison of Change Management Architecture

Korea	Singapore	Indonesia
Define and revise the standard Government EA, reference models, maturity models and guidelines, socialization application of EA, evaluation of the status and maturity level of the Agency EA, collect information from agencies architectural, provides statistics and executive summary of IT resources, analysis of data redundancy and information systems integration area	intra-government process reengineering, inter-govern-ment process reengineering, reengineer legacy technolo-gy, processes, skills and mindset	ICT change management imple-mentation is done by monitoring and evaluation of success indicators in any governance process. Monitoring and evaluation of independence carried out both internally and externally.

5. CONCLUSION
a. Korean EA Framework emphasizes the direction EA, EA activity and the EA product. Singapore EA Framework is grouped into EA governance, business architecture, information architecture, application architecture, technical architecture, EA processes, practices, technique and principles, EA methodologies, models and standards. Indonesia does not have a National EA framework.
b. Korean architectural vision is more emphasis on efficiency and quality of service. Singapore is more emphasis on collaboration between government and society. Indonesia is more emphasis on sustainable development of communication and information.

c. Korean solution & opportunities requires all e-Government project based on EA projects. ICT development in Singapore and Indonesia was committed to the achievement of connectivity.

d. Korean EA migration process is to make the EA program package, a central government as a pilot project for the implementation of EA, make regulations, appoint responsible and EA program execution. Singapore EA migration process is an improvement of public administration through ICT, the target of the world's leading EGOV implementation, and develop programs to improve customer and community satisfaction . Indonesia split 4 stages of ICT development for Indonesia Digital realization that all districts / cities have implemented e-government.

e. Korea and Indonesia have ICT management structure in the form of a hierarchy ranging national level to the institutional level. While the Singapore involve Ministry of Finance in the implementation of EA.

f. Change management in Korea consists of defining EA, socialization, monitor the implementation of EA, and avoid data redundancy. Change management in Singapore consists of intra-process reengineering government, inter-government processes and legacy technology, processes, skills and mindset. Change management in Indonesia is done by monitoring indicators of success in any ICT governance processes.

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