Activity theory view of enterprise architecture implementation in the Ghanaian government environment

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Abstract

Many governments deploy enterprise architecture (EA) to mitigate challenges associated with the alignment between business and information systems/technology. However, many developing countries, particularly in Africa, are challenged with the implementation of EA because the value derived from the deployment of EA cannot be quantified. This is due to a lack of standard metrics to measure the value of EA. The study aims to reveal the factors that influence the successful implementation of EA in government institutions. The study followed the qualitative method with the government of Ghana as the case study. Data collection was EA documentation, analyzed subjectively and guided by the Activity Theory.

Keywords: enterprise architecture, government, Information systems, activity theory

Introduction

Organizations are continuously faced with various types of challenges such as adapting to global changes, and the coexistence of infrastructure, which affect their operations. According to Plataniotis, et al. (2014), many organizations across the world are challenged by factors of change, which manifest from events such as acquisitions, mergers, technological innovation, and the introduction of new business processes. Some of the factors influence the alignment between business activities and its information system and technology (IS/IT) solutions. In addition, some organizations do not have a holistic view of their environments, which makes alignment between IS/IT and business processes difficult towards providing consistent solutions for changing needs. Shaanika and Iyamu (2015) claim that the deployment of IS/IT alone does not guarantee success in an organization, hence the use of enterprise architecture (EA). The authors further claim that EA is used to manage and regulate business activities and its associated IS/IT solutions towards the attainment of its organizational goals. In addition, the implementation of EA is the means of getting a holistic view of an organization (Buckl et al., 2010).

EA can be viewed from different angles, which can be attributed to its enterprise-wide and holistic nature. From one angle, Tamm et al. (2011) refer to EA as the model and documentation tool that is used to describe a high-level view of an enterprise's processes and IT systems, their interrelationships, and the extent to which these processes and systems are shared. From another angle, Safari, Faraji and Majidian (2016) argue that EA is a strategic tool that can be used to govern and manage business processes, information value, application and technology deployment. However, these documents should not only elaborate on what architectural documents should include, but they should also educate how to operationalize the EA programs (Bui, 2017). Irrespective of the angle EA is viewed, the concept is geared towards benefits.

EA implementation is a set of activities that ultimately aim to align business objectives with IS/IT artefacts in an organization (Nygard & Olsen, 2016). Aier (2014) resonates that an organization that has implemented EA effectively enjoys a stable and flexible environment, which are significant benefits. Other benefits that

can arise from implementing EA include reduced operating costs, improved project execution and increased alignment between business and IS/IT (Buckl et al., 2010). The popularity of EA in the private sector has motivated governments to develop EA, to establish a holistic view of government operations (Klischewski, 2014). EA is of significance to governments because of its efforts to deploy internet government services, make it citizen-centric and produce results based on the need of the market (Saha, 2010). Countries such as South Africa (Van Zijl & Van Belle, 2014), Ghana (Kaushik & Raman, 2015), Kenya (Katuu, 2018) and Egypt (Mohamed et al. 2013) are but some of the governments in developing countries that have developed EA. The development and deployment of the government enterprise architecture (GEA) have been associated with benefits such as change management, budget optimization, complexity management and IS/IT portfolio management (AlSoufi, 2012).

EA implementation is questioned and interrogated, as their benefits are not easy to scrutinize (Tamm, et al., 2011). It is imperative to establish a basis for EA assessment that can guide a systematic, neutral way to measure and determine whether the deployment of the EA achieves its objectives in an organization (Karimi et al. 2014). Another challenge in determining the benefits of the EA is its vast nature, which many of the current assessment models are not able to cover because of their specific focus (Nikpay et al 2017). Thus, organizations including governments are still faced with the challenge to realize benefits derived from the implementation of EA (Bakar et al. 2016).

The study aims to reveal the factors that influences the successful implementation of EA in government institutions in developing countries. The objective is to understand the rationale as well as expectations of implementing the concept of EA in an environment, which can be used to establish metrics. The second objective is to establish how EA is practiced in governments' institutions in developing countries. This is to determine the factors that influence the benefits.

Enterprise Architecture in government

Increasingly, many organizations have shown interest in the deployment of EA over the last two decades, including governments around the world (Dang & Pekkola, 2017). EA is used to develop Government Enterprise Architecture for governments (GEA) (Saiya & Arman, 2018), which is also referred to as National Enterprise Architecture (NEA) (Lee, et al., 2013). GEA is a mechanism used to have a holistic view and understanding of government institutions' activities (Saha, 2012). It is a nationwide strategy and holistic plan used to align government services and processes amongst government institutions, to enhance information sharing using integrated IS/IT solutions (Saiya & Arman, 2018). The integrated solutions and sharing of information are imperative due to the complex distributed structure of government institutions. GEA is the overarching strategy to transform public sector services to its stakeholders (Hjort-Madsen & Pries-Heje, 2009).

GEA can further be used to manage complexities, establish change management, cost management, support system development, and support business and IS/IT alignment (Saiya & Arman, 2018). Moreover, the deployment of EA can reduce risks and derive benefits in organizations experiencing complexities of IS/IT. (Kappelman & Zachman, 2013; Tamm *et al.*, 2011). Also, change in organizations can be complex, which is often difficult to manage or control without flexibility and addictiveness (Al-Kharusi et al., 2017). The demand for improved services from stakeholders motivates governments to adapt their operations to technical advancements. One of the main strengths of the EA is governance, which focuses on flexibility, scalability and adaptiveness (Kasemsap, 2018; Iyamu, 2015; Kappelman & Zachman, 2013).

Organizations experience various types of challenges at different levels, with the EA. Iyamu (2015) argues that it is difficult to find an organization that has successfully designed, developed, implemented and

institutionalized the concept of EA. This could be attributed to the fact many organizations and government institutions find it difficult to interpret and customize the EA as a solution for organizational needs (Van der Raadt, et al., 2010). This is attributable to a lack of metrics or measurement models (Hamalainen & Markkula, 2007). Valdes et al, (2011) suggest that EA implementation challenges can be mitigated if there is an assessment mechanism in place. According to Doucet, Saha and Bernard (2009), EA is measured by time to market, business responsiveness, and coherency in both IT and non-IT space. There is not a single way to measure the value of EA, as resonated by Niemi (2016), different measures constitute are linked to different EA benefits.

Activity Theory

The activity theory (AT) is a social theory that emphasizes human interactions within a social setting (Goncalves et al., 2017). The premise of AT is that undertakings of human efforts are referred to as activity, which is influenced by intentional interaction between subject and object (Carvalho, et al., 2015). Kuutti (1995) explains that AT is based on the structure of activities undertaken by a subject (humans) to resolve an issue (object), using tools (instruments) to achieve a desired outcome. The interaction between the subject and object is not direct, but mediated by the instruments (Goncalves et al., 2017).

The community that the subjects belong to influences their activities using rules set in that community (Er et al., 2010), and these rules are a set of conditions that expect conformance, defining how and why subjects may act (Goncalves et al., 2017). Subjects are governed by these rules, which can be explicit or implicit (Er et al., 2010). Explicit rules are standardized practices whilst implicit rules are norms or informal practices (Er et al., 2010). The AT is suitable for this research in that in the course of developing a metrics model, different activities are undertaken. The EA constitute different objects referred to as domains (Wang & Zhou, 2009). The EA is developed and implemented based on organizational rules and requirements (Iyamu, 2015c). Iyamu (2015b) explains the roles of individuals including process and technology, which AT refers to as objects, in the development, implementation and practice of the EA in organizations.

Different communities such as architects, business users, and managers participate in the EA activities. The theory is most suitable for analyzing individuals' activity, their intention for partaking in the activity, the rules that govern the activity, and the community that can affect the outcome of the activity (Hashim & Jones, 2007). The theory has in the last two decades increasingly gained popularity in the field of IS (Ahmad et al., 2013). AT has been applied in IS studies from various viewpoints, to examine activities and episodes. According to Hashim and Jones (2007), AT is used to underpin the complex challenges of human activities in IS studies.

Ahmad et al. (2013), discussed the use of AT to investigate the requirement for Android applications. Shaanika and Iyamu (2015) used AT to determine the factors that influence the development of enterprise architecture. Makovhololo et al. (2017), employed AT to study and understand the impacts of communication in healthcare systems data analytics. Holen, Hung and Gourneau (2017), adapted AT as a conceptual framework to examine the implementation of a one-to-one laptop initiative in a rural high school. AT was specifically chosen as a lens in this study to assist the researcher to uncover the activities undertaken during the implementation of EA in an organization. AT fits this study because of its capability to provide an understanding of how people do things, with the assistance of sophisticated tools in its dynamic environments (Crawford & Hasan, 2006).

In addition, AT will be used to analyze the activities between the individuals in the organization, involved in the deployment of EA and to further determine the reason or motivation behind their participation in

these activities. The main objective of AT is to assess and understand the rationale of each partaking in an activity (Barhoumi, 2015).

Methodology

This study adopted the qualitative research method because it allows the researcher to establish a perspective of the subject under study through participants' views, opinions, and experiences (Kornbluh, 2015). In addition, the qualitative research method will allow the researcher to interrogate existing content, to determine the factors that influence EA value and benefits as well as the manner that EA is implemented in organizations.

A case study, as the research design was selected, which is defined as an empirical investigation of a phenomenon within its real-life context (Godwin & Potvin, 2017). Benefits such as getting multiple sources to reveal the complexities in their entirety (Yazan, 2015), and the revelation of different subjects from a specific setting, organization or people (Gray, 2013), have been associated with case study research design. The government of Ghana was selected as the case study. EA documents from Ghana were collated from Google and scholastic databases. The documents from Google were predominantly the national and strategic documents of EA from each country, where most of them are not peer-reviewed publications. The scholastic databases were used to search peer-reviewed EA documents of these countries. The keyword strings used for the search were Ghana, Africa, government enterprise architecture and public sector enterprise architecture.

The keywords string for the search were enterprise architecture in government, public sector, and enterprise architecture implementation. The databases used include Google Scholar; AIS Electronic Library; ACM Digital Library; IEEE Xplore; and Science Direct – Elsevier. The above databases and search engines were selected and used in searching for literature for two main reasons: (1) they are primarily focused on studies in the field of Information Systems, Information Technology, and Enterprise Architecture; and (2) the university (CPUT) subscribe to these databases, which make them easily accessible.

A total of 38 documents were collected and used as data. The primary focus areas were development, implementation, and practice as shown in Table 1. The researcher had a challenge collecting more documents that are relevant to EA for Ghana. This is an indication that there is a gap in the academic literature in Africa for GEA in general and Ghana specifically.

Table1: Collected Data

Factor	Description	Doc
Development	Development refers to the design of the current architecture in the organization with all its related artefacts, processes and challenges used to build the to-be architecture of EA (Al-Kharusi, Miskon & Bahari, 2017). The documents that were collected are related to or focused on the development of EA in the context of the country. This includes policy, technical design, requirements, and procedural documents.	6
Implementation	The implementation of the EA is an iterative process through which plans involving designs, systems, processes, and technology platforms are actioned (Dale & Scheepers, 2020). The documents collected indicate the plans for the EA implementation. The implementation of EA is deployed through organizational structures, of both business and IT units.	25
Practice	The EA is practised through its domains (business, information, application, and technical). The practice is often based on best practices from both technical and business units (Bui, 2017). The practices often lack measurement, which makes it difficult to assess the value.	7
Total		38

As shown in the above table, the data is arranged primarily to ease analysis by structuring documents according to their relevance. Document analysis was used for the analysis and interpretation of textual data, which was followed by highlighting categories, patterns, and themes (Assarroudi et al., 2018).

Analysis of the data

Data analysis is a very significant process that involves the identification of emerging issues through documented data and trying to interpret and derive sense from that data (Grbich, 2012). New insights can be gained through data analysis (Gray, 2013) and the outcome of data analysis determines the fulfilment of the research objectives Flick (2013). As mentioned before, this study used interpretivism for data analysis which is the construct of reality through the subjective understanding of the researcher (Kroeze, 2012). Data analysis was done interpretively using the documents, which is referred to as document analysis.

Activity theory: Tools

The deployment (development, implementation and practice) of EA is achieved using different tools and approaches such as framework. Also, the tools and approaches entail several steps or stages, such as vision, gathering of requirements, and identification and training of personnel. Through the different stages, planning is regarded as one of the most critical stages that can ensure the success or failure of activities in the development, implementation and practice of EA. Within an activity, Tools are considered the mediating artefacts that provide a link between the actors (subject) and the end goal (object). From AT perspective, tools can be anything, such as documents, signs, or physical elements. Thus, in the deployment of the Ghana Government Enterprise Architecture (GGEA), tools were essentially critical.

The government of Ghana initiated the EA process that was based on documents. The documents were based on a readiness assessment conducted in its environment. The readiness assessment focused on *"gaining an understanding of the business of Government, enabling technologies and their maturity levels"* (GH-DEV05,5: 187-188). The purpose of these documents was to "*provide a consolidated understanding of the business processes and systems that were currently in use at the various ministries, departments, and agencies" (MDA)* (GH-DEV05,6: 344-346). Documents contain the outcome from the planning stages, which were used as tools to guide how EA can be developed, implemented, and practised. In addition, the documents were referred to as Architecture Reference Models, which are "*designed to facilitate cross-MDA implementation of technology services through the use of common vocabulary, standards, reusable application components and a shared infrastructure*" (GH-DEV05,18: 570-572).

However, the documents were developed based on the subjective reasoning of a group of individuals knowledge. This means that there was no framework employed to guide the development of the government's EA. Currently, there exist many EA frameworks, which include the Gartner, Forrester, and Zachman frameworks (Iyamu, 2018; Bui, 2017; Lapalme et al., 2016). The existence of numerous EA frameworks makes selection crucial, to ensure suitability within context and relevance. Thus, it is important to have a tool (criteria) defined by requirements for selecting the most suitable framework for organizational purposes. Documents as a tool can be referenced or used to influence or alter EA deployment activities, from both technology and business perspectives.

Tools can be classified to be tangible or intangible, with each being equally important for the development and implementation of EA. Tangible tools such as technologies, which include *"infrastructure and application systems"*, were identified as one of the focuses of the GGEA, for the transformation of vision purposes (GH-DEV05,6: 223-224). The transformation initiative is based on the premise of using tools such as the internet and other technologies for the modernization of services (GH-DEV05,8: 300-302). The

intangible tools include processes that were required for the attainment of the future state of Ghana's administration. This is critical because "*MDAs are constantly obliged to improve their business processes*" (GH-DEV05,9: 335), to advance effectiveness and efficiency in improving service delivery.

Activity theory: Subject

A subject is defined as a human being, or humans grouped for a specific task in an environment such as an organization. Also, a subject is referred to as an actor. In an environment, a subject initiates an activity with a purpose. Usually, a subject is not stagnant, but is always active and evolves to invent or produce outcomes within context (McMichael, 1999). A group of individuals within the Government of Ghana initiated EA to enable transformation by the government using technology. The aim for deploying "*an Enterprise Architecture framework is to enable better technological decision-making, more effective prioritisation and superior program management*" (GH-DEV05,5: 159-161).

The government consists of several ministries, each with a specific mandate and deliverables. The development of the GGEA is shared by the Ghana ICT Directorate (GICTeD) and the Ministry of Communication (MoC). The MoC was mandated to develop the EA programs. The GICTeD was responsible for in-scoping GGEA for the *ministries, departments, and agencies (MDA),* based on which requirements were gathered and development was undertaken. Thus, requirements were gathered from the various ministries, departments, and units of the government. The implementation plan of the GGEA was designed "*to define the concrete steps to be taken by the Government of Ghana (GoG) through GICTeD to implement the recommendations provided in the GGEA report* "(GH-IMP01,4: 5-6).

This means that the activities of GGEA were centralized. Thus, actors within the MoC were tasked with the responsibility and accountability in the GCEA programme development. The *"MoC was supported by the other ministries, departments, and agencies (MDAs) of the government*" (GH-DEV05,5: 191). Subsequently, MDA personnel were assigned tasks in the GCEA deployment. These tasks were defined in the implementation report with "*concrete steps to be taken by the Government of Ghana (GoG) through GICTeD to implement the recommendations provided in GGEA report*" (GH-IMP01,4: 5-6). However, the lack of an EA framework to guide the implementation is making this plan ineffective. This means that the formal approach or framework that guided the process is not effective. This has negative implications in measuring deliverables because certain tasks might have been allocated to people that were not the most appropriate.

EA is a very specialized discipline and, therefore, requires highly skilled personnel. In Ghana, the objective includes "*building a comprehensive business-driven blueprint for the entire Government*" (GH-DEV05,6: 193-194). EA is a blueprint that defines the current state of the desired state that covers *infrastructures, utilities, systems, and processes to enable and support the administration and service delivery of the government* (GH-DEV05,6: 215-217). Despite EA's wide coverage that includes information and business design and management, the GGEA focuses on operational ICT solutions. Primarily, this could be attributed to two factors, lack of know-how and not applying an existing EA framework to guide its deployment. Hazen et al. (2014) argue that training and know-how enhance the use of EA and mediate actors' relationship with the performance of EA in an environment.

The roles of the GICTeD and MoC including the MDA were distinctive in the implementation of the GGEA. Thus, employees (actors) were heavily relied upon to execute tasks and avoid duplication or overlap. This makes skillsets important in allocating tasks based on the in-scope. Thus, it is crucial to employ the organisational structure that streamlines the activities of individuals and groups from GICTeD, MoC and MDA perspectives.

Activity theory: Rules

Rules enact governance which are used to regulate activities (Baguma, 2019). Thus, the enforcement of rules influences the success or failure of an activity. There was no governance *to support and oversee the formulation, valuation, and implementation of ICT projects* (GH-DEV05,5: 183-184). Primarily, this was a motivating factor for the development of GGEA. Consistency and standardisation can be achieved through rules, which enable and guide the management of ICT projects. Formal rules are referred to as explicit and those that are informal as implicit rules. Explicit rules are obligatory. The implicit rules are continually applied, and they become norms, accepted, and propagated in the organization. Subsequently, both implicit and explicit sets of rules manifest and become organisational culture. As part of the efforts to ensure the success of EA implementation, a "*cultural change in which decisions for ICT investments will be driven by business imperatives, and the GGEA that defines the architecture principles, reference models and standards*" is expected (GH-DEV05,5: 172-174). The government of Ghana (GoG) recognizes the impact which organizational culture can have on the GGEA. Hence, it was important to manage the culture and its perceived outcome.

EA is about governance, and it entails guidelines that need to be followed to create synergies between business goals and ICT solutions. A *Governance Model was necessary because it guides the decisions in each activity of the architecture, which includes ICT priorities and project formulation* (GH-DEV05,8: 293-295). Also, a governance model is required to ensure consistency in the management and formulation of policies to guide the use of ICT solutions, in advancing *service delivery to citizens* (GH-DEV05,12: 429-431). Therefore, the policies are an integral part of the EA, which ensures that rules are adhered to. Thus, the MDA is the custodian of Governance through which compliance with GGEA is measured (GH-DEV05,9: 329-334).

Activity theory: Community

In this context, the community comprises different individuals who share the same objective and a common goal (Hu, Nisbet, & Chang, 2022). A community can further be described as a group of individuals who have aligned interests to deliver a specific service or task. In the development and implementation of the GGEA, different communities were involved. The communities were both internal (to the government) and external. Some of the internal communities included MDA, MoC, GICTeD and ICT specialists. Some of the external communities included ICT vendors who provided services and supplied ICT solutions to the government. Although the focuses of the communities were different, there was a common goal, which was to contribute to the development and implementation of the GGEA.

In this context, the government is viewed as a community which consists of individuals, to deliver EA (GGEA). Also, within the boundaries of the ministries of the government, problems can be defined, various tools can be used, several rules can be set, and solutions can be achieved. The government of Ghana (GoG) have sub-communities that consist of "*over 150 MDAs*" (GH-DEV05,8: 308). The sub-communities are established to "*implement specific services defined in its mandate to citizens and businesses*" (GH-DEV05,10: 376-377). Each sub-community has its own rules and mediating tools that are backed by its mandate to deliver specific services to other communities.

Also, citizens form a community to receive common *services delivered* by the MDAs (GH-DEV05,11: 407-408). There are 'pockets' of services that are enabled by ICT solutions and delivered to the citizens (GH-DEV05,19: 629-631). In delivering the services using ICT solutions, the GoG have a community of technical (ICT) experts that execute the tasks, a "*technology-driven transformation*" of the way MDAs operate (GH-DEV05,5: 157-158).

Business units of the government are a community that provides "*the business function of the GoG*" (GH-DEV05,20: 677-678), which is further defined as the purpose of government operations and services. It is upon this premise, of the business function, that ICT is used as the mechanism for the GoG to achieve operational efficiency. This is expedited by the ICT team, which is another community consisting of ICT experts responsible for the planning, installation, and support of ICT systems in the government. Moreover, the government relies on different stakeholders to support its objectives, such as the "*13 ISPs currently providing Internet and WAN services to the MDAs* "(GH-DEV05,17: 551). The Internet service provider (ISP) forms part of a community of third-party suppliers of ICT services. Such suppliers provide specialised services that the government cannot provide themselves. The different communities are interdependent, each having activities defined by its mandate for a common goal.

Activity theory: Division of Labour

An activity consists of several tasks, which are executed by the expertise and inputs of different individuals or groups. The allocation of the tasks is referred to as the division of labour in AT. Hu, Nisbet and Chang (2022) define division of labour as the way tasks are horizontally arranged whilst the vertical division represents the power and status that are associated with the allocation. Division of labour is based on skills, and/or negotiations or preference. The GoG divides EA development and implementation activities among its structures for better management and control. The Ghana ICT Directorate (GICTeD) is responsible for the "*in-scoping of the EA, which defines the various tasks for the MDAs*" (GH-DEV05,8: 188-189). The development of the GGEA is also shared by the Ministry of Communication, which together with the support of the MDAs is responsible for the development of the EA programme, which builds a comprehensive business-driven blueprint for the entire Government (GH-DEV05,5,6: 191-194). However, each MDA is tasked with the development of its implementation strategy. This is because each MDA has its own unique culture, challenges and ICT systems, making it imperative that each MDA has the mandate to develop and execute its strategy. In addition, each MDA has established a Working Group to ensure the adoption of the GGEA (GH-DEV05,20: 599-600).

Activity theory: Object

An object is the point of interest that motivates an activity to happen. According to Hu, Nisbet and Chang (2022), the object is defined as the problem space at which an activity is directed. The object can be tangible or intangible, and the purpose of the activity is to transform it towards an outcome that will achieve the goal of the activity. In the context of GoG, the outcome is the GGEA, which this study examines. The GGEA is intangible; however, the associated documentations are tangible. The GGEA was initiated, purposely for the standard deployment of ICT solutions, to advance service delivery in the country. Global technological advancement and trends have exposed citizens to the point of expecting better services. Consequently, "*more citizens are realizing the benefits of ease of access to information and services by Government*" (GH-DEV05,8: 302-303). However, this has been a challenge for the GoG to deliver improved services due to factors such as "*the lack of interoperability and the absence of robust information-sharing between government's Departments and Agencies, which have led to very disparate systems*" (GH-DEV05,12: 436-438). Hence, the MDAs are constantly compelled to improve their business processes to fulfil obligations to citizens' service delivery expectations (GH-DEV05,9: 335-336). This increases the need to ensure a successful implementation of the GGEA.

In resolving the problem that could hinder the object (GGEA), the government requires a technology-driven transformation to advance how the MDAs operate (GH-DEV05,5: 157-158). However, there is confusion, in that transformation is understood differently by various actors and groups. Some uphold that transformation should not be technology-driven but business driven. This view is based on the credence

that technology is an enabler that is established on the premise of citizens' needs and demands. The confusion creates a gap that has the potential to derail an outcome. The confusion or gap exists because of the lack of an EA framework. According to Iyamu (2018), fundamentally, EA frameworks are a holistic approach for coordinating deliverables and mapping IT solutions with the goals and objectives of an organization. EA was most appropriate to address some of the hindering challenges and create a successful outcome. The deployment of EA facilitates the enhancement of collaboration between MDAs, the government, and citizens (GH-DEV05,5: 161-162). In addition, the deployment of EA reflects the change in applying know-how (skillsets), the design of business processes, the effectiveness of organizational structure, and the enactment of governance in advancing service delivery (GH-DEV05,8: 303-305). Thus, the GGEA is considered a transformation initiative in the Ghanaian environment, and its implementation is aimed at enabling the modernization of the MDAs, which focuses on improving services to the citizens (GH-DEV05,8: 300)

Findings and discussion

Empirically, the factors have been revealed from the analysis of the government of Ghana using AT. The factors are baseline components for measuring the usefulness, contribution, and value of EA to an organization. From different angles, the factors are found to critically influence the deployment and practice of EA. The following influencing factors were revealed (1) Readiness assessment; (2) Selection criteria; (3) Organizational Requirements; (4) Governance, and (5) Return on investments.

Information Technology Governance

Governance refers to the institutionalization of decision-making, by establishing policies, standards, and guidelines in an organization. Johns (2021) defines governance as the establishment of processes and regulations within an organization. This is implored in the manner and structure in which decisions are made, directives are established, and activities are executed, to fortify the deployment and practice of EA within a government environment. Thus, IT governance is applied in organizations to maintain consistency and uniformity of IT solutions and operations (Borja et al., 2018). The relevance and usefulness of IT governance have long been identified in both practice and academia. The longevity of IT governance relevance and usefulness depends on the trajectory, which is important to have a cohesive direction when deploying EA. According to Sambamurthy and Zmud (1999), IT governance is the structure of authority for strategic IT activities. Fundamentally, this makes the origin of IT governance critical in the deployment of EA. From implementation and practice perspectives, Miyamoto (2021) emphasized that IT governance is the strong rule that enforces control over the deployment of infrastructure, use of IT solutions, and key activities of IT and business domains of an organization.

Thus, IT governance is critical if the deployment and practice of EA are to be successful in an organization. Additionally, some of the factors why IT governance is associated with many benefits, include the meticulous structure of decision-making and operations, which enhances the alignment between IT and the business (Wiedenhöft et al. 2020). As revealed in the analysis, structure and alignment are essential to the deployment and practice of EA within government environments.

Organizational requirements

Organizations consist of different business and IT units, each having a specific mandate that contributes to the mission and vision of the organization, which are transformative in nature. Thus, for the deployment and practice of EA to support and enable an organization (government environment), it must be based on requirements that can transform the current into the future. Zondani and Iyamu (2021) asserted that effective

business solutions and initiatives are established on the premise of organizational requirements. However, these organizational requirements are not always constant, as they are influenced by internal and external factors, which make them critical factors in the deployment or practice of EA. Also, the requirements consist of the needs and objectives of the IT (technical) and business (non-technical) units. The technical covers technology solutions, including database, software and hardware. While the non-technical consists of business logic, information management, and process (Iyamu, 2022).

The technical and non-technical requirements define the type of change that drives the dimension of social change. It is based on the organizational needs and requirements that EA is implemented across an organization (or environment). The demand for better services and the introduction of technology to drive innovation and provide effective and efficient services are influenced by the type of change which shapes and reshapes events.

Return on investment

Organizations invest resources in IT solutions purposely to gain positive returns. Lal *et al.* (2020) define return on investment (ROI) as the link between the investment made and the profit derived from that investment, which is used as a reference point. The deployment of the practice of EA requires investment from both technical (e.g., software and hardware) and non-technical (such as process and skill set) perspectives. The ROI can be tangible or intangible. There is a challenge in assessing, qualifying and quantifying the tangibility of investment against returns in the deployment and practice of EA.

Readiness assessment

The deployment of any system or process encompasses both technical and non-technical contributions, which creates a solid foundation and holistic view of the solution. It is thus imperative that an assessment is conducted on the readiness of critical solutions in an environment. Readiness is an organization's preparedness to adapt to change (Hussein et al., 2019), and the readiness assessment is the systematic examination to determine an organization's ability to cope with and sustain the planned change, with the main objective to identify the strengths, weaknesses, opportunities, and potential challenges (Pirola, Cimini & Pinto, 2019). Therefore, it is fundamental to conduct an assessment of the readiness of EA in any government environment, as revealed in the cases used in this study.

Selection of EA Framework

There are many EA frameworks, such as the Gartner Inc., Federal Enterprise Architecture (FEA), The Open Group Architecture Framework (TOGAF), and Zachman Framework (Iyamu, 2022). The frameworks are used to develop and implement EA in an organization. A framework represents a blueprint of the various objects and their interconnection. According to Cameron (2015), the framework is used to define components such as modality, concept, and principles in deploying EA in an organization. Some of the frameworks are designed for specific purposes, and others are generic and must be customized to fit an organization.

Thus, each framework has strengths and weaknesses that need to be understood before its selection. However, selecting a framework is not easy due to the uniqueness of each organization. As a result, there is a need for selection criteria to guide and inform the selection of a framework for the deployment and practice of EA.

Conclusion

Some governments in developing countries are faced with the challenge of quantifying the value associated with the deployment of EA. Through the sections, the objective of the study was to identify the factors that influences the successful implementation of EA in government institutions. Data about the EA of the government of Ghana was collected through documentation, which was subjectively analyzed with the heuristic aspect, and underpinned using the Activity Theory as the lens. The findings from the data analysis are the factors that influence EA implementation within the government of Ghana.

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