

Solving Challenges in an Electronic Banking Services Company by Implementing Enterprise Architecture Frameworks

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Abstract. Enterprise architecture has always been important for the business. It helps to close the communication gaps between stakeholders and provides a better understanding of the different roles and responsibilities of the stakeholders. Businesses can gain a competitive advantage from implementing enterprise architecture. Various types of businesses have implemented enterprise architecture. The electronic banking business is one of them. The article aims to discuss the challenges that an electronic banking services company faces and how these challenges can be solved by implementing the enterprise architecture framework. Several challenges have been addressed such as no clear boundaries between departments, duplicated projects, delays in the process flow, and no standard method for documentation. These challenges should be solved by implementing enterprise architecture frameworks, namely the Zachman framework and TOGAF.

Keywords: Enterprise architecture framework, electronic banking services, library management, information management.

1 Introduction

Due to the rapid development of technology, enterprises need to use information technology systems to adapt to market changes and respond to customers' requirements. Banks are one of the major sectors affected by automation; customers need to transfer money quickly, customers need applications to buy products and services, customers receive transaction notifications, etc. The central bank decides to establish an IT company with other shareholders to provide electronic services to the banks. Several banks are linked to this IT Company to benefit from its services. At the same time, the

IT Company linked to telecommunication companies to send notifications to the bank's customers. The IT Company is also responsible for installing, distributing, monitoring, and maintaining ATMs and POS. Various functions and processes need to be handled by this IT Company. Therefore, the company needs a holistic view of the processes and a clear definition of the roles and responsibilities of all stakeholders to manage processes inside and outside effectively.

This research studied an electronic banking services company that never utilizes Enterprise Architecture (EA) concepts and frameworks before. Some main challenges the company faced were addressed. Then, the research attempted to propose that the specified EA frameworks can overcome these challenges. The results of this research will benefit other electronic banking services companies or other IT services companies when selecting EA frameworks for their own implementation. The organization of this paper is that the first section discusses the literature review of the most common EA frameworks. The second section presents the research methodology. The third section addresses the company's structure, processes between departments, and the challenges with the company's current structure and processes. The fourth section discusses how the proposed EA frameworks solve the identified challenges. The last section is the conclusion and recommendation

2 Literature Review

Enterprise Architecture (EA) is defined as a "blueprint that documents all the information systems within the enterprise, their relationships, and how they interact to fulfill the enterprise's mission." (Langenberg & Wegmann, 2004). EA is a tool that provides a basic organizational structure for the company as a whole and describes the relationship between the aspects in it (Masnunah & Hadisaputro, 2022). Based on the company's needs, it should select and implement a suitable enterprise architecture framework. An EA framework is a model that provides a logical structure for enterprises (Langenberg & Wegmann, 2004). The created deliverables of EA (models, guidelines, documents, and other deliverables) will be related. The purpose of an EA framework is to simplify the structure overall of an enterprise and the complexity of the related components within the enterprise. There are several EA frameworks, but the common ones are Zachman, TOGAF, FEAF, and DODAF. However, the most common one is TOGAF. Some companies used one framework, and others used a combination of more than one framework.

The most common EA frameworks are described in this section. First, the Zachman framework is an ontology that describes the architecture through two dimensions, rows, and columns (Nogueira et al., 2013). The framework uses a comprehensive and flexible frame and provides a means of classifying an organization's architecture. It is a proactive business tool that provides a formal and structured complete picture of an organization and also can model an organization's existing functions, elements, and processes while helping manage business change (Andry et al., 2021; Nogueira et al., 2013). The Zachman framework is shown in Figure 1.

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	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>
SCOPE (CONTEXTUAL) <i>Planner</i>	Class of Business Entity	Class of Business Process	Major Business Location	Major Organisation Unit	Major Business Event	Major Business Goal/Strategy
BUSINESS MODEL (CONCEPTUAL) <i>Owner</i>	Business Entity	Business Process	Business Location	Organisation Unit	Business Event	Business Objectives
SYSTEM MODEL (LOGICAL) <i>Designer</i>	Data Entity	Application Function	Node Function System	Role	System Event	Criterion
TECHNOLOGY MODEL (PHYSICAL) <i>Builder</i>	Segment or Row	Computer Function	System Software	User	Execute	Condition
DETAIL REPRESENTATIONS (OUT-OF-CONTEXT) <i>Subcontractor</i>	Field	Language Statement	Address	Identity Organisation	Interrupt	Sub-condition
FUNCTIONING ENTERPRISE	Data	Function	Network	Organisation	Schedule	Tactic/Policy

Figure 1: Zachman framework

Next, TOGAF is the most common framework. TOGAF stands for The Open Group Architecture Framework which is an architectural framework that provides tools and methods for helping in implementing, using, and maintaining enterprise architecture (Camatti et al., 2020). It aligns business strategy and goals with IT systems (Visual Paradigm, 2022). The IT developers need to understand and reflect on the organization's business goals. The company needs to ensure that the IT developers correctly understand the business goals. TOGAF supports four main areas, which are business structure (define business strategy and business processes), data structure (describes data assets and data resources), application architecture (describes application relationship), and technology architecture (describes the hardware, software, and network infrastructure) (The Open Group, 2022). TOGAF uses ADM (Architecture Development Method), an iterative methodology for EA development (Nikpay et al., 2017). TOGAF ADM has the most complete process, easy and clear to use (Anggraini et al., 2019). TOGAF ADM helps to increase the service quality of IT functions to internal users (Girsang & Abimanyu, 2021). For example, it is used to increase the level of automation in a company's business processes, optimize the current ERP Platform of a company, and integrate with other applications within the company. TOGAF ADM (The Open Group, 2022) is shown in Figure 2.

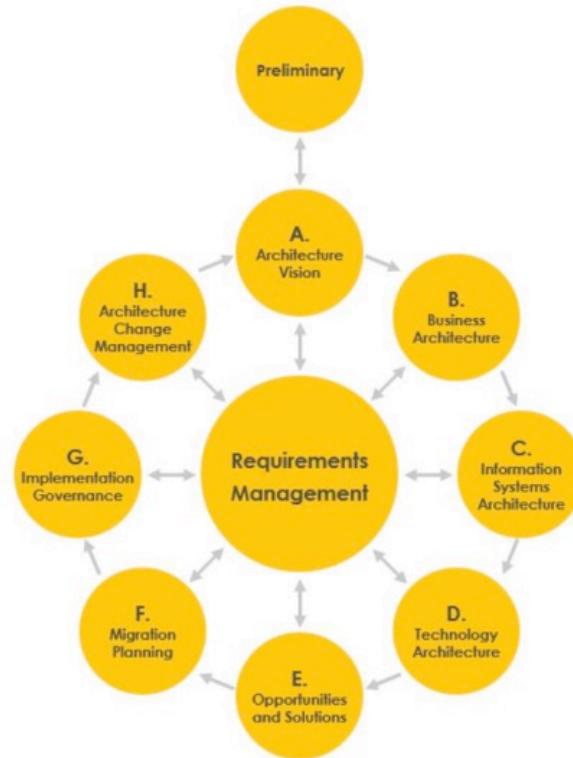


Figure 2: TOGAF ADM

According to the above figure, the company will clarify its current architecture by using the framework and EA concept in the Preliminary phase (Nikpay et al., 2017). ADM cycle includes several phases which are

- The architecture vision phase describes the business and IT's current structure and required structure. In this phase, the IT Company will be aware of its current situation and how it can align between business and IT.
- The business architecture phase represents the current business architecture and analyses the gaps between it and the desired one.
- Information system architecture develops an IS architecture that analyses the gaps between as-is and to-be.
- Technology architecture builds up the implementation (specify the as-is structure, define the to-be system model, conduct gap analysis, verify business targets, determine the enterprise architecture).
- Opportunities and Solutions describe the implementing options.
- Migration Planning prioritizes implementing projects by analyzing cost, benefits, and risks.
- Implementation Governance ensures that the implementation projects adjust to the architecture.

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- Architecture Change Management considers future changes.
- Requirements Management identifies the requirements of each stage.

During the application of ADM, many outputs are produced based on some inputs and steps. For example, the outcomes of business architecture are process flows, architectural requirements, and project plans (Visual Paradigm, 2022).

3 Research Methodology

Research questions were addressed as follows;

- Research question 1: What are the main challenges occurred from the company's current structures and processes?
- Research question 2: How can Enterprise Architecture (EA) framework help solving the identified challenges?

This research used case study method (Rashid et al., 2019) to collect the data from the IT experts in an electronic banking services company in a country located in North Africa. Semistructured interviews, meeting observations, and documents collection were used to identify the problems and challenges occurred within the company. A group of IT experts with strong background knowledge and experiences from IT projects were interviewed and observed. The collected data were analyzed and discussed by three researchers; two researchers had working experiences in IT field while another researcher earned a degree in Information Systems. This methodology followed the content analysis with investigator triangulation (Archibald, 2016) to reduce the bias from researchers.

4 Company's Structure, Processes, and Challenges

This section describes the company's structure and processes and the challenges occurred from these structures and processes.

4.1 The Company's Structure

The Company is an IT company that provides e-payment methods to the banks. It links the banks to its central switch. It has several departments; each one dedicated to one area. The departments consist of System and operation, Technical support, Infrastructure, Development and Quality Assurance (QA), Security, HR, Finance, Services and administration, and Marketing and business development (BD). Some departments have more than one unit. For example, System and operation department includes three units which are Cards, Configuration, and Operation. Technical support department includes two units which are Customer Relation Management (CRM) and Customer Care (CC). Infrastructure department includes three units which are Database (DB), Operating System (OS), and Network (NW). Development and Quality Assurance department includes two units which are Software Development (SWD) and Quality Assurance

(QA). Finance department includes two units which are Account receivable and Account payable. Marketing and Business Development (BD) department includes three units which are Project Management (PM), Branding, and Sales and Marketing. The company has several shareholders participating in decision-making and many stakeholders to achieve the business goals and strategies. The diagram below shows the company's structure.

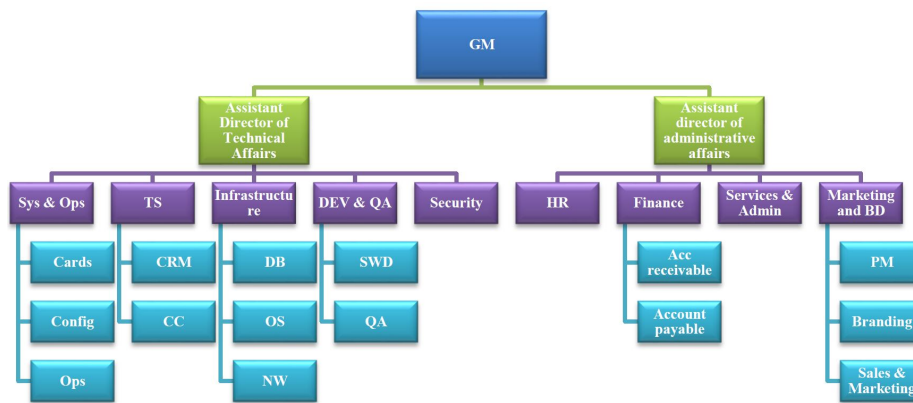


Figure 1: The Company's Structure

4.2 The Company's Processes

First, the top management or business development department (BDD) suggests new projects. BDD provides a project request document for a new project or changes of the existing one to a project management unit (PM). PM designs the project plan, scheduling, milestones, ranking of project importance, etc. After the approval, the BDD provides the business requirement document (BRD) to Development and Quality Assurance department (QA). The software development unit (SWD) begins writing their technical documents and developing the new project or enhancing the existing one. The infrastructure prepares the network, the security unit checks the connections, and the QA team executes the system testing. The technical support unit (TS) is responsible for receiving customer care complaints and reporting them to the operation unit (Ops). The settlement unit is responsible for customers' dispute issues.

4.3 Challenges with Current Structure and Processes

The challenges with current structure and processes of the company are addressed below. First, the roles and responsibilities of departments overlap. There are no clear boundaries between departments. This causes a conflict between the business department and technical department. For example, the business gives the priority to some new projects while other projects are still in the development phase. However, SWD refuses to start a new project before completing the current ones. Sometimes SWD sees

some limitations with their systems or platform. If they have to start developing a new project, it involves extra cost, extra time, and probably new employees hire. Another example, the SWD does not provide the exact requirements such as the interface or service steps. It has a different view while providing the requirements required by the business. Because of this conflict, the service's launch will delay, which means the company does not commit to the schedule and does not meet the customers' needs. There are still some questions that need to be answered as below

- Who is in charge of deciding which projects must stop and which projects must continue?
- Is the BDD has a detailed feasibility study or a comprehensive vision of all the projects?
- Can BDD determine which projects are more profitable?
- What are the risks connected to these decisions?

Second, the company has multiple projects providing the same services but with different project names. This means that the company utilizes more resources than it should be. The resources include employees, costs, time, hardware, and software. There are a few questions the company needs to answer which are

- Are the decision-makers able to realize this situation?
- Who has the right to stop one of those projects?

Third, the problems with the process flow which are process flow delay and skipping. Some processes are stopped at a department due to ambiguous requirements, not enough developers, or lack of good communication between business and IT. Also, some departments do not follow the process flow and skip some process flows. For example, the business department asks to apply new requirements to the current project while these requirements need more time, affect another requirement, change the system flow, and etc. The business department must provide a change request document first, approve it by the general manager, and then send it to the software development department. However, the business department sometimes did not submit the change request document but request the software developers to apply the changes first.

Forth, there is no standard or unified methodology for documentation. Each department has an electronic repository, which keeps its documents inside it. This repository does not become available for all departments. The SWD manages the repository accessibility. Related departments share their documents, such as business development and QA. Moreover, the company has multiple shareholders with different points of view. Therefore, it would be difficult to convince all of them about implementing any new technology. Overall, these challenges lead to wrong decision making, more complaints from the banks and customers, and project delays.

5 Discussions

According to the challenges addressed in previous section, the research proposed to solve those issues by implementing two EA frameworks namely Zachman framework

and TOGAF. The challenges, the proposed EA frameworks, and how frameworks help solving the challenges were summarized in Table 1.

Table 1: Challenges and Proposed Frameworks

Challenges	Proposed Frameworks	How Frameworks help
Roles and responsibilities of departments overlap	Zachman framework	Help identifying clear roles and responsibilities
Multiple projects providing the same services but with different project names	Zachman framework	Clear roles and responsibilities help preventing the company to initiate multiple duplicated projects
Process flow delay and skipping.	TOGAF	Help shaping up the company's processes and the alignment between business goals and IT.
No standard or unified methodology for documentation	TOGAF	Help setting up the process for standardization of documentation.

From Table 1, Zachman framework can help the company to identify roles and responsibilities which will be more transparent. Therefore, implementing Zachman framework will help the company to overcome the first challenge where the roles and responsibilities of departments overlap. Once the roles and responsibilities are clear, it will help solve the second challenge as well. These clear roles and responsibilities identification can prevent the company to initiate multiple projects providing the same services but with different project names.

TOGAF can help the company to solve the third challenge, the process issues, because the framework provides tools and methods for helping in implementing, using, and maintaining enterprise architecture. The framework will help shape up the company's processes and the alignment between business goals and IT. The processes should also be set up to include the standardization of documentation. The company needs to have the standard tools and methods for collecting the documentation. Therefore, implementing TOGAF will also help to solve the fourth challenge related to no standard or unified methodology for documentation. Moreover, the implementation of EA needs two steps. The first one is the Enterprise architecture Framework (EAF). Which is the base structure for the Company; its output is EA artifacts (graphs, diagrams, documents, and models). The second one is the Enterprise Architecture Implementation Methodology (EAIM). An EAIM aims to implement the artifacts inside the Company (Nikpay et al., 2017).

6 Conclusions

The research result addresses current challenges from the selected electronic banking services company. These challenges are overlapping of roles and responsibilities of

departments, multiple duplicated projects, process flow delay and skipping, and no standard or unified methodology for documentation. This research also proposes two EA frameworks namely the Zachman framework and TOGAF to be implemented in the company to solve the identified challenges. The Zachman framework can help identifying clear roles and responsibilities and thus preventing the company to initiate multiple duplicated projects. TOGAF can help shaping up the company's processes and the alignment between business goals and IT. Also, TOGAF can help setting up the process for standardization of documentation. The further study of the EA implementation of this company is highly recommended.

Moreover, before implementing the EA, the company needs to realize that the implementation will be costly in the initial phase. The company would gain the benefits after its completion. The business and IT will have the same picture in terms of business goals, requirements, and strategies. The process flows will be clear and followed by all departments. The documentation methodology is automatic, which means all the requirements and changes will be documented. The roles and responsibilities will be defined explicitly, so there are no more overlapping. Therefore, the shareholders can make quick and effective business decisions. The company will utilize the resources and achieve a significant return on investment.

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