

Enterprise Architecture Management (EAM) Practice Implementation Success Factors

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ABSTRACT

Enterprise Architecture Management (EAM) is a critical practice with the goal to achieve alignment between Information Technology (IT) and the core business of the organization; however, EAM needs to be carefully implemented with consideration of many factors that would impact the success of the practice. In this paper, a model for identifying the success factors of an EAM practice was developed, which consisted of seven factors. The data analysis has shown a strong relationship between the success of EAM practice in an organization and four of the seven model factors; these factors are: unit purpose definition, top management buy in, knowledge about the strategy, and principles and policies existence. Knowing these success factors can help EAM practitioners to focus their efforts on them and pay less attention to the unrelated factors.

KEYWORDS

Enterprise Architecture Management (EAM), Alignment, Information Technology (IT), Success Factors, Management, Strategy, Principles, Policies, Organization, Size, Structure

1 INTRODUCTION

In today's world of accelerated and integrated business, Information Technology (IT) is a crucial component for the success of any organization. Nevertheless, it is usually the case that an organization's management gets overwhelmed with the complexity of either business or IT on the account of the other. Such a situation creates misalignment, which results in operational inefficiency, wasted resources and unnecessary expenditures.

To balance the complexity of both business and IT, and therefore, achieve the required alignment, the practice of Enterprise Architecture Management (EAM) emerged in the IT industry. EAM strives to achieve alignment via comprehending four main components: the business itself (business layer); the data being produced or consumed by the business (data layer); the applications used to process and analyze the data (application layer); and the technologies used to host or develop these applications (technology layer). Understanding these four layers with their relationships among each other and utilizing this understanding in planning and decision making processes is the practice of EAM.

Implementing an EAM practice in the organization is mainly to manage the technological change and control its impact on the organization's business. To be able to control such changes, the EAM practice needs to be carefully conducted as many previous attempts demonstrated how challenging such an implementation might be.

In this paper, seven factors that have an impact on implementing a new practice in an organization will be analyzed to identify their impact on the success of the EAM practice within organizations. These factors are the unit purpose definition, top management buy in, knowledge about the organization strategy, principles and policies existence, organization size, organizational structure type and organizational structure levels.

2 ENTERPRISE ARCHITECTURE BACKGROUND

The enterprise architecture (EA) concept emerged into the commercial world in the 1980s [1]. The concept was introduced by John Zachman, which he then followed by a more specific framework adopted in several organizations [2]. EA is defined by Gartner, an IT leading technology institute as “a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analyzing the execution of change toward desired business vision and outcomes. EA delivers value by presenting business and IT leaders with signature-ready recommendations for adjusting policies and projects to achieve target business outcomes that capitalize on relevant business disruptions. EA is used to steer the decision making process toward the evolution of the future state architecture” [3]. EA is a technical mechanism, which defines the role of the business, information, technical and application architectures that best enable the needs of the organization [4]. EA refers to a discipline that attempts to integrate, govern and analyze enterprise elements. Alignment of elements creates synergy in achieving enterprise objectives [5]. To put it in simple words, EA is about understanding the current status of the organization “as-is” and the future status of the organization “to-be” and then to build transformational plans to take the organization from the as-is architecture to the to-be architecture with the least impact on the organization and achieving the optimal value.

The EA concept has been translated into functional frameworks, which describe a method for designing information systems in terms of a set of building blocks, grouped in architectural domains, and how these blocks work together [6]. EA is intended to provide methodology for modeling what business functions are performed; who (or what) performs them, where and when the functions

are performed, how the functions are performed, and most importantly, why the business needs to perform these functions [4]. Through an evolutionary, iterative process, the current and future state definitions of the architecture are continuously developed, evaluated, and updated to ensure EA alignment with changing business requirements and emerging technology [4].

Adopting an EA framework in an organization provides several benefits to both the business as a whole and to the IT in specific. Related to the business, the impact of staff turnover would be reduced as all knowledge captured from employees and consultants is well documented. Moreover, EA brings faster adaptability to the organization when changing systems or bringing new components. EA will also improve the operating procedure by modeling, understanding and re-engineering business processes. Related to IT, EA helps the IT organization manage complexity by understanding interdependencies in a useful manner. It also provides visibility and oversight of all technical resources, which helps in preventing redundancies and achieves alignment to the business [6]. EA is intended to reduce the cost of deployment, maintenance and management of technology and processes in the enablement of business goals and objectives [4].

Finally, some researchers have highlighted that the existing EA methodologies have some problems. First, there has not been a common and exact semantic understanding between humans and systems yet, and it causes communication problems. In addition, data collected in developing the EA are not based on a common definition of concepts and data communication; e.g., a planner has one definition for action and a developer has another definition; in some cases specific data is called by different names [5].

3 LITERATURE REVIEW

Fundamental design principles underline any well-functioning organization. The fundamentals are: What are our goals? What are the basic tasks? Who makes which decision? What is the structure of communication and what is the incentive structure? [7]. To design an EA practice in an organization, Rajabi et al. suggested an EA development process is based on enterprise ontology. This process consists of four steps: Determining Purposes of EA Development; Determining the Depth of the Architecture; Determining the Required Concepts; Collecting Data and Data Analysis [5].

Top executives frequently neglect the need for a new design because of organizational inertia. This neglect to get the design right is very costly for the firm [7]. Bricknall et al. (2006) identify critical factors for EAM initiatives: Among others, they refer to top management buy in, implementation of an EA governance process and EAM's alignment with other enterprise life cycle processes, such as the investment process. They advise to start small and use a step-by-step approach, with an agreed relevant scope and understandable deliverables between business and IT [8].

The decision on the best organizational design type is done via a process that starts with the organization's goals, and from there we work from the top to the bottom, considering strategy, structure, process, people, coordination, and control [1]. Also, in different research, five components were revealed to be most critical in the successful implementation of EA. These components are regarded as the key strategic components by the organizations. The components include Guiding Principles, Policy, Strategic Relationship and Ownership, Performance Measurement, and Conformance [4].

There are several organizational design types. Two famous organization design types are the organic design and the mechanistic design. Both of these designs agree on the key organizational design variables, however, they differ in the magnitude of each variable. The variables considered in these designs are: The level of formalization (the degree of written procedures, task specialization and performance control); the level of integration (the degree of using liaison processes and structures); and the level of centralization (the degree of decision making authority delegation). The mechanistic design has a high level of formalization and centralization and a low level of integration. On the other hand, the organic design has a low level of formalization and centralization and a high level of integration [9].

Moreover, researchers have identified several environmental factors that drive an organization to adopt a particular design: The personality and style of the founder, the design trends during the period in which the company was founded, the historic size of the company, the environment in which it does the business, the work that it performs, and the people it employs [10].

According to Tarabanis et al. (2001), the organizational structure consists of values, visions and power, which influence the development of strategic processes. According to Iyamu (2009), some factors that influence the institutionalization of the EA include organizational structure, economic investment, administrative processes and politics evident within the organization's structure, technical capabilities and business buy in [11]. Moreover, he also revealed some of the unforeseen factors impeding the success of the EA deployment in the organization: hierarchy, policies, communication, knowledge and resources [11].

4 RESEARCH MODEL

Based on the literature review, a model for identifying the success factors of an EAM practice was developed as exhibited in Figure 1. The model consists of seven factors that are suggested to have an effect on the success of the EAM practice in an organization. A brief definition of each considered factor is given in the next section.

4.1 EA Purpose Definition

The first factor suggested to be affecting the success of the EAM practice is the definition of a clear purpose of the organizational unit, which is the EA unit in our context. The purpose definition is done by first identifying the key stakeholders and decision makers. Then, their intention and purpose of developing the unit in the organization are recognized. From the explanation of this factor, we hypothesize the following:

H1: Defining the purpose of the EAM practice has a positive impact on the success of the EAM practice.

4.2 Top Management Buy In

Top management buy in refers to the long-term top management commitment, sponsorship or involvement. EAM is sometimes difficult to justify the top management that the investment that seems expensive at the moment will save money in the future. The top management buy in can be measured by identifying their level of commitment to the agreed upon approach and policies and their involvement in the EA development. From this factor, we hypothesize the following:

H2: Top management buy in has a positive impact on the success of the EAM practice.

4.3 Knowledge about the Strategy

In this factor, it is suggested that the success of the EAM practice is affected by whether the organization follows the strategic management

process or not. Following the strategic management process is indicated by having a clear vision and mission statements, long-term objectives and a clear three-to-five year's strategy. In this factor, we are not measuring their existence as much as their acknowledgment by the enterprise architects. Therefore, we hypothesize the following:

H3: Knowledge about the strategy of the organization has a positive impact on the success of the EAM practice.

4.4 Existence of Principles and Policies

This factor covers the existence of clear principles and policies and the extent to which their existence might impact the success of the EA practice. The principles refer to clear statements about architectural domains that are used as references when making an architectural decision. For example, one architectural principle can be that "all general purpose applications must be developed in-house and all scientific applications must be purchased from a vendor." For policies, they refer to actions related to architectural processes such as the software development life cycle, demand management process, etc. The policies define what should be done and what will happen if the agreed upon action was not done. From the definition of this factor, we hypothesize the following:

H4: The existence of clear principles and policies for the unit has a positive impact on the EAM practice.

4.5 Organization Size

The organization size has a noticeable impact on the performance of any organization and its related processes. In this factor, we are testing whether the size of the organization has an impact on the success of the EAM practice or not. Therefore, we hypothesize the following hypothesis:

H5: The organization size has an impact on the success of the EAM practice.

4.6 Organizational Structure Types

The organizational structure has a noticeable impact on the performance of any organization and its related processes. EAM is considered as a strategic process that has the potential of being impacted by the type of the organizational structure. In this factor, we are

testing whether the type of the organizational structure of the organization has an impact on the success of the EAM practice or not. Therefore, we hypothesize the following hypothesizes:

H6: The organizational structure type has an impact on the success of the EAM practice.

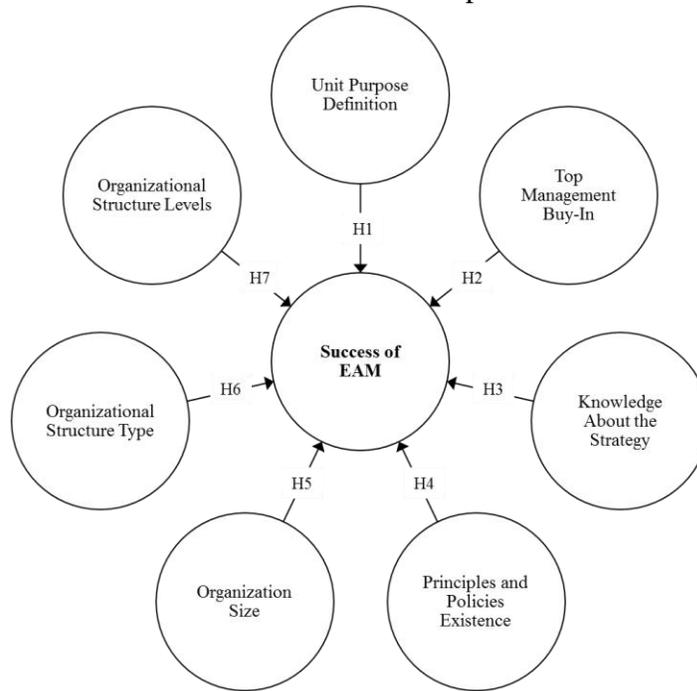


Figure 1. Research Model

4.7 Organizational Structure Levels

The number of levels between an employee and the head of the organization has a definite impact on the performance of the organization. In some cases, the increase in the structural levels may lead to a delay in decisions and less autonomy; however, in other cases, such increase in the levels is found to be needed, especially in large organizations to exert more control. In this factor, we will measure if the number of levels between the enterprise architects and the organization’s decision makers has an

impact on its success or not. Therefore, we hypothesize the following:

H7: The number of organizational structure levels has an impact on the success of the EAM practice.

5 RESEARCH METHODOLOGY

Data for this study was collected via surveys distributed online in 2015. A total of 200 questionnaires were delivered to respondents of which 132 were returned giving a response rate of 66%. The questionnaire was targeted to enterprise architects all over the

world where they were contacted via their twitter accounts and email addresses.

The survey consisted of several sections, which contain questions measuring several possible factors affecting the success of the EAM practice. For most of the questions, the Likert five point scale was used, ranging from “totally disagree” to “totally agree” and a neutral option in the middle of the scale.

The survey was developed and tested with my organization’s EA team. They verified the feasibility of the hypothesis and their

ability to explain the success of the EAM practice. Upon that, the survey was modified and finalized.

6 DATA ANALYSIS

The questionnaire was completed by 132 respondents from 30 different countries around the world. The majority of responses were from North American countries, the United States and Canada, as they constituted 44% of the overall responses. Figure 2 is a graph of the response distribution among continents.

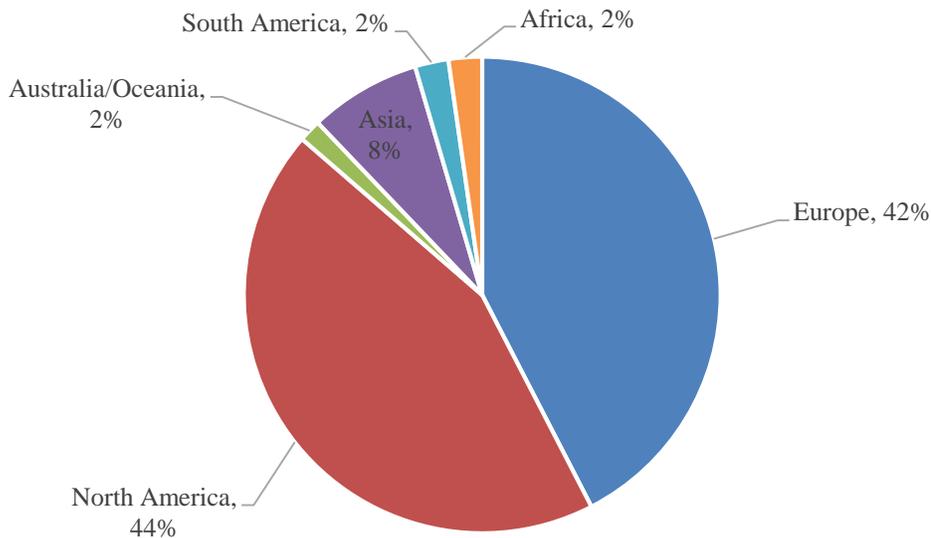


Figure 2. Response Distribution Worldwide

The survey was completed by enterprise architects from different age groups: 47% of the respondents were 22 to 34 years old; 25% were 35 to 44 years old; 14% were 45 to 54 years old; 11% were under 21 years old; and finally, 2% were 65 years old or above. The majority of the respondents were males with a contribution of 96% against 4% of females.

As we have some factors measured by more than one variable, we started by testing the

reliability of the variables explaining each factor. Peterson points that acceptable value of Cronbach’s alpha can vary between 0.5 and 0.95, depending on the type of research [12]. For basic research, Cronbach’s alpha should be higher than 0.7 to 0.8. Table 1 summarizes the reliability results for each factor.

As described in Table 1, all the variables representing each factor can be considered reliable as all of them score above 0.7

Cronbach’s alpha. For the factor’s Organization Size and Organization Structure Type and Levels, they are measured by a single variable for each; therefore, a reliability analysis was not needed.

Table 1. Factor Reliability Analysis

Factor	Cronbach’s alpha
Unit Purpose Definition	0.777
Top Management Buy In	0.874
Knowledge about the Strategy	0.895
Principles and Policies Existence	0.878
Organization Size	NA
Organizational Structure Type	NA
Organizational Structure Levels	NA

After confirming the reliability variables used to measure the factors, this model was used to measure the validity of the hypotheses made for each factor. The dependent variable, the success of EAM, was measured by one variable (Question 1), which measures to what extent the enterprise architect believes his organization is conducting a successful EAM practice. The null hypotheses will be rejected for a significance level less than 0.05.

According to the hypothesis type, number and level of measurement for the dependent and independent variables, different types of analysis were conducted. Table 1 also lists the factors and the data used to select the proper analysis

After deciding on the proper analysis to be conducted, the Statistical Package for the Social Sciences (SPSS) was used to conduct the analysis and to find the significance of the relationship between the dependent and independent variables. Table 2 summarizes

the p-value found for each of the tested hypotheses. Detailed SPSS outputs can be found in the appendix for each analysis conducted.

Table 2. Hypotheses P-Values

Hypothesis	P-Value
H1: Defining the purpose of the EAM practice has a positive impact on the success of the EAM practice.	0.000
H2: Top management buy in has a positive impact on the success of the EAM practice.	0.000
H3: Knowledge about the strategy of the organization has a positive impact on the success of the EAM practice.	0.000
H4: The existence of clear principles and policies for the unit has a positive impact on the EAM practice.	0.000
H5: The organization size has an impact on the success of EAM practice.	0.995
H6: The organizational structure type has an impact on the success of the EAM practice.	0.934
H7: The number of organizational structure levels has an impact on the success of the EAM practice.	0.579

7 RESULTS AND FINDINGS

The research was conducted to test seven factors and their relation to the success of EAM practice in any organization. Each of the hypotheses developed and listed earlier covers one of the factors. To better understand the results, each factor will be stated along with its related hypotheses and the interpretation of the analysis conducted on it.

For the first factor, Unit Purpose Definition, H1 was hypothesized that defining the

purpose of the EAM practice has a positive impact on the success of the EAM practice. The analysis yielded a p-value = 0.000 < 0.005, which indicates that the null hypothesis cannot be rejected and that there is a relationship between the success of EAM practice and the definition of the EA purpose, which constitutes knowing the targeted stakeholders and being aware of the reason of establishing the EAM practice in the organization.

For the second factor, Top Management Buy In, H2 was hypothesized that top management buy in has a positive impact on the success of the EAM practice. The analysis yielded a p-value = 0.000 < 0.005, which indicates that EA success depends strongly on the level of top management buy in, which includes their commitments toward EA, their support to the established policies and their frequent and close communication with EA.

For the third factor, Knowledge about the Strategy, H3 was hypothesized that adopting the strategic management process in an organization has a positive impact on the success of the EAM practice. The analysis yielded a p-value = 0.000 < 0.005, which purposes a relationship between the EA success and the adoption of a strategic management practice and being aware of its components such as the organization's vision, mission, objectives and strategies.

For the fourth factor, Principles and Policies Existence, H4 was hypothesized that the existence of clear architectural principles and policies has a positive impact on the EAM practice. The analysis yielded a p-value = 0.000 < 0.005, which indicates the existence of a strong relationship between the success of EAM in an organization and the existence of a clear set of architectural principles and governing policies.

For the fifth factor, Organization Size, H5 was hypothesized that the organization size has an impact on the success of the EAM practice. The analysis yielded a p-value = 0.995 > 0.005, which means that we cannot conclude an existence of a relationship between the success of the EAM practice and the size of the organization.

For the sixth factor, Organizational Structure Type, H6 was hypothesized that the organizational structure type has an impact on the success of the EAM practice. The analysis yielded a p-value = 0.934 > 0.005, which indicates that a conclusion cannot be made whether the structure type of an organization can impact the success of the EAM practice.

For the seventh factor, Organizational Structure levels, H7 was hypothesized that the number of the organizational structure levels has an impact on the success of the EAM practice. The analysis yielded a p-value = 0.579 > 0.005, which indicates that a conclusion cannot be made whether the number of structure levels of an organization can impact the success of the EAM practice.

In conclusion, four factors were found to have an impact on the success of the EAM, unit purpose definition, and top management buy in, knowledge about the strategy and principles and policies existence. For the remaining three factors, organization size, organizational structure type and organizational structure levels, no relationships were found between them and the level of success.

8 LIMITATIONS AND FURTHER RESEARCH

To assure the collection of correct and represented information, it was necessary to get the responses only from actual enterprise

architects, which advocated sending the surveys to a targeted audience whom the researcher knows them as enterprise architects or they were recommend by other enterprise architects. Looking into social media websites such as Twitter, you can find more than 1,500 accounts in which they refer to themselves in their account biographies as an enterprise architect. Nevertheless, it was not a reliable confirmation about their real identities, and therefore, they were not to be included in the research.

Another limitation was the lack of adequate literature about the relationship between organizational design and EA. Most of the available researches where conducted in the field of either pure organizational design challenges or with a great focus on enterprise architecture frameworks. This limitation led to inadequate inclusion of more organizational design factors that can impact the success of EA and that can be supported by a literature argument.

Many possible areas are available for further analysis that can enrich this area of research. One key area that can be further researched is the effect of the EA team size. Researchers have indicated a direct relationship between the size of the team, the functions assigned to it and the performance of the team. Such a relationship can be further analyzed to learn if the team size can be one of the success factors for the EAM practice. Another area of research that can be further analyzed is the impact of the team members and leader's characteristics on the success of the EAM practice within an organization. A third area for further research is the impact of the organization's employees' perception of the EA team on the success of the EAM practice within organizations.

9 CONCLUSION

EAM practice is being adopted by many small and large organizations, which imply its importance and effect on the organization's performance and profitability. In this research, seven main factors were identified from the literature review, which can contribute to the success of the EAM practice in the organization. These factors are EA purpose definition, top management buy in, strategic management adoption, architecture depth definition, principles and policies existence, organization size and organizational culture.

The research has revealed a strong relationship between the successes of an EAM practice in an organization and four of the seven model factors; these factors are unit purpose definition, top management buy in, knowledge about the strategy, and principles and policies existence. For the organization size and structure type and levels, the data showed no relationship between them and the success of EAM practice.

For further research in this area, several topics are suggested to be discussed such as the effect of the EA team size, the impact of the team members and the leader's characteristics on the success of the EAM practice and the impact of the organization's employees' perception of the EA team on the success of the EAM practice.

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