

# The Role of Enterprise Architecture in Aligning Business and Information Technology in Organisations: Nigerian Government Investment on Information Technology

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## ABSTRACT

This study focuses on the role of Enterprise Architecture in the alignment of business and IT in organisations particularly, IT investments by Nigerian government. The research will identify several issues of misalignment of business and IT investments by Nigerian government; the roles of Enterprise Architecture will play in the implementation of IT in Nigerian governmental organisations; explore strategies in which Enterprise Architecture can support the successful alignment of business and IT and recommend strategies/model of aligning business and IT investments by Nigerian government. Nigerian government investment in IT and the society, agencies and citizens whom the IT investments are targeted for will be the research case study. Investigation has shown that most IT investments by Nigerian government have failed due to several reasons. The most prominent is the failure to adopt the use of enterprise architecture in the alignment of business and IT. It is a general concern of most organisations that invest in IT to ensure that they achieve the objectives of investment. The literature review revealed the gap in the adoption of Enterprise Architecture when organisations invest in IT.

**Keywords:** *Enterprise, Architecture, Alignment, Organisation.*

## 1. INTRODUCTION

IT professionals know that their job is getting harder. The world in which companies operate is changing faster all the time. New enterprise solutions need to be delivered more quickly and directly linked to measures of business improvement. New technologies are being introduced with greater frequency.

Organizations are more dependent on IT than ever before and most projections suggest that the dependence will grow in the years ahead. As IT becomes more central to the survival of the company, one might think CIOs would get more respect. Unfortunately, many CEO's are unsatisfied with how their IT organizations are performing.

According to Buchanan and Soley (2002), many studies have suggested that senior business executives do not think they are getting a good return from their IT investments. Furthermore, they affirmed that out of 145,000 major IT projects conducted by Fortune 500

firms between 1998 and 1999 (costing in excess of \$265 billion), fewer than 25% met their narrowly defined project goals. Worse, senior managers felt that fewer than 12% fundamentally advanced the strategic goals of the enterprise.

Thus, even as their importance to the company increases, CIOs are under more pressure to justify the cost of IT development, devise more effective means to manage IT projects, and justify the value of the IT organization.

Nigeria is the most populous country in the African continent with a population of over 140 million spread across 923,768 sqkm. Telecommunication and Internet services are the major IT market in Nigeria. Recent report shows that Nigeria is one of the biggest and fast growing telecom markets in Africa, yet the internet sector has been hindered by the country's underdevelopment and unreliable infrastructures (BuddeComm, 2012). This explains the rapid increase in the internet usage in Nigeria as shown in the table below.

YEAR	USERS	POPULATION	%
2000	200,000	142,895,600	0.1%
2006	5,000,000	159,404,137	3.1%
2009	23,982,200	149,229,090	16.1%

Source: BuddeComm, 2012

## 2. LITERATURE REVIEW

### 2.1 The Role Information Technology in Organisations

Over the last two decades, the role of information technology (IT) has gradually increased in organisations. According to Luftman and Bullen;

“From the early days of the computer as the simple ‘number cruncher’ supporting the accounting and financial functions in a business, technology has expanded its role and now supports the entire range of business operations, including the external activities that occur in dealing with suppliers and customers” (Luftman and Bullen 2004, p. 5).

IT provides and sustains competitive advantage for organizations that decide to pursue the use of IT as an integral part of the business strategy. IT management professionals, in the 21st century are concerned with the successful alignment of business and IT (Lufman, Lewis & Oldach., 1993). It has been argued that the metaphor of enterprise architecture is chosen because IT strategy is not just about technology but the purposeful creation of integrated environments that leverage human skills, business processes, organizational structures, and technologies to transform the competitive position of the business” (Luftman&Bullen, 2004).

Ross et al. (2006) insist that, the alignment of business and IT strategies is necessary to support the successful implementation of IT into business. The authors maintain that to build an effective foundation for execution, companies must develop and apply three key disciplines: an operating model, enterprise architecture, and an IT engagement model.

Gregor (2007) argued that, organisations have focused more on high alignment of Information Technology and business as a vital aspect of achieving positive business outcomes. In addition, any organisations looking for maximum business performance should align their business strategy with the existing and future information systems through consolidated information systems Strategy.

### 2.2 Why Enterprise Architecture?

Enterprise architecture successfully aligns the strategies of enterprises with their business processes and IT resources (Wegmann, 2003). This implies that, the primary target of enterprise architecture is to provide an insight of the organisational structures, processes and technology that makes the enterprise, highlighting opportunities for efficiency improvement and improved aligning with business goal.

Studies have shown that, enterprise architecture enables organisations to adapt to changes in customer requirements and business goals, which influence the entire chain of activities of an enterprise from business processes to IT support. Moreover it is suggested that EA helps in supporting and improving communication, change management and decision-making in organisations (Boer et al. 2005).

EA provide an integrated and coherent view of an enterprise, aligning business, information and IT, and guiding specific projects. As a consequence, the EA assists in achieving the enterprise’s essential business objectives (Lankhorst et al., 2005).

It was argued that enterprise architecture clarifies and helps in optimizing the interdependencies and relationship among organisation’s business operation and underlying IT infrastructure and application that support operations. EA enable organisations to determine their current and future states of the business with a visual model that makes communication easier and more effective. Enterprise architecture provide a way to integrate employees and technology systems operation, it proves that enterprise integration has more facets than just technology (Hoogervorst, 2004).

### 2.3 The Role of Enterprise Architecture in Organizational Alignment

Most complex organisations conduct some form of business strategic planning, often coordinated through a strategy committee or planning organisations that identify threats and opportunities emerging from the environment and recommends appropriate organisation’s responses and investments. These recommendations become part of company plans and budgets. The maturity and usefulness of these efforts vary, although, this work is necessary.

At the same time, most IT organisations have groups that establish IT goals and manage the acquisition and development of new hardware and software systems. In a well-aligned company, the IT organisation would derive its goals and priorities from the corporate strategy and planning groups. This would insure that IT projects routinely supported corporate goals.

What is missing in most organisations is a mechanism that can align or “bridge the gap” between the concerns of corporate strategists and IT project managers. “Enterprise Architecture” represents a process that result in the creation and iterative refinement of many artifacts that collectively define future enterprise architecture, and it will identify the gaps between the current state and this future architecture (Buchnan&Soley, 2002).

The enterprise architecture, in effect, describes the logical linkages between the enterprise business, information and technical architectures and the enterprise solutions

architecture. The traditional notion of enterprise architecture is extended so that the hierarchy of architectures extends from the business strategy level and links to the IT implementation level. This enables organisations to align business goals and IT investment plans, and facilitates communication and decision-making between business strategy and IT management groups (Chan, 2002).

It is important to emphasize that the enterprise architecture does not represent a series of static documents, but an ongoing process. The business architecture is constantly being refined or revised as strategists and corporate planners identify environmental trends that require new corporate responses or priorities (Ambler, 2002).

It implies that, as corporate responses are modified, the information and technical architectures must be modified. That, in turn, leads to new application and infrastructure development priorities. The alignment between business and IT is a key issue in every organisation, given the impact it has in the overall organisation.

The need for repeated data insertions in different systems, the effort required to keep multiple replicas of the same information coherency and the lack of business information are common examples of such misalignment. The concept of alignment is based on ideas commonly used in the Enterprise Architecture Frameworks (EAFs), where organisations' business and IT are drawn (Macaulay, 2004). However, even though business and IT are commonly understood concepts, they are addressed differently in different frameworks (Pereira and Pedro, 2005).

Therefore, this research will express business and IT alignment in terms of well understood components, found in most EAFs, namely business, information, application and technology architectures.

## 2.4 Architectural Alignment Components

The concept of alignment firstly appeared in the 1970's and its relevancy and actuality is unquestionable, given the level of dissatisfaction that exists in organisations regarding to their information systems (Pereira and Pedro, 2005).

The concept of alignment has been defined among Business, Systems and Information as a way to quantify the coherency level in relation to the business necessity, the systems offer and information management (Pereira and Pedro, 2003). In line to this definition, the understanding about alignment is the result of these possible misalignments, which the scope of this research will emphasize between the following:

### 2.4.1 Business Architecture (BA) and Application Architecture (AA)

The alignment between Business Architecture (BA) and Application Architecture (AA) is concerned with the automation of work that employees actually need to do to use applications that run the business, for example: insert the same data in several systems; logging in several applications that support the same business process; and manually transform and process reports and data that are produced by the application systems.

It has been argued that a measure of such misalignment would be the time/effort business employees spend doing the work required for the use of the application systems (Chan, 2002). All work that has no direct link to business and it is only justified to interface with the Applications infrastructure is an evidence of misalignment between BA and AA.

For example, each time an employee is admitted in the organization and business people have to register him/her in several application systems. Business process automation is mostly related to business architecture and application architecture.

### 2.4.2 Application Architecture (AA) and Information Architecture (IA)

The alignment between AA and (Information Architecture) IA is often about the effort IT people spend to provide necessary information for applications and business operations running. It is a well-known fact that the same information (example, customer address) is replicated several times in organisation systems and that a significant portion of IT budget goes to maintain the code/procedures that keep replicas coherent and updated (Pereira and Pedro, 2005).

An appropriate example of good AA and IA alignment is an ERP System (Enterprise Resource Planning) where a single database exists; ERPs do achieve a highly aligned Application and Information Architectures because information is not replicated replicas within the ERP to keep it coherent and updated.

However, this does not imply that ERP workflows are aligned with the business processes. Example of misalignment between Application Information Architectures is the time IT people spend on:

- Running synchronization programs for updating the employee lists among different applications;
- Dealing with eventual errors during the synchronization Process Updating and maintaining the batch programs when new fields are necessary or

when new applications are involved in the management of the list.

### 2.4.3 Business Architecture (BA) and Information Architecture (IA)

The alignment between BA and IA is primarily concerned with providing information required to perform non-automated actions, for instance:

- Implicit decisions in business processes;
- Decision making;
- Controlling and managing the business.

In a well aligned BA and IA, business managers spend no time searching for information that their systems could provide. An example of misalignment between BA and IA is when the client has to ask the supplier for things he is buying. This research will identify alignment heuristics that will provide a measure that will better formulate, understand, analyze and evaluate an organisation from the business process, application process, IT and Information Systems point of view using the Enterprise Architecture's concepts. Furthermore, due to the constant changes in organisation, business and technology, the strategies of alignment will be perceived as a process not a static result.

## 3. CASE STUDY

### 3.1 Information Technology Investment By Nigeria Government

It has been revealed that there is an anticipated 5.12% rise in global IT spending for the year 2011, up from 3.4 billion USD in 2010, majorly in the area of telecommunication (mobile services and device segment (Gartner, 2011).

The Information Technology Association of Nigeria (ITAN) has estimated Nigeria's IT market at over 150 billion USD with anticipated growth of 10% over the global average. CHAOS report (2009), revealed that only 32% of IT projects were considered successful (that is, the projects been timely completed, on budget and to specified quality), 24% of the IT projects were considered to be failed projects (that is, projects having been cancelled or unsuccessfully delivered) while 44% were considered challenged IT projects (that is, projects were finished late, over budget and of standard quality).

Some notable IT projects that have failed despite the huge amount Nigerian government have invested are<sup>1</sup>:

- The African Development Bank (ADB) cancelled 80% of her project in Nigeria due to project failure;

- Abuja Investment and Property Development Company (AIPDC) lost about 3.8 billion naira over four years due to failed IT projects;
- Energo Nigeria Limited transmission substation achieved less than 5% implementation in year 2008.

Recently, a multi-million dollars project: Nigeria Communication Satellite Replacement (NigCom Sat1-R) was replaced after the Nigeria Communication Satellite (NigCom Sat1) installed in 2007 failed which was supposed to have 15 years duration but lasted for 18 months.

The government of Nigeria has agency in charge of monitoring ICT projects. NITDA is an institution that have been mandated by the Government of Nigeria to provide IT guidelines, standard, policy strategic plan, research and development in Nigeria. In line with the mandate given to NITDA, the agency has proposed national strategic action plan whereby ICT serves as a tool for development in all sectors of Nigerian economy.

Unfortunately, the nation still experience failed projects. Although, Charles and *et al.* [n.d], argued that the primary factors that have lead to failed projects in Nigeria are:

- Poor Planning
- Lack of top management support
- Failure to address risks areas
- Inadequate skill and expertise of IT project manager

### 3.2 Influence of National Culture in the investment of IT by Nigerian Government

Hofstede's cultural dimension model shows how values in organisation are influenced by culture. This gives business executives better understanding of the intercultural differences within regions and between counties. Like other nations, information technology has contributes to the Nigerian economy and productivity. Appropriate investment in IT by Nigerian government can have a long lasting effect on the nation's economy.

Susan (2005) argued that before IT investment can be regarded as a successful and beneficial it has to integrate the following five steps;

1. Ideas generation,
2. Determining the feasibility of the ideas,
3. Selection of the appropriate projects for the IT portfolio of the business,



4. Effective implementation of the ideas and
5. Complementary investments to achieve the benefits from IT use.

Certainly, each of the stages of successful IT investment stated above requires decision making and management of processes. Ein-Doret *al.* (1993) affirmed that cultural factors are liable to affect behavioral and procedural subsystems of any information system. Culture has influenced those that are involved in the management of IT investment in Nigeria. Business processes and organisational performance are been influenced by level of development, infrastructure, research and development, education, population growth and the culture (Hoogvorst, 2004).

The most influenced factor that is affecting Nigerian IT investment is culture. Hofstede (2001) conducted the most extensive study on national culture and highlighted five factors that affect workplace as:

- Power Distance (the extent to which the less powerful members of a society accept and expect that power is distributed unequally),
- Individualism/Collectivism (the preference of which the society accept a loose ties between individual and expect to cater for themselves and their families only, the opposite refers to collectivism),
- Masculinity/Femininity (Masculinity is the preference in society for achievement, heroism, assertiveness and material reward for success while femininity represents cooperation, modesty, caring for the weak and quality of life),
- Uncertainty Avoidance (degree to which members of the society feel threatened by uncertainty and ambiguity) and
- Long term orientation (long term versus short time orientation in life).

The table below shows the values obtained by Hofstede in his assessment of Nigerian cultural value:

Hofstede's parameters for assessment	Value /100
Power Distance	80
Individualism/Collectivism	30
Masculinity/Femininity	60
Uncertainty Avoidance	55
Long term orientation	16

## 4. FINDINGS

Adopting the findings of Susan's theory on the impact of national culture on IT investment management processes (2005) and the values obtained by Hofstede in his assessment of Nigerian cultural value, the Nigerian government IT investments have been influenced by cultural differences on different stages of IT investment management process as follow:

### 4.1 Power Distance (80)

Nigerian government gives less responsibility for each stages of IT investment management to middle and low level managers because of her high Power Distance. This implies that responsibility for IT investment is more centralized within the senior staff. This explains why poor planning is one of the reasons that have lead to unsuccessful IT projects in Nigeria.

### 4.2 Individualism/ Collectivism (30), and Masculinity/Femininity (60),

Susan's theory states that, there is more idea generation from the line of employee when a country has a high individualism and masculinity. On the contrary, Nigerian has a low Individualism and high masculinity, but there is high level of idea generation from line employee. It's unfortunate that, despite the line of idea generation, the Power Distance which is high affects the implementation of the ideas. Further more, Nigerian government rarely utilizes informal consensus building mechanism when investing in IT.

### 4.3 Uncertainty Avoidance (55)

Uncertainty avoidance affects IT investment in Nigeria and the processes of formalizing ideas and projects are not standardized. In addition, fewer risk and investment selection are based majorly on financial metrics. Nigerian government is commended for her high invest on IT but most of the projects have been unsuccessful as a result of poor risk management and formalized processes.

### 4.4 Long Term Orientation (16)

Affirming Susan's theory which states that, countries with long term orientation focuses more on long term planning and long term objectives. Lack of long term orientation has affected the several IT investments in Nigeria, like the NigCom Sat1 which has a short life span.

## 5. CONCLUSION

The world is been driven by ICT, the government of Nigeria like every other nations have significant multimillion dollars IT projects, some of which are:

- NigCom Sat 2 and 3
- Centralizing Database of Nigerians (140million people) through census and National Identity Card by National Identity Management Commission (NIMC)
- Cashless Society geared by the Central Bank of Nigeria
- NEPAD's e-school initiative,
- Mobile Internet unit,
- Nigerian Cybercrime Working Group
- Cisco Regional Networking Academy,
- e-Government and Governance,
- Virtual Library and Development of the Nigerian ICT4D plan

Considering the value of these projects, it is significant to properly align organisational objectives before investing on IT projects, in order to justify and achieve the objectives of spending on IT in Nigeria.

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