BOOK CHAPTER | Requirement Enginering in Public Administration
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The Implications of Requirements Engineering For Public Administration in Nigeria

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ABSTRACT

The major constrain to effective Requirements Engineering in Nigeria is ecological issue which the government regulates. Therefore, it is imperative to examine its implications for effective government decisions and actions. This paper discusses these issues and profer tenable solutions.

Keywords: Public Administration, Nigeria, Requirement Engineering, Solutions Government Regulations.

Introduction

Theoretical Framework

Structural -Functional Theory: This theory argues that the political system consists of political structures that perform various functions, including political socialization, political communication, interest articulation, interest aggregation, rule making, rule application, and rule adjudication. The effectiveness of these structures determines the success of political systems in maintaining public political support for the smooth running of the system (Asaduzzaman &Virtanen, 2016).

Therefore, It is the responsibility of the government to regulate all engineering practices in Nigeria, including requirements engineering, through policies and regulations, regulatory institutional frameworks and other mechanisms in order to ensure that the interest of the public is protected, and that the satisfaction of all stakeholders involved are met for a sustainable national development.

Hence, Public administrators and requirements engineers must work together to ensure the best possible outcome when it comes to developing public projects.

Conceptual Explanations

Public Administration: Public administration is often describes as the activities of the government, by the establishments or the agencies that administer, oversee, and manage public programmes within a given area (Uchem & Erunke, 2013). It is the sum total of all the activities of public organizations towards ensuring that government accomplishes its responsibilities in the interests of the general public. Public administration is the non-political bureaucracy in a political system, representing the business side of government, which comprises the three branches of government. It is more concerned with policy making and execution, and providing regulatory and service functions to enhance people's welfare (Thapa, 2020).

Requirements Engineering: Requirement Engineering is the process of drawing out stakeholder needs and desires, and developing them into a prerequisite set of detailed requirements that can serve as a basis for other subsequent development activities. The main purpose of requirement engineering methodologies is to ensure that the identified problem is stated clearly and complete, and the solution is correct, reasonable, and effective. It assesses a project's feasibility and its associated risks. It is applicable to all industrial standards including the aerospace, automotive, telecommunications, railways, nuclear, electrical and electronics industries. It is essential for any software system, and the objective is to ensure that the end users get value for their money (Asghar& Umar, 2010).

Processes Of Requirements Engineering

Requirements engineering comprises a set of activities that connect and interact to form the Requirements Engineering Life Cycle which consists of five steps or processes (Sai Ganesh, 2008).

1) Feasibility Study**:** this is the first step in the requirement engineering process. It is conducted to provide answers to the questions concerning relevance, duration, budget, and integration with other systems (Somerville, 2006).The data gathered from this activity and other sources determine the practicality of the system to be created (Sai Ganesh, 2008).
2) Requirements Elicitation and Analysis: this stage is concerned with the various ways through which knowledge about the project domain and requirements is acquired. It involves , both the technical professionals in the organization and the end users of the system, and the techniques include interviews, task analysis, prototyping, questionnaire, observation, brainstorming, joint application development, user-centered design, and so on (Sai Ganesh, 2008).
3) Requirements Validation: It is to demonstrate that the requirements align with customer's system specification (Polini, 2007). It is conducted at every stage of the process to prevent high requirements error costs which may be incurred after delivery (Bochmann, 2010).
4) Requirements Management: It is the process of managing changing requirements during the process and system development (Polini, 2007). It is essential because new requirements are often desire due to the changes in business process, technology, and better understanding of the problem. It requires focusing on the relationships between requirements, their sources and the system design (Bochmann, 2010).
5) Requirements Documentation: The main purpose is to serve as an agreement between the software developers and the end users based on its purpose (Berezin, 1999). It could be in form of Requirements definition, that is, an informal outline with a few paragraphs or simple diagrams, or a Requirements specification which is long list with thousands of pages describing the system in detail (Bochmann, 2010).

Role Of Public Administrators Towards Requirement Engineering Management

In order to ensure sustainable growth and development, it is imperative for public Administrators as managers of government tasks, to devise pragmatic initiatives to address issues of efficient and effective Requirements Engineering processes. Formulation of Policies: It is the role of government to formulate policies and laws to regulate engineering practices including requirements engineering, to ensure compliance to certain ethical standards by professionals and to protect the public. On January 25th 2021, the COREN President, Ali Rabiu, announced that the Council would soon release regulations that would cover all engineering practices in Nigeria, to safeguards the interest of stakeholders and the public (Nwannekanma, 2021).

Fiscal Measures: government is responsible for formulation and implementation of fiscal measures to stimulate investment and growth in the engineering sector. These include; providing funds to aid innovation for accessibility and availability of engineering products and services, and introducing tax reforms to facilitate globally competitive engineering sector. The recently passed Financial Act 2021 provides for 0.25% levy on profit before tax of commercial companies, to be credited to NASENI to promote research and development of the engineering field (Ayeoyenikan, 2022).

Regulatory Agencies: Providing a sound, responsive and efficient regulatory environment is another device the government must put in place to stimulate technological growth and development and R & D efforts in the engineering sector. Council for the Regulation of Engineering in Nigeria (COREN) is the professional body charged with the accreditation of training institutions, and regulation of the practices of engineering profession in Nigeria (Nwannekanma, 2021). Research Initiatives and Coordination: Public administrators need to facilitate research initiatives to ensure that engineering practices and innovations in the country meet the global standards.

The National Agency for Science and Engineering Infrastructure (NASENI), established in 1992, is the agency dedicated by the government to facilitate appropriate and dynamic science and engineering infrastructure base for achieving a home initiated and sustained industrialization for Nigeria. It focuses on six major intervention areas including; Advanced Manufacturing Technology, Education Intervention, Energy Intervention, Mechatronics, Nanotechnology, and Reverse Engineering (NASENI).

Constraining Factors

Lack of Adequate Skilled Personnel: The engineering sector in Nigeria suffers inadequate skilled personnel needed to execute technical projects, including requirements engineering. Thus, engineering practices are often undertaken by semi-skilled personnel. According to a recent 2020 National Youth Survey, less than half of Nigerian youths (45.1%) have knowledge or skills of words processing (Bailey, 2021). The huge rate of computer illiteracy explains the high level of unemployment which inadvertently aids brain-drain of the smaller percentage of competent engineering professionals in the country, due to low incentives compares to their counterparts in Europe and North America (Olatokun, 2006).

Corruption: Corruption hinders the effectiveness of supervising government agencies. It includes; bribery, fraud, embezzlement, nepotism, and favoritism. This corrupt practices responsible for low quality of projects, and demotivates engineers and other related technicians for hard work. Reduction in public spending on education and research, diversion of developmental resources for private interests, wastage and decline in skills are constraints (Dada, 2014).

Inadequate Infrastructure**:** The insufficient and inadequate basic infrastructure is huge barrier to the accessibility and availability of engineering services and equipment, especially outside the major cities. For instance, the erratic supply of electricity in Nigeria renders ICT networks unreliable and inefficient, and the cost of using alternative sources of electricity is expensive to maintain and operate the ICT equipment and infrastructure, and this further discourage local investment (Obutte, 2014).

Weak Regulatory Institutions: The regulatory institutions are weak and inefficient. The weakness of COREN in carrying out its regulatory and monitoring duties leads to unethical practices like appointment and promotion of many unregistrable engineers in different capacities, many tertiary institutions have low capacity for training engineering personnel in Nigeria, approval of construction designed by unregistered persons, and lack of interest in the support for professional development and promotion of engineering and technology (Nigerian Society of Engineers, Port Harcourt).

Overdependence on Foreign Products: Current engineering practices rely heavily on imported technology and design meant for a different climate, society and culture (Dunmade et al, 2019). This does not only constrain technology transfer, economic growth and development but also control processes over engineering sector, (Adeyemi, 2016). Inadequate Funding: Weak economy base of the country and corruption constrains funding of both engineering and regulatory activities.

Recommendations

Review Educational Curriculum: the curriculum needs to reflect demand of local engineering and the 21st century economy, and to incorporate sustainable and lifecycle engineering courses such as lifecycle analysis, industrial ecology, sustainable design, sustainable manufacturing and many others (Dunmade et al, 2019). More Effective Regulatory Institutional Frameworks: Government needs to reform various regulatory instruments and implementation agencies for monitoring and enforcement effectiveness, and to boost the confidence of consumers in Nigerian engineering products and services.

Provision of Basic Infrastructures- Aside formulating policies, government also needs to provide necessary infrastructure, human and fiscal resources for implementation. The provision of basic amenities like stable electricity supply, water supply system, transportation infrastructure and communication systems are essential for development of the engineering sector (Dunmade et al, 2019).

Collaboration with Relevant Professionals- An effective collaboration between the government and local professionals will deplete domination of foreign technologies by promoting standardization, export and the adoption of local engineering products and services. The professional bodies include, Federal Institute of Industrial Research, Council for the Regulation of Engineering in Nigeria, the Nigerian Society of Engineers, Institute of Software Practitioners of Nigeria, and the National Agency for Science and Engineering in Nigeria, and so on (Business Day, 2015).

Conclusion

It is evident that public Administrators have a serious role to play towards effective public management of Requirements Engineering processes in particular and engineering practices in general.

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