

Adoption of Technological Capabilities in Managing Public Sector in Nigeria

Nathaniel C. Ozigbo

*Department of Business
Administration
University of Abuja, Abuja –
Nigeria*

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Corresponding Author:

Nathaniel C. Ozigbo

Abstract

There is growing appreciation of the role of technology in enhancing productivity and competitive advantage. The strategic importance of information technology has been reflected in visions of national information infrastructure in Nigeria public sector. This study examines the experience of Nigeria public sector in the promotion and acquisition of technological capabilities. The acquisition involves more than acquiring computerized equipment and microelectronics-based product designs and related know how. It involves the development of technical change generating capabilities to adapt given technology to a widening range of needs. The study noted that the new technologies in computing, communication and multimedia are changing the way we work, learn and are changing the global flow of information, trade and investment. These changes require agility and responsiveness and have put premium on the use of the new technologies. The study also noted that all public enterprises of all sizes should invest in technological development and learning, and that the Nigeria government should redefine their roles to promote learning and establish policies and infrastructures to accelerate the adoption to generic technologies. In addition, the study reviews the experiences of selected developed nations to draw guidelines. The study suggested broad directions for adopting these technologies and conclude by suggesting the roles of government to accelerate the benefit of information technology adoption for development.

Background to the Study

To develop the technological capability, a nation needs to have the appropriate policy, build the necessary institutions and structures which should be sustainable. In most cases, Nigeria public sector are still unable or unprepared to build the institutions/ management structures necessary to overcome their problems, hence are likely to remain without the technological capability for entry into the global space as they are not capable to possess the distinct resources which Bell and Pavilt (1992) described as technological skills, knowledge, experience and institutional structures and linkages. The government should be involved because institutions do not exist in a political vacuum, instead operate within a policy and cultural environment in which competition for resources and power exist. This study draws on the experience of industrial countries in the acquisition of new technologies in computing, communication and multimedia which are changing the way we work, learn and changing the global flow of information, trade and investment. These changes put a premium on the use of these new technologies. This study should be of interest to policy makers in Nigeria which draw guidelines for designing technological capability components for maximum impact to the public sector of Nigeria. The government agencies should learn to become catalyst by working closely with private sector-associations. Technological capability could influence on the global economy in enhancing productivity and competitive advantage. It involves the development of technical change generating capabilities to the widening range of needs.

Problem Identification

A number of problems appear to impede the technological capabilities in the public sector of Nigeria. One of the key impediments is the lack of awareness of the potential benefits of the capability. The critical problem deal with the organization's inability to absorb the new technology. This study asserted difficulties to isolate common barriers from those specific, hence need for conceptual framework to clarify the barriers. Our view is that technological and organizational changes are complementary and mutually reinforcing. The existence of the new technologies has its own attraction for policy makers in Nigeria and should be used to induce and support managerial and organizational best practices.

Objectives of the Study

The focus of this study attempt on drawing lessons for desiring and implementing effective adoption of technological capabilities, rather than evaluation of impact. The study covered a vast range of technologies from management information systems that attempt to utilize the growing flow of information as a useful resource for management to cope with the growing information centres.

Research Questions

Based on the problem identification and the objectives of the study, the following research questions were propounded to guide the study;

1. Should Nigeria government promote the adoption of technological capability in the public sector?
2. What specific lessons could be drawn from the adoption policy experience from the industrial countries?

This study seeks to establish guidelines for best practices based on industrial countries policies and programs. The countries like Netherlands which has particularly wide-ranging policies regulating technology support and acquisition and managing successful programs. Germany, where significant capability programs and promotions have operated for a number of years and Canada has long established successful technology transfer policies. These countries span a range of experience and approach, viewed as good practice in the realm of science and technology policy.

Review of Related Literature

Technological capability is the most pervasive generic technology of our time. This is however a whole spectrum of information technologies with varying degrees of public good features, implying differences in ease of capability. The acquisition and use of the technology is not easy. It depends largely on the availability of appropriate skills, access to information and availability of appropriate financing mechanisms. Biggs et al (1995) noted that information technology adoption in developing countries have resulted in significant increase on operational efficiency. Romiju (1996) demonstrated that the use of new information technology resulted in a significant increase in Singapore's operational productivity. The gains from adopting information capability appears to vary across different countries. Bell and Pavitt (1995) study received a number of IT applications in developing countries showed that dramatic productivity increases were possible only when best practices were adopted, but that the diffusion of these practices have been quite limited. Some scholars (Bennet 2001, Antonelo Roll and Crossman 2014) argued that with appropriate support policies and use of information technology, expected benefits in productivity improvements have been high. In Nigeria, lagging productivity in public sector has not strengthened the view that IT adaptability only involve a little institutional and skills changes tend to have relatively long gestation period before improvement could be realized.

In United States of America, improvements in productivity have shown that the gestation period were over for leading IT users have moved down the learning curves and are now capable of re-engineering themselves to recap the transformational benefits of technological capability. Given the strategic and economic potential of the capability, there exist evidence that united state government support of IT is waning.

The question that come to mind is; should Nigeria government attempt to accelerate the pace of diffusion of information technology through selective intervention? If so, should they target specific sectors for accelerated diffusion.

1. What sort of simultaneous socio-institutional reforms and complementary investments are needed?
2. What is the appropriate timing of policies for Nigeria at different levels of development?

The experience of those countries who have successfully adopted information technology could help provide answers and could produce many useful insights. The pace, direction

and extent of the diffusion of technology depends to a large extent on the nature of demand for improved products and better work practices. This in turn is influenced by the overall incentives within which firms operate in macro-economic environment with inclusive growth prospects, intellectual property rights and effective competition. Recognizing the importance of competitive markets, an increasing number of developing countries are now taking steps to remove barriers to competition, tariff, barriers to entry and exist.

Studies (Hama 2017, Lall 2018), have shown that an incentive framework alone might not be sufficient motivation to adopt new technology and might not know the potential pay off of new technologies or be acquainted with the standards, support services, skill requirements. This was the experience in the developed countries at the on set of the technology revolution. Hence, the key objective of diffusion program should be to increase awareness among potential user and the general public alike.

When faced with the decision to deploy new technology, many organisations seek to minimize their risk by under-investing in its adoption, some appear to be intrinsically conservative when it comes to adopting the new technology. Notwithstanding, government in the developed countries have provided adoption incentives in the form of consultancy assistance to explore new applications, assist to explore markets for IT production, provide shared facilities for consortium of organisations/firms and providing financial assistance for IT applications.

However, the acquisition and use of technology is not easy, depends largely on the availability of appropriate skills, access to information and availability of appropriate financing mechanisms. The empirical literature dealing with technology acquisition shows that technology transfer involves a great deal more than supply/buying 'black boxes' and setting them to work. First and foremost, the acquisition of new technology requires the ability to evaluate various technological opinions to search for reliable configuration of tools and systems and enter into pertinent technical and marketing arrangements. It is usually not possible to transfer foreign technology without some modifications to suit local conditions like climate, raw materials, scales of production, product quality and design specifications. Lall (1987) noted that if technologies are imported from different countries with different engineering traditions, a great deal of effort is needed to alter and standardized designs, components and processes. In some cases, minor process changes could also save on energy which lead to better use of the product, increase product utility and marketability. Infact, the acquisition of new technology does not automatically make it operative, need to undertake necessary modifications are crucial to the successful transfer of new technology (Aiyepoku 2016) New technology needs special skills which in most cases not readily available in most developing countries due to novelty of the technology, which imposes tremendous demand for education and training, which in most cases necessitating a complete revamping of academic curricula to strengthen education and learning in computer science, electronics engineering and other engineering sciences. Given its generic nature,

users who invest in the new technology do not necessarily build on their own accumulated technological capability and may require external support to develop technological capabilities. In some cases, public support could help to develop the necessary capabilities.

In developing countries, it is increasingly clear that skill shortage and changing skill requirements are the principal barriers to the acquisition of new technologies. The generic nature of the new technology and its rapid progress all suggest that a considerable amount of in-house R & D might be needed for adopting more sophisticated applications such as computer aided and computer integrated product. The uncertainty associated with in-house R & D related to new technologies is particularly high especially in business environment characterized by short term profitability considerations, while indivisibility of research could retard the R & D efforts.

The figure below explains the technology take up phases which are affected by many factors;

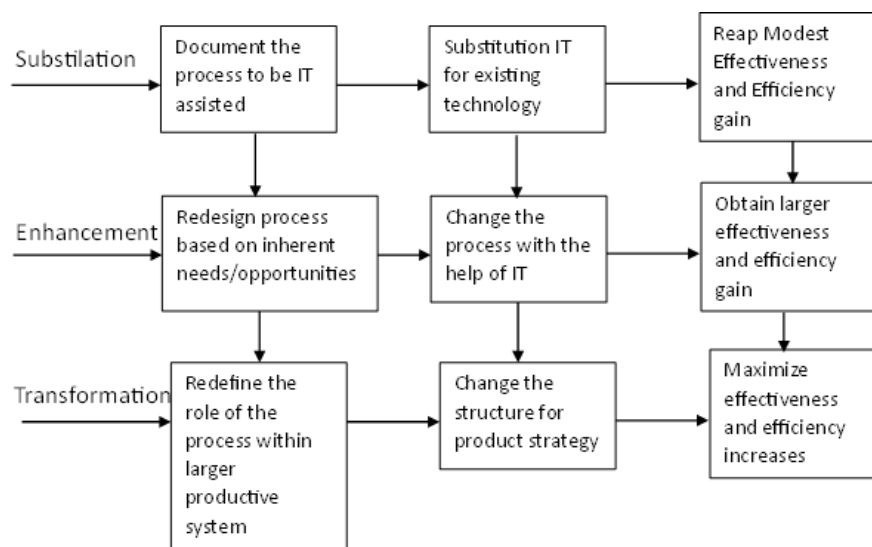


Fig. 1

Source: Compilation from other studies with minor additions

The figure above shows that technology take up phases are affected by many factors. The adoption process makes it clear that technology acquisition and exploitation involves a great deal more than simply buying black boxes and setting them to work. In other hands technology specific skills are needed and should be found from the education and training system or poached from other users.

One of the most obvious factors affecting the take up of technology is the use to which it is to be put. The technology which totally transform a production process is more daunting than one which involves minor modifications to existing tasks and procedures.

The three different phases include the following;

1. Substitution phase
2. Enhancement phase
3. Transformation phase

Detailed Adoption Phases

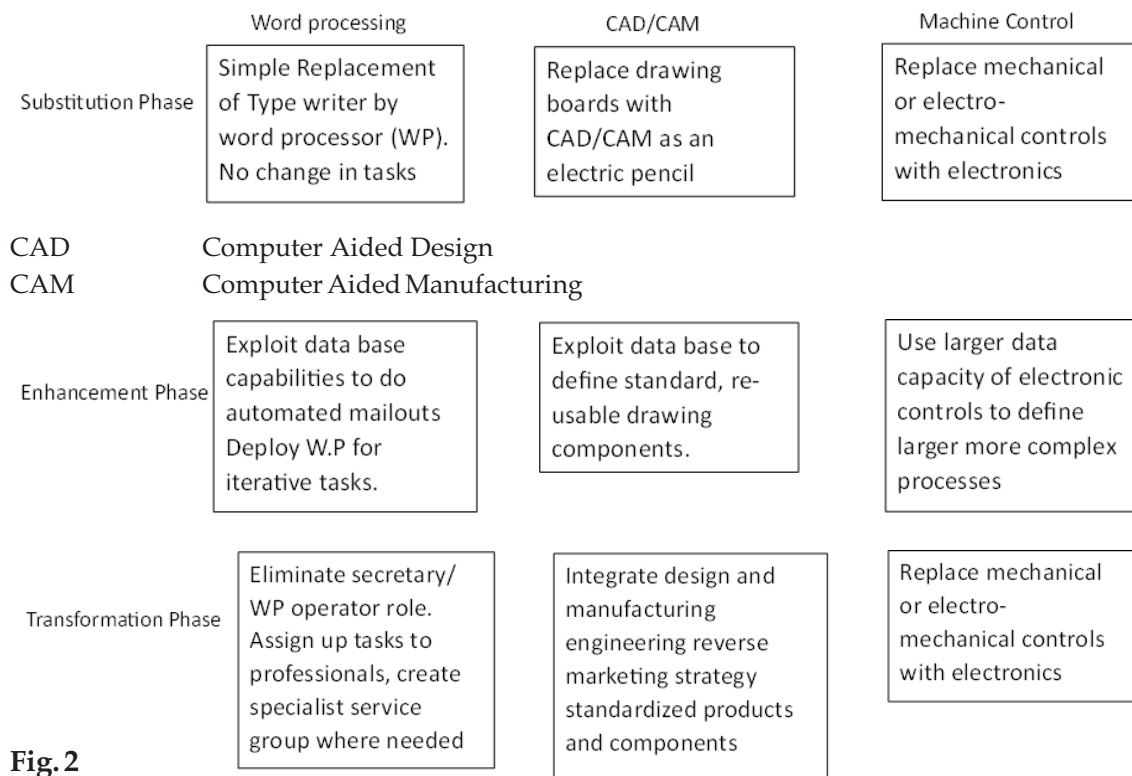


Fig. 2

Source: Compilation from other studies with minor additions

From the figure above, the substitution phase involves simple replacement of existing technology with information technology. The usual expectation is that new technology performing the old function improve productivity. The enhancement phase involves redesigning an existing process to make the best use of the new technology, improve product quality and provide additional and related services.

The transformation phase involves taking a system perspective on the role of the process within the organization as a whole. In this case, the process might be merged with another, eliminated or expanded. In a more complex case, it means integrating design with manufacturing engineering and reviewing the company's product range and the component from which products as assembled to reduce complexity, reap economies of standardization and serve diverse niche customers.

Overview of Government Technology Policy Matrix

The actions across policy matrix are essential components of government strategies to enhance the strategies to enhance the development and use of technology. Studies have shown that IT strategy for Nigeria as a whole has not been developed in a markedly co-ordinate fashion. Co-ordination at the operational level is generally required when desperate actions are in place and there is a desire to avoid duplication and encourage synergy.

In spite of piecemeal approaches to technology policy, the Nigeria government has attempted to evolve more strategic positions. In particular, the government has sought to monitor developments in key generic technologies in order to create the intelligence to prioritize resource creating technology which is seen as critical to the formulation of policies nurturing indigenous capability in key technologies (Aiyepoku 2016) and exploiting their use through widespread diffusion processes. As we are aware, public sector in Nigeria are massive handlers of information and the potential benefits associated with the use of IT are well known.

It is understood that faster and more efficient processing and communication of information are the keys to productivity improvements and enhanced delivery of outputs and services. This makes IT attractive to all concerned with handling information. Public sector organisations have an obvious interest in promoting the use of IT within their own administrative structures, and government support not only to recap the direct benefits associated but also to encourage or strengthen broader support policies for widespread use in other sectors.

Basically, there are reasons for government support strategies for the use of IT in the public sector

1. To support local producers and service providers by creating demand for indigenous IT products and services
2. Promote widespread use of IT through exemplar or vanguard strategies
3. Continue to function effectively in an increasingly IT dominated environment
4. Take advantage of the intrinsic benefits of IT in coping with the information handling loads of government departments.

In some cases, many governments have tried to support the growth of IT supply sector with nationalistic procurements strategies and also seek to promote IT use in the economy at large by a vanguard demonstration effect in the public sector. Furthermore, through compliance with IT standards, governments seek to promote best practices in purchasing and IT system choice procedures.

In Nigeria context, we observed that public sector demonstrations have had a marked beneficial effect on IT practices and has become imperative to other sectors to catch up with the developments in order to achieve;

1. Sound industrial culture and skill base

2. Build modern economic infrastructure
3. Efficient competent system of operations

The Nigeria government need to be IT based to deliver effective and internationally competitive service levels, without them, national industry could be significantly disadvantaged and development can be impeded. In essence, the government has to keep up with IT developments and dependencies for the whole system to function well. Hence, the important task for government therefore becomes its objectives for increased productivity, better program delivery, enhance service to the public by improving management processes and the use of information technology (Frenzel 2010).

In the United States for example, information technology is taking a prominent role to reinvent government practices and this effort aim to cut the red tape, streamline the budget/procurement processes, empower state and local governments, decentralize decision making, improve accountability, re-engineer programs and processes and reduce the use of the federal government (Arnold et al 2014).

Notwithstanding, the diffusion/adoption of information technology in the Nigeria public sector is expected to play a major key role in achieving these aims ascertained above. Hence, emphasis should be put on upgrading IT training for all civil servants to develop a clear vision of IT benefits and a commitment to its use. It follows that adequate technological capabilities are needed to drive home those noble objectives of information technology diffusion/ adoption in the Nigeria public sector.

Policy Recommendations

This study examines the effectiveness of technological capabilities diffusion/adoption in the Nigeria public sector. The study analyses the national IT policy portfolios to draw lessons and trends. The study also reviews the experiences of developed countries to draw guidelines for designing IT diffusion programs for maximum impact in the public sector of Nigeria. The study after thorough investigation, come up with the following policy recommendations:

1. Public agencies should contract out systems development and support services given the current pace of technological change and innovation.
2. Government should decentralize the planning and management information systems.
3. Government should set broad directions and priorities for IT application and invest in data-base and networks of use across agencies.
4. Need for comprehensive review of public computerization to identify infrastructural gaps.
5. Need to provide a central agency to provide guidelines for IT procurement, training and occupational streams for informatics professionals.
6. Diffusion programs should start with a diagnosis of the market and environment so that programs fit local problems.
7. National IT strategy should be tailored to its technological capability, size and

structure of its domestic market, industrial development and management competence.

8. IT investments should be employed to reduce organizational changes, while productivity and flexibility could be improved by adopting the Lean production and continuous improvement innovations.

Our view is that technological and organizational changes should be complementary. Public agencies in Nigeria should not be locked out of dramatic improvements in information and communication technologies. The introduction of the modern technologies should attract policy makers and should encourage managerial practices. It is important to note that technological capabilities index rely on networks such as trade association and chambers of commerce to spread knowledge. This approach is responsive to industrial traditions intend to establish client relations, and the diffusion/adoption should reward those institutions/agencies that respond effectively to the new technological demands.

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