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IT Infrastructural Change: Effect on Organizational Performance: Case Study of Kaduna Refinery and Petrochemical Company

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Abstract

Due to the importance of the daily operations and strategic positioning of the modern business enterprise, information technology has become the backbone and ever more important part of the structure of most organizations. Therefore, the importance of Information Technology (IT) infrastructure is recognized more and more within companies and corporations. The research was made to looking into how IT infrastructural changes affect the performance of an organization, as this (infrastructure) is the foundation upon which IT services of an organization operate. The researched looked at the some of the existing standards used in change management which includes COBIT, Prince2 and ITIL. This research used a case study of Kaduna Refinery and petrochemical company to analyse the effect of IT infrastructural change and methodology adopted for this study was a quantitative approach, where 60 questionnaires were distributed and 80% responded. Some of the findings of the research were that IT infrastructural change was on using normal change procedure in the organization which sometimes results in poor service provision and misuse of resources. IT staffs are sometimes not involved in the change process and can result in poor staff performance. Since infrastructure is vital in IT service provision and organization processes depends on it, it is therefore important to have standard procedure for such change so as to reduce risk and cost involved in such change. It is recommended that, IT staffs and stakeholders should fully involve in IT changes and staff training and change management process should be done on regular bases. In conclusion IT infrastructural change should be carefully analysed by IT staff and stakeholders so as to reduce the risk involved in such change. Organizations should adopt used of best practise procedures for change processes and also provide staff training.

Keywords:
Infrastructure, Information Technology (IT) and Change management

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Background to the Study

The daily actives and strategic positioning of the modern day business organization has seen information technology become a global and increasingly significant part of the of most organization frame work (Dohertyand King, 2005). Organizations employ the use of IT services ranging from Internet, Database and enterprise application to optimize productivity and innovation. This has brought about different research on the important of IT to organization performance by many researchers, bring up questions on how important is it to execute or implement a change in information technology department in an organization? Considering that *IT-induced changes in an organization often results in user resistance and, in some cases, possibly even system rejection*. (Martinsons & Chong 1999 cited by Doherty & king, 2005).

The truth is that change deals with real people who have needs, desirers and aspiration and most times unconsciously, will interpret and report situations and opportunities through the filter of their own experiences or aspirations, and that's what needs to be taken into account. Although it is important to understand the various types of change and knowing the various options available to management they will be a great step toward building a capacity to manage change in the company.

The research will also be looking at the various change methods and IT service management guides used in change management and analysing the risk involved in traditional change management compared to using a best practice method. Information technology is no longer seen as a budget item in organizations instead, it is perceived by most executives and managers as a strategic investment that will increase revenue while reducing operating costs. IT services today provides many critical business functions, efficient improvements and reduced operational redundancy in organizations. It is used for operations management, decision support and executive strategy development.

Change is constant in an organization's life cycle; therefore, it is important to properly manage all changes throughout the organization. IT infrastructural change can be due to new technology leads to new opportunities, which in turn leads to competitive advantages. For instance, most organizations will be looking into cloud computer as the next step in database management. These will be a crucial change and the risk involved may be high. Organizations need to evaluate a change before implementation to make sure it is worth doing. Kaduna Refining and Petrochemical Company (KRPC) was established to efficiently and profitably process crude oil into refined petroleum products and manufacture linear alkyl benzene (LAB) and tins and drums for domestic consumption and export.

To optimize the full potential of the organization all department most perform its duties efficiently and effectively. Each department interchanges information with one another to provide an effective result at the end of the year. This research will be based on the computer or IT department. The IT department provides the all the IT needs of the company which may include network management, data base management, installation of computer and computer components and IT maintenance and all IT services.

Department like the finance department, procurement, warehouse and stock control to mention but a Few are the main use of IT in the organization. These departments need effective and efficient IT services at all time to do their work. Therefore, it is necessary to carefully analyse any request for change in IT infrastructure and properly implement such changes to reduce risk associated with the change.

Statement of Problem

Organizations have lost a lot of working hour due some changes made in IT infrastructure. Business processes dependent on IT sometime are put on hold when a network is being put in place, or when an organization is moving from one platform to another. These as a result slow the business process and some result in loss of income.

Non IT staffs who in most cases are the main users of IT service are not usually involve in implementation processes of IT change which some time affect employee performance as people are the main users of IT services.

Objectives of the Study

An evaluation of IT infrastructure changes in an organization in Nigeria and the effect of such change on people and the business process to

1. Determine the IT services that are dependent on IT infrastructure.
2. Evaluate change management process in an organization.
3. Analysis socio technical aspect of change in an organization

Significance of Study

The research was conducted to analyse the impact of change management in IT infrastructure. IT infrastructure changes are change that occur once in a while, therefore it is usually is requires huge amount of resources both human and capital. It is important to have a proper change management process in place so as to minimize the amount of failures in the project. This research has pointed out some of the issues relating to the sociotechnical aspect of change management in IT.

Literature Review

IT infrastructure is defined as a set of shared IT resources which is a foundation for both communication across the organization and the implementation of present/future business applications (Hartono et al, 2010). It is composed of two broadly defined infrastructures which are technical and human(Chanopas, krairit and Ba Khang. 2006). The technical infrastructure includes hardware, software, the network, telecommunications, applications and tangible IT resources, while the human infrastructure refers to the knowledge and skills required to manage IT resources within an organization. Therefore, a change in any of this component will be regarded as an infrastructural change whether it is a hardware change or a change in IT staff. "IT infrastructure is an important unit of the organization, which consumes over 50% of the IT budget of a classic organization" (Broadbent and Weill, 1997), therefore it is important to plan, build, test and evaluate all changes in involved with IT, so as to avoid risk and organizational process downtime. In spite of the fact that IT infrastructure is ever more broadly defined and offered in a growing number of academic articles, a more intelligible and dependable view is quiet needed. It could be said that a more substantial definition for IT infrastructure is needed but however IT infrastructure is been seen to assist the subsequent purposes by Broadbent and Weill:

1. It forms the technical and human backbone for business and business applications in an organization. Hence it is the foundation for all business applications in an organization and need efficient.
2. It holds, routes, assembles and shares information by satisfying business and managerial needs for reducing costs and increasing efficiency in the organization. IT applications are used by management and organizations as support tool for decision making and a source of sharing information through the use of internet and other communication Medias.
3. It enables the preparation and alterations of business processes, back the development of new organizational forms, and develop connectivity between importance groups. It allows for flexibility within an organization business process for instant IT infrastructure can aid an organization to move from a brick and mortar to online market space.
4. Nurtures the realization of maintainable competitive advantage as a fundamental capability of the firm, and, as a flexible platform, aids speedy new implementation of innovations and cost effective adjustments of current applications

This day's most organizations build their business process on IT infrastructure, which means changes made on them will affect the business process depending on whether the change was successful or not (Davenport and Short; 1990). "As a result the IT function is changing, morphing from a technology provider into a strategic partner. Concurrent to these changes, the IT infrastructure is moving towards a centralized, highly adaptive utility model". (Sallé, 2004)

Characteristics of IT Infrastructure

IT infrastructure has been characterized into seven dimensions by (Star and Ruhleder 1996):

1. Transparency. Infrastructure is transparent to use, in the sense that it does not have to be reinvented each time or assembled for each task, but invisibly supports those tasks;

2. Becomes visible upon breakdown. The normally invisible quality of working infrastructure becomes visible when it breaks; the server is down, the bridge washes out, there is a power blackout. Even when there are back-up mechanisms or procedures, their existence further highlights the now-visible infrastructure.

3. Reach or scope, this may be either spatial or temporal—infrastructure has reach beyond a single event or one-site practice;

4. Built on an installed base Infrastructure does not grow de novo: it wrestles with the "inertia of the installed base" and inherits strengths and limitations from that base. Optical fibers run along old railroad lines; new systems are designed for backward compatibility; and failing to account for these constraints may be fatal or distorting to new development processes.

5. Links with agreements of practice, Infrastructure both shapes and is shaped by the conventions of a community of practice, e.g. the ways that cycles of day-night work are affected by and affect electrical power rates and needs.

6. Embodiment of principles, modified by scope and often by conflicting conventions, infrastructure takes on transparency by plugging into other infrastructures and tools in a standardized fashion.
7. Embeddedness, modified by scope and often by conflicting conventions, infrastructure takes on transparency by plugging into other infrastructures and tools in a standardized fashion.

IT Infrastructure and the Need for Change Management

Change management has been defined as 'the process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers' (Brightman & Morgan 2001). Therefore, it can be argued that as new technologies are invented every day in the IT world organizations will be force to change along with it to keep up with the competitions which may involve some changes in the infrastructure. A number of best practices IT service management guide have been developed to help organization reach their goals in providing service quality and customer satisfaction by properly managing its IT infrastructure. These best practice guides include ITIL v3, CoBIT and PRINCE 2.

Information Technology Infrastructure Library (ITIL)

This is a framework of processes based on industrial best practices. Information Technology Infrastructure Library (ITIL) defines the organizational structure and skill requirements of an information technology organization and a set of standard operational management procedures to allow the organization to manage an IT operation and associated IT infrastructure. It started in the late 1980's when the Office of Government Commerce (OGC) developed a set of guidance to manage the growing number of IT users and their services. It has since been recognized as the de facto of ITSM. ITIL has undergone 2 major changes in its version, the ITIL v2 was released in 2000 and ITIL v3 in 2007. ITILv3 which was released in 2007 was structured around five distinct sets which are the core volume of ITILv3.

1. Service Strategy
2. Service Design
3. Service Transition
4. Service Operation
5. Continual service improvement

Control Objective for Information and Related Technology (COBIT)

This is an internationally accepted set of tools organized into a framework that executives can use to ensure their IT is helping them achieve their goals and objectives (Ridley, Young and Carroll. 2004; Lainhart, 2000). It ensures IT is working as effectively as possible to minimize IT-related risks and maximize the benefits of technology investment. We will be incorporating COBIT as an IT governance tool to bridge the gap between the university and IT. It will be used by the university to the way IT is being used in the university to meet its requirement.

Tuttle and Vandervelde (2007) stated it defines a strategic IT plan that satisfies the business requirement for IT, while being transparent about benefits, costs and risks by focusing on incorporating IT and business management in the translation of business requirements into

service offerings, and the development of strategies to deliver these services in a transparent and effective manner is by

1. Engaging with business and senior management in aligning IT strategic planning with current and future business needs. This means that the senior management at the university most be willing to invest on IT services that are relevant to the need of the university.
2. Understanding current IT capabilities: we have to understand the capacity of the IT in the university, are there enough resources (skill, finance), what is the state of IT infrastructure in the university and the competence of the department to deliver.
3. Providing for a prioritization scheme for the business objectives that quantifies the business requirements and is measured by
    a. Percent of IT objectives in the IT strategic plan that support the strategic business plan
    b. Percent of IT projects in the IT project portfolio that can be directly traced back to the IT tactical plans
    c. Delay between updates of IT strategic plan and updates of IT tactical plans

Change Management

Given the prevalence and importance of infrastructural change, and the difficulty of successfully bringing it about, there has been much debate over the years in particular as to the most appropriate way to manage change. Therefore, IT infrastructural change cannot be separated from service strategy, or vice versa since the need for change often is unpredictable, it tends to be reactive, discontinuous, ad hoc and often triggered by a situation of organizational crisis (cooper, Ludlow & Clift, 2007). ITIL provides guidance on how to design, develop, and implement service management not only as an organizational capability but also as a *strategic asset*. (ogc) Service Strategy guidance is useful in the context of Service Design, Service Transition, Service Operation, and Continual Service Improvement. As IT infrastructure is part of IT services, it therefore need to designed, implemented, monitored and continuously improved on for an effective and efficient service to be provided. To continuously improve on IT services changes, have to be made on its infrastructure.

Research Methodology

Quantitative research method was adopted which focused on numerical statistical analysis of data to cross evaluate change management and IT infrastructure of the organization. The population of this research was the IT department and some selected non IT staffs. Random sample was adopted and a total of 60 questionnaires were distributed. A total 48 responded which is 72% of the total questionnaires distributed. Data was analysed using percentage of respondents.

Data Analysis

The research findings where done using two methods which were interview and questionnaire. For the interview there were three interviewees, who were from different departments of the organization. They represent the IT users of the organisation. I wanted to get their view on IT performance and to know if they were aware of any change going on in the IT department.

Objective 1: to determine the role of IT infrastructure in organizations

This aspect of the research is to examine the impact of IT infrastructure in the daily running of an organization. These infrastructures are the necessary hardware, software and man power needed for the provision of IT services in an organization.

Table 1: IT infrastructure Awareness

Statements	Yes	No	No idea
Familiar with organization's IT infrastructure?	83.33%(40)	8.33%(4)	8.33%(4)
Is the organization dependant on IT or not	39.58%(19)	56.25%(27)	4.17%(2)
Is IT service provision dependant on IT infrastructure in your organization	54.17%(26)	12.5%(6)	33.33%(16)

Source: Research field survey

The table over used yes and no attribute to determine if IT services are dependent on IT infrastructure in the organization. This was done by first examining if the employees are familiar with IT infrastructure and 84% of the respondent shows that they familiar with it. The research also shows that for the case study organization, it is not dependent on IT but IT services are dependent on IT infrastructure. This shows that for IT services to be fully utilized a proper infrastructure needs to be in place. With a mean of 59.33% of the respondent selecting yes to this section of the research it shows that the respondents have good knowledge of IT infrastructure and it importance to service provision.

Table 2: Use of Change Management

[illegible]	[illegible]	[illegible]
[illegible] management?	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible] world of technology	[illegible]	[illegible]
[illegible] IT changes	[illegible]	[illegible]

Source: field survey

The table above analyse the process used in implementing change in the organization. With IT innovation and new technologies coming out every day, it is essential for organization to constantly improve on their technology to meet up with the changing world. The research shows that 95.83% of the respondent that organization should move along with the constant change in IT industries and to achieve this organization most be willing to change some of its IT infrastructure. And a proper change management should be adopted in doing that. With 70.83% of responds showing that change management is key in implementing IT changes.

Table 3: Socio Technical Aspect of Change;

Statements	SA %	AG %	NS %	DA %	SD %	Total
Change is expected without being linked to incentives	18.75(9)	50(24)	14.58(7)	12.5(6)	4.17(2)	100(48)
Change projects create resistance which has to be broken	0	68.75(33)	22.92(11)	8.33(4)	0	100(48)
Communications about the change are timely and relevant	0	68.75(33)	22.92(11)	8.33(4)	0	100(48)
Communication about the changes is limited to only those directly concerned with the project	27.08(13)	41.67(20)	0	31.25(15)	0	100(48)
Good ideas for change are hidden and used for personal agendas	0	60.42(29)	0	29.17(14)	10.42(5)	100(48)
Those concerned with the outcome of the change project take part in planning	0	16.67(8)	64.58(31)	18.75(9)	0	100(48)
The project lead for the change is known and project champions aid the planning and implementation	0	25(12)	72.92(35)	2.08(1)	0	100(48)
Are the right people chosen for leadership and management roles	12.5(6)	20.83(10)	4.17(2)	50(24)	12.5(6)	100(48)
Involve key stakeholders in planning process to obtain their ownership of change plans.	14.58(7)	75(36)	10.42(5)	0	0	100(48)

Source: Field survey

Findings from Data Collection

The research response on the topic shows some outcome on the way change is been carried out in the case study domain. Although this may not be applicable to all organization in Nigeria it could be of importance to note the attitude attributed to IT-mediated change in organizations. From the response gotten the following can be said about IT service provider in the organization. There is a lack of standardization, this is due to the fact IT changes can be carried out in any form and this may have effect on productivity if such approach is applied to infrastructural changes. IT staffs are used to using a tradition way of doing thing and they do not give room for improvement. Due to the rigid hierarchy in the organization best decisions are not always taken. For an effective and efficient change management system to be in place there should be a flexibility the organization hierarchy. This will encourage acceptability of IT changes and thus reduce rejection rate of induction of new systems. The research also shows that there is lack proper evaluation of proposed changes. Change project will take longer time than expected because of improper evaluation of a project before implementation.

Infrastructure changes arise as a result of new technology and incidence. Changes are being managed by the TQM team which member may not be from the IT department, thereby lack the necessary skills to monitor or manage a change.

Conclusion

IT infrastructure has become a core process in most organization. The importance of change and how to manage these infrastructures can therefore not be ignored by the organization. It is there the responsibility of IT providers to have a flexible and efficient change management process in their organization. ITIL V3 service transition has provided a prescriptive guidance on how to change, release and deploy a project use best practice management techniques. By doing this the organization will be able to reduce the risk associated with a change before, during and after the change has been implemented. It will also help reduce the hided cost related to the change.

Recommendations

The organization's culture toward change, due to the nature of people in the departments, where majority of the employees have worked in the organization for more the fifteen years was rigid. we are bond to meet people with strong resistance to change as they are used to doings things in a particular way. This study will be relevant to organizations with high number of an aging staffs e.g. the owned organizations. Employee empowerment need to be improved in the organization, top management must be willing to listen to good ideas from lower level staffs, and not take credit for it. They should try to avoid having a rigid hierarchy where all decisions are been taking by the senior management without the concert of other staffs.

The organization should also have standardized IT service management principle and policy for guidance. Standards like ITIL, Cobit and PRINCE 2 can be adopted by the IT department for guidance in managing their services. These set of guidance will provide a more comprehensive and standardize form of managing IT service as to the traditional form being used by the organization. This can be done by employee learning schemes on IT service management courses.

Further studies can be conducted in social and technical acceptance of IT-mediated changes, while looking at the phenomena's attributed to resistance or acceptance of change in new technology in organizations.

Reference

Brightman, B. K., & John W. M. (2001) Managing organizational priorities. *Career Development International* 6.5 244-288.

Broadbent, M., & Weill, P. (1997). Management by maxim: how business and IT managers can create IT infrastructures. *MIT Sloan Management Review 38*(3) 77.

Chanopas, A., Krairit, D., & Ba Khang, D. (2006). Managing information technology infrastructure: a new flexibility framework. *Management Research News*, *29*(10), 632-651.

Continual Service Improvement, (2007). ISBN 9780113310494

Cooper, T., Ludlow, M., & Clift, T. (2007). Examining the role of Eco-labels in changing the Approach to Sustainability in the Commercial Fisheries. *Greener Management International* (57) 27.

Davenport, T. H., & Short, J. E. (1990). The new industrial engineering: information technology and business process redesign.

Hartono, E., Li, X., Na, K. S., & Simpson, J. T. (2010). The role of the quality of shared information in interorganizational systems use. *International Journal of Information Management 30*(5) 399-407.

Lainhart IV, J. W. (2000). COBIT™: A methodology for managing and controlling information and information technology risks and vulnerabilities. *Journal of Information Systems 14*(s-1) 21-25.

OGC Office of Government Commerce (OGC): ITIL V3, The Stationery Office (TSO)

Ridley, G., Young, J., & Carroll, P. (2004). COBIT and its Utilization: A framework from the literature. In *System Sciences, 2004. Proceedings of the 37th Annual Hawaii International Conference on* (pp. 8). IEEE.

Sallé, M. (2004). IT Service Management and IT Governance: review, comparative analysis and their impact on utility computing. *Hewlet*

Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information systems research*, *7*(1), 111-134.

Tuttle, B., & Vandervelde, S. D. (2007). An empirical examination of CobiT as an internal control framework for information technology. *International Journal of Accounting Information Systems 8*(4) 240-263.

t-Packard Company, 8-17.

Service Operation, (2007). ISBN 9780113310487

Service Transition, (2007). ISBN 9780113310487