

Technology Adoption Management Strategies and Organizational Performance: Evidence from Telecommunication Industry in Nigeria

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Abstract: *This study examined the effect of technology adoption management strategies on organizational performance: evidence from telecommunication industry in Nigeria. The cross-sectional survey research design method was employed in the study because it helps to collect data from respondents at a particular point in time. The total population is 390 which consist of the Customers and the employees of Airtel Telecommunication firm. For this study, a sample of 197 respondents has been drawn from Airtel telecommunication is south-south region in Delta State using the Taro Yamane formula. The finding reported that technology innovation has the positive effect on organizational performance ($\beta = .233, P < 0.01$). It was reported that IT network infrastructure has a positive effect on organizational performance ($\beta = .345, P < 0.01$). The researcher therefore concluded that IT network infrastructure has effect on organizational performance. Organizations and business managers should pay significant attention to integrating the design of applications and network support into the design of the business operations as part of business process change projects. The study recommends that flow of information between members of the supply chain ensuring the timely delivery of goods and services between supply chain partners.*

Keywords: Technology Adoption Management Strategies; Technology Innovation; It Network Infrastructure; Organisational Performance

Introduction

Technological evolution will continue to accelerate the future in this modern world of rapid high-technology changes. Organisation productivity depends on the successful incorporation of appropriate technology into the organisation. Technological advancements have completely restructured organisations by making their business processes highly effective and smooth-running than ever. Organizations use technology to facilitate work, making it easier and faster, as well as to improve competitiveness and innovativeness (Tidd, Bessant and Pavitt, as cited in Ezuma, Hamzah, Ismail & Abdullah, 2019). Studies have also shown that technology usage in organizations, especially those in manufacturing, yields much more finished products. The result is increased profits, the amount of which depends on the level of adoption and sophistication (Hayes, Wheelwright and Clark, as cited in Ezuma, Hamzah, Ismail & Abdullah, 2019). This implies that technology usage requires developing skills and expertise to use technology to enhance production, and as such, the importance of technology usage cannot be over emphasized, specifically in medium-sized manufacturing enterprises (Shipton, Dawson, West and Patterson, 2002). Network competence, on the other hand, is a relational competence which requires that firms adopt a networking managerial mind-set to build strategic advantage (Chaudhuria and Boer, 2016).

Thus, the adoption of information technology has affected, directly and indirectly, the organizational performance. The performance of the organization reflects its ability to achieve its objectives in the long run (Schermerhorn, Osborn and Hunt as cited in Ughovero, Ogundare & Akparobi, 2021). Furthermore, the performance is the final result which is seeking to achieve the organizations through the formulation of the strategy, and the exploitation of resources in an optimal way to get to superior organizational performance (Dewett and Jones as cited in Ughovero, Ogundare & Akparobi, 2021). As a result, the research focuses on the technology adoption management strategies for organizational performance.

Statement of the Problem

Nigerian manufacturers, unfortunately, found it difficult to compete with foreign manufacturers. The local companies cannot compete with the foreign counterparts in terms of product quality and other areas of marketing capabilities.

Players in the industry are bemoaning the lack of funds needed to completely enable the network, claiming that a strong telecom network is essential for economic development. Over the years, Telecommunication continued to grow as an organization and this involved a change in its operations and processes.

There was tremendous growth in the number of technological devices used by employees` in telecommunication and investments in data management and communications systems. There was a need to find out if that was contributing positively to the organizational performance, hence the essence of this research. Anticipated changes in organizational performance involve a reduction in the duration taken in processing critical tasks and elimination of repetitive tasks resulting in higher productivity and efficiency as well as better and quality service delivery. As a result, the research focuses on the technology adoption management strategies for organizational performance.

Objectives of the Study

The general objective of this research study is to examine the effect of technology adoption management strategies on organizational performance: evidence from telecommunication industry in Nigeria. The specific objectives are to:

- i. Determine the effect of technology innovation on organisational performance.
- ii. Examine the influence of IT network infrastructure on organisational performance.

Research Questions

This study is guided by the following research questions:

- i. What influence does technological innovation have on organisational performance?
- ii. What is the effect of IT network infrastructure on organisational performance?

Significance of the Study

It is hoped that the management will use the findings as the base upon which to review organisational performance and necessary improvements identified will be undertaken to enhance performance at the work place and increase operations efficiency. It is also hoped that the findings will also be used by human resource management to help in boosting employee performance.

Scope of the Study

The study focused on Airtel telecommunication in South-South region in Delta State. The study is restricted to the assessment of the effect of technology adoption management strategies in organizational performance. The dimensions of the technology adoption management strategies to be covered in the study include technological innovation, internet application, IT network infrastructure and IT knowledge and how they affect organizational performance in the Airtel telecommunication firms in South-South region, Delta State, Nigeria.

REVIEW OF LITERATURE

Review of Concepts

Concept of Technology Adoption Management Strategies

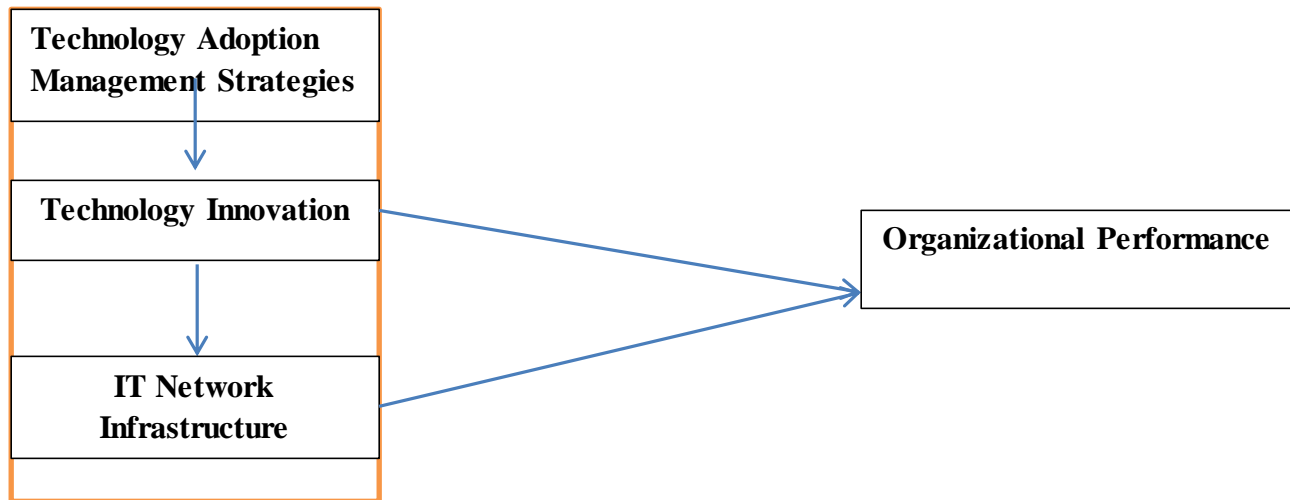
Although there are exceptions, many scholars nowadays agree that both dimensions are essential and that innovation comes in various forms. Differentiating between types of innovation is necessary for understanding innovative behaviour in organizations (Damanpour, 1991). Despite the importance of non-technological innovations, a technological perspective on innovation has dominated past research (Pareira & Romero, 2013).

A closer look shows that, in addition to the difference between technological and non-technological innovation, two other dimensions or classifications have gained a lot attention in the literature. These are, respectively, product and process innovations and radical versus incremental innovations (Utterback, as cited in Shahla, 2017). Damanpour argues that "all types or dimensions of innovation do not have the same characteristics, do not follow the same process of implementation and finally, do not relate equally to the same predictor variables"

Organizational Performance

Firm performance, therefore, is the accomplishment of giving goals by an organization, with value added that is quantifiable. Firm performance is a collective effort by all the resources within the firm. How these resources are put to use will determine the performance. Human capital is one key resource that if well selected, trained, rewarded and motivated, will contribute to improved performance. Organizations have come up with different ways of measuring and rewarding individual performance, which is in itself the key component to firm performance. Reward systems have been put up not only by individual organizations but also by industries to recognize and award good performance. In an economy where information and service are key competitive advantages, people's actions in their positions are just as important as their performance. Therefore, if effective performance is to be encouraged in organizations, there are needs to focus not only on what people do but also how they do it. Effectiveness and efficiency have to be incorporated into all operations within an organization.

Firm Performance is a multi-dimensional concept whose definition depends upon the indicators used to assess it. A common distinction is between financial and non-financial measures and different tools have been used to measure performance. Kaplan and Norton (2000) an organizations best performance measurement tool is the balanced scorecard as it includes both financial and non-financial parameters. Kaplan and Norton (2000) the parameters of measurement within the balanced scorecard have evolved. Organizational performance can be measured in four parameters namely-; financials, customer service, internal business processes and learning and growth. Financial measures focus on the net worth of the organization to the shareholders. It is measured through trend analysis and profitability ratios, annual turnover, net profits, total assets turnover and earnings per share. The firm`s solvency and financial performance can be derived from financial reports and can be compared over time. Customer service, internal business processes and learning and growth in the organization are also measurable and manifested at all levels of the organization.

Conceptual framework**Independent Variable****Dependent Variable****Source: Researcher's Model, 2023****Technology Innovation and Organizational Performance**

It is often suggested that IT has become so ubiquitous an investment that it is assumed to provide value, increase productivity, and competitiveness as a matter of course. However, investments in IT have not always resulted in the expected gains (Tippins & Sohi, 2003; Bhatt & Grover, 2005). Big data is a good example of this. It is argued here that large quantities of data are difficult for people to interpret and make sense of on such grand scales (Romme & Dillen, as cited in Chegus, 2018), which may obstruct effective interpretation and use of such information (Calvard, 2015), resulting in cherry-picking of data and inability to recognise trends and make reasonable generalisations (Calvard, 2015). Failure to properly comprehend the data being relied upon to make organizational decisions may distort intentions, discourage the use of technological aids, or worse, set the scene for poor organizational decision making based on misunderstanding and misplaced confidence in the decision-making processes. The simple existence of a big data infrastructure is not sufficient for enhanced organizational processes as the potential for improper use of technology may undermine competitive positions. Technologies, such as big data, then need additional context to provide a competitive advantage.

Technology in the organization has traditionally been studied from two main perspectives, the information technology/information systems (IT/IS) perspective and the organizational studies perspective. The former has tended to be more concerned with development and application of specific IT tools while the latter tends to develop and test broad theoretical explanations for organizational behaviour (Orlikowski, 2001). Various tools used in companies include communication technology, information archives, databases, and analytical and computational skills. Work on specific technologies includes Orlikowski's (2001) investigation of telecommuting, Dodgson et al case study of virtualization technology, Myreteg's (2015) study of the use of enterprise resource planning systems, and Calvard's (2015) insights through big data. Areas that have not traditionally used IT have also started to embrace its use (Tippins and Sohi, 2003; Real, Leal and Roldán 2006; Calvard, 2015). Modern examples include human resource management (HRM), customer relations management (CRM), enterprise resource planning (ERP), and social media integration. It is not only the quantity of informational products that is growing, but also the variety of information itself (Calvard, 2015) as together, these tools cover a vast swath of different data types and ranges of information. Many current business processes that rely on data transfers, reports, and analyses have turned to data repositories. Information management methods often encompass modern incarnations of data repositories. For example, resources that help in information storage, organization, retrieval, and sharing (King, 2009) are often referred to as big data, databases, which can store and move vast amounts of data at high speeds (Calvard, 2015).

IT Network infrastructure and Organizational Performance

Infrastructure is defined as (1) an underlying framework, particularly for an organization or a system; and (2) the basic facilities, services, and installations required for the functioning of a community or society, such as transportation and communications systems, according to the American Heritage College Dictionary. Thus, an infrastructure is the foundation or base upon which something else "runs" or "operates." In other words, it is the foundation or base without which something else cannot run or operate. The concept of IT infrastructure is generally consistent and agreed upon by researchers. IT infrastructure, as described by McKay and Brockway as cited by William and Weidong (2015), is the enabling base of shared information technology resources on which business relies. They consider IT infrastructure to be a part of the IT architecture that is used by all. Earl defines IT infrastructure as the technical base of computer, communications, data, and basic structures, as cited by William and Weidong (2015). He sees IT infrastructure as the technological system that helps the company meet its business and management objectives. IT infrastructure,

according to Duncan (as cited by William and Weidong (2015), is the collection of IT tools that allow for both innovation and continuous improvement of IT systems.

Broadbent and colleagues IT infrastructure, as described by William and Weidong (2015), is the backbone of budgeted-for IT capacity (both technological and human), shared across the firm in the form of reliable services, and typically controlled by the IS community. As a result, IT infrastructure is widely regarded as the bedrock of shared IT capabilities that allow the creation of IT applications and the management of business processes.

IT infrastructure is described in this study as a collection of IT resources and organizational capabilities that are shared across the enterprise and serve as the foundation for the development of IT applications and the support of business processes. Generally, correct and precise achievement of information technology seems to be difficult. Until 1980, computer was the only technology which was covered as the information technology. Currently, IT has become like an umbrella which includes a group of equipment, services, functions and basic technologies. Computers, multimedia systems, and telecommunication technologies are all examples of information technology.

The Information Technology Association (ITA) is a technology that researches, creates, implements, supports, and manages computer-based information systems, especially software and hardware programs. In sum, IT deals with issues such as using electronic computers and software to turn, store, protect, process, transfer and retrieve information securely. IT is a device many other devices which managers can use to solve problems

IT is a branch of technology that uses hardware, software, and NetWare to allow the analysis, use, and processing of data in the areas of storage, manipulation, transfer, management, control, and automated data preparation. Infrastructure, work, and human resources are three axes to remember when using IT in organizations. The technology axis' rules and regulations are network and technological equipment, while the feature axis' rules and regulations are electronic training, paperless systems, teleconferences, E-government, E-commerce, and so on. Human resources refer to all employees who work in the storage, processing, and distribution of information, as well as those who work with hardware and software. Training, increase of skills and categorisation are the substantial axes of human resources. Many researchers have searched the influence of using IT companies. In the meantime, the influence of IT in the financial performance of companies had an important role.

Allamah, Zare and Davoodi (2011); Laudon and Laudon (2012); and O'Brien and Marakas (2008) they pointed out that the information technology means the development and management techniques used by the organization represented with instruments, software, networks, databases, communications and human skills programmers and end-user. While, Scott and Walczak (2009) confirmed that the tools of information technology infrastructure based on the computer, are including the collection, storage, processing and storage of data and information. On the other hand, Love, Fong and Irani (2005) noted that the infrastructure density of information technology could lead to improving the performance and make the organization more superior over its competitors from organizations that do not invest in information technology. The importance of information technology infrastructure can be considered as a key dimension to the kinds of capabilities of information technology in business organizations (Byrd and Turner, 2001). As information technology infrastructure capabilities will be available to support new applications and initiatives in the organization (Mithas, Ramasubbu, Krishnan and Sambamurthy 2007).

Profile of Organizations used

Airtel Nigeria

Airtel Nigeria is headquartered at Plot L2, Banana Island, Ikoyi, Lagos, a major economic nerve-point in Nigeria. Econet Nigeria was founded in 2001 and was granted a Digital Mobile License (DML) for communication services in Nigeria. On August 5, 2001, it made history by becoming the first telecommunications service provider in Nigeria to introduce commercial GSM services. As management changed hands in 2004, Vodacom took over the group.

Vee Networks took over the company in 2004 and changed its name to Vmobile. Celtel purchased Vmobile in May of 2006. In 2008, another telecommunications firm, Zain Group, paid over \$3 billion for all of Celtel International's shares. Celtel Africa's operations were rebranded from Celtel to Zain as a result of this purchase. Bharti Airtel, the parent company of Airtel Nigeria, completed the \$10.7 billion acquisition of Zain Group's Africa sector in 2010. Airtel Nigeria has an estimated 46.8 million subscribers, accounting for 26.8% of the market, and with 32.4 million subscribers in July 2019, it is the second-largest mobile internet user in Nigeria.

Theoretical Review

2.3.1 The Technology Acceptance Model

Emerging information technology cannot deliver improved organizational effectiveness if it is not accepted and used by potential users. Technology Acceptance Model (TAM) is one of the most successful measurements for computer usage effectively among practitioners and academics (Davis as cited in Ughovero, Ogundare & Akparobi, 2021). TAM is consistent with (Rogers as cited in Ughovero, Ogundare & Akparobi, 2021) theory on diffusion of innovation where technology adoption is a function of a variety of factors including; relative advantage and ease of use.

Two particular beliefs are addressed through TAM; perceived usefulness and perceived ease of use. Perceived usefulness is defined as being the degree to which a person believes that the use of a system will improve his performance. Perceived ease of use refers to the degree to which a person believes that the use of a system will be effortless. TAM attempts not only for prediction but also for explanation to help researchers and practitioners identify why a particular system may be unacceptable and pursue appropriate steps. In conclusion, the researcher suggested that, for organizations to achieve their set goals, all employees should be considered relevant in the aspect of technology adoption because it stands as a veritable key to organizational success. Policies that will break the back bone of stereotyping and bias categorizations should be regularly formulated and implementations, if the organization must achieve its corporate goals. The Technology Acceptance Model (TAM) is relevant to this work because it helps to know technology adoption management strategies that will be suitable for an organization to be effective in operations.

Empirical Review

Mukail and Yusuf (2020) investigate the effect of technological innovation of organizational performance of Dangote Plc, Ibesa Plant, Ogun State. The objective of the study was decomposed to find out the impact of Strategic planning capability & Marketing Planning Capability on Organizational Performance. A descriptive survey design was adopted for this study. A sample size of 96 employees in the study area was conveniently selected by the researcher to aid effective result. A structured questionnaire was utilised to collect the needed data from the respondents. The collected data was analysed using simple percentage statistics while the hypotheses were tested using linear regression analysis. The finding of the study revealed that strategic planning capability and marketing capability have positive relationship with organizational performance ($p=0.000$). Following the findings of the study, it was recommended that there should be pragmatic strategic planning capability in order to deliver superior performance and ultimately sustained competitive advantage.

Monika, Omkar, Nurhizam, & Zainudin, (2020) investigates the impact of technology adoption on organisation productivity. The framework has three independent variables viz. technological change, information technology (IT) infrastructure, and IT knowledge management and one dependent variable as organisational productivity. An explanatory research design with a quantitative research method was employed, and data was collected using a self-administered questionnaire using online as well as an offline survey. The sample consisted of 300 IT managers and senior-level executives (production as well as service team) in leading IT companies in Malaysia selected using snowball sampling. Normality and reliability assessment was performed in the first stage utilising SPSS 22, and Confirmatory Factor Analysis (CFA) was performed with maximum likelihood estimation to assess the internal consistency, convergent validity, and discriminant validity. Finally, Structural Equation Model (SEM) and path analysis are conducted using AMOS 22. The research findings demonstrated that technological change and IT infrastructure positively and significantly impact the organisation's productivity while IT knowledge management has significant but negative impact on organizational productivity of IT companies in Malaysia. The research concludes that all three factors plays important role in deciding organizational productivity. Recommendations, implications, limitations and future research avenues are discussed.

Ezuma, Hamzah, Ismail, and Abdullah, (2019) investigated whether network competence matters in the relationship between technology usage and organizational performance of medium-sized manufacturing enterprises in the state of Lagos, Nigeria. This study examines the conceptual relationships in the Nigerian context. The data for the study were based on the responses to structured questionnaires that were completed by 245 owners/managers of medium sized manufacturing enterprises. The Statistical Package for Social Sciences (SPSS) was used for descriptive analysis (mean values, frequencies and percentages), and Structural Equation Modelling (SEM) using AMOS was employed for inferential statistics. Furthermore, the mediating effect was examined using bootstrapping analysis. HRD indicators for performance (namely effectiveness, efficiency, development, satisfaction, innovation, and quality) were used to measure organizational performance. The findings showed that the integration of network competence practices and technology usage did translate to improved organizational performance. Network competence served to promote a degree of trust within and outside interdependent firms. Furthermore, practices related to development of the individual's skills in technology usage should be adopted to improve organizational performance. The findings indicated that network competence partially mediated the relationship between technology usage and organizational performance of medium-sized manufacturing enterprises. The findings would help Nigerian owners/managers involved in medium-sized manufacturing enterprises adopt the right human resource development practices, including the development of technology usage skills and network competence capabilities.

METHODOLOGY

The cross-sectional survey research design method was employed in the study because it helps to collect data from respondents at a particular point in time. The justification for choosing this method is that surveys are ideal for scientific research studies. The total population is 390 which consist of the customers and the employees of Airtel Telecommunication firm. For this study, a sample of 197 respondents has been drawn from Airtel telecommunication is south-south region in Delta State using the Taro Yamane formula. The probability sampling method was used with the stratified random technique. This is due to the fact that the researcher grouped the population into strata such as senior, middle and lower management staff. To establish the reliability of the research instrument, Cronbach's alphas were used as a basis of judgment. The Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group.

Table 1: Reliability Statistics

Cronbach's Alpha	N of Items
technology innovation	.876
IT network infrastructure	.888
organisational performance	.863

Source: SPSS Output, 2023

RESULTS AND DISCUSSIONS

This chapter presents the analysis of data collected from the management staff and customers of Airtel telecommunication firm in south-south region. Out of the 197 set of questionnaire administered, 150 copies were retrieved and was used for the analysis, which is 76%.

Table 2 Correlation matrix between studied variables

Correlations				
		technology innovation	IT network infrastructure	organisational performance
technology innovation	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	150		
IT network infrastructure	Pearson Correlation	.477**	1	
	Sig. (2-tailed)	.000		
	N	150	150	
organisational performance	Pearson Correlation	.523**	.535**	1
	Sig. (2-tailed)	.000	.000	
	N	150	150	150
**. Correlation is significant at the 0.01 level (2-tailed).				

Source: Research Data (2023)

The result in table 2 shows that the tested variables showed an overwhelming positive correlation ranging from (.477 to .535.) Implying that, there is a significant positive association between the variables of technology adoption management strategies and organisational performance.

Regression Analysis

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.996 ^a	.993	.993	.1636

a. Predictors: (Constant), technology innovation, IT network infrastructure

Source: Research Data (2023)

As shown in Table 3, the four items of independent variables that were studied explain .993 (93.3%) of the organisational performance as represented by the R². Therefore, further research should be conducted to investigate the other factors (0.7%) that affect organisational performance.

Table 4: Multiple Regressions

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

	(Constant)	.233	.150		1.559	.121
1	technology innovation	.273	.178	.233	1.348	.002
	IT network infrastructure	.998	.129	.345	1.821	.000

a. Dependent Variable: organisational performance

Hypotheses Testing

The Decision Rule

If the probability value calculated is greater than the critical level of significance, then the null hypotheses will be accepted while the alternate hypotheses is rejected and vice versa. If the probability value of 0.00 is smaller than the critical value of 5% (i.e. $0.00 < 0.05$), we conclude that the given parameter is statistically significant. In this situation, it is accepted that there is need to reject the null hypotheses and to accept the alternate.

Hypothesis One (H_{01}): Technology innovation has no significant effect on organisational performance

The multiple regression table 4; expresses how technology innovation influences organisational performance. The regression analysis for technology innovation and organisational performance on the test of hypothesis one, table 4 indicated that the exact level of significance calculated (.002) is less than the probability of committing a type error (0.05). Given the result, the null hypothesis would be rejected and the alternate accepted. Thus, implying that, there is a statistical significance relationship between technology innovation and organisational performance.

Hypothesis Two (H_{02}): IT network infrastructure has no significant effect on organisational performance

Table 4 shows how IT network infrastructure influences organisational performance. The exact level of significance (.000) is less than the probability of committing a type one error (0.05). There is the need therefore to reject the null hypothesis stating that there is a no significant relationship between IT network infrastructure and organisational performance, while accepting the alternate that stated otherwise. Hence, there is a significant positive relationship between IT network infrastructure and organisational performance.

Discussion of Findings

Technology Innovation and Organizational Performance

It was reported that technology innovation has the positive effect on organizational performance ($\beta = .233$, $P < 0.01$). In furtherance, the test of hypothesis indicated in table 4, reveals that there is a significant relationship between technology innovation and organizational performance ($.002 < 0.05$). These findings disagree with the view of Prhanlad and Hamelas cited in Adeyeyetolulope, (2014) Technological innovation is a tool for economic growth and the application of those inventions to meet emerging business opportunities, and to meet social needs, and environmental challenges. For any organization to be able to compete, it must be technologically innovative. Technological innovation and core competitiveness enjoy symbiotic relationship.

IT Network Infrastructure and Organizational Performance

It was reported that IT network infrastructure has a positive effect on organizational performance ($\beta = .345$, $P < 0.01$). In furtherance, the test of hypothesis indicated in table 4, reveals that IT network infrastructure has a significant relationship with organizational performance ($.000 < 0.05$). These findings are consistent with Scott and Walczak (2009) confirmed that the tools of information technology infrastructure based on the computer, are including the collection, storage, processing and storage of data and information. Love, Fong and Irani (2005) noted that the infrastructure density of information technology could lead to improving the performance and make the organization more superior over its competitors from organizations that do not invest in information technology.

Conclusion

Technology innovation affect organizational performance, Organizational learning is required to obtain the long-term knowledge necessary to satisfy the resource-based view conditions of internet technology as a competitive advantage.

The study further concludes that IT network infrastructure has effect on organizational performance. Organizations and business managers should pay significant attention to integrating the design of applications and network support into the design of the business operations as part of business process change projects.

Recommendations

ICT infrastructure in procurement improves communication, enhances efficiency, enhances monitoring and control, makes work easier as well as improving service delivery. ICT infrastructure also plays an important role in improving the level of coordination between members of the supply chain network. It facilitates the flow of information between members of the supply chain ensuring the timely delivery of goods and services between supply chain partners.

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