ISSN: 3187 – 7288
Volume 8, Number 2, 2020
International Journal of Innovations in Accounting and Economics Management

INTERNET OF THINGS AND IT AGILITY IN TELECOMMUNICATION COMPANIES IN NIGERIA

Jemima Ogechukwuka Irabor-Ighedosa
Department of Management, Faculty of Business Studies
Ignatius Ajuru University of Education, Port Harcourt, Rivers State, Nigeria

Email; ojemima@yahoo.com; jemimairabor@gmail.com

Abstract

This study investigated the relationship between internet of things and IT agility. The study was carried out in telecommunication firms in Nigeria.. Survey design was adopted in the generation of data. The instrument for data collection used in this study was the questionnaire. The target population of the study comprised the three hundred and sixty (360) employees in four telecommunications companies. From the population, using Krejcie and Morgan sample determination table a sample size of one hundred and eighty-six (186) respondents was used for the study. Descriptive statistics (mean, standard deviation, and percentages) were used as statistical tools for analyzing the data, while Spearman Rank Order Correlation was used as statistical tools to test the hypotheses with the Statistical Package for Social Sciences (SPSS). Findings revealed that there is positive relationship between internet of things and IT agility. Hence the study concludes that hike in internet of thins improves the agility of telecommunication companies. Therefore, among other recommendations, the study strongly suggests that telecommunication firms greatly build a strong organizational culture in order to adapt to emerging change brought about by the adoption of internet of things

Keywords: Internet of Things, Information Technology, Agility, Telecommunication

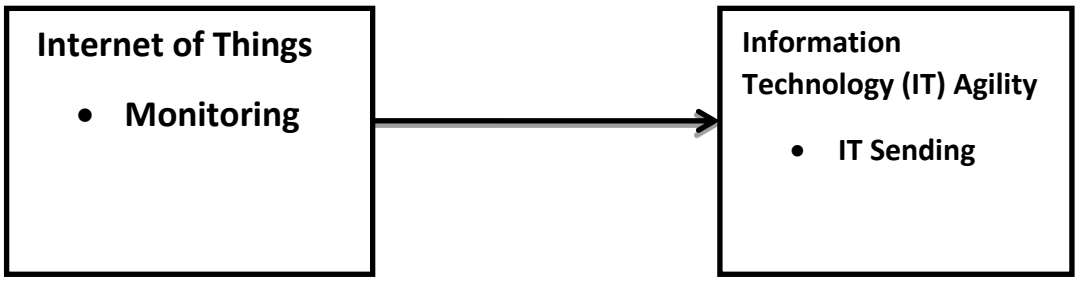
Introduction

Over the years, man has continually sought to better his life and his environment and ultimately to reduce the weight of hard work on his lifespan and Information Technology agility. The pursuit of man has made for a very agile environment which has produced countless changes to which he must adapt. His adaptability to everyday changes whether geographic, economic, technological etc, is a determinant of his survival and attainment of progress in his new world characterized not only by new innovation agility which are interconnected, but also their application and diffusion describing an extraordinary quickening in the rate of growth and change. The Internet of Things is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment and the confluence of efficient wireless protocols, improved sensors, cheaper processors, and a bevy of start-ups and established companies developing the necessary management and application software has finally made the concept of the Internet of Things mainstream. The number of Internet-connected devices (ICD) surpassed the number of human beings on the planet in 2011, and by 2020, Internet-connected devices are expected to number between 26 billion and 50 billion. For every Internet connected PC or handset there will be 5–10 other types of devices sold with native Internet connectivity.

IT function's mandate expands to support transformative activities, aiming at digital value creation and innovation in addition to its traditional focus on automation and information (Dehning *et al.*, 2003). This dual focus bears the potential for tensions, as competing in the digital business world means to act fast and explore, while managing traditional enterprise IT requires stability, reliability, and exploitation of existing resources (Gregory *et al.*, 2015). In response to these tensions, some companies are even structurally separating their IT function into an agile (high-speed) and a legacy (slower-speed) IT unit (Andersson & Tuddenham, 2014; Gartner, 2014). Thus, corporate IT functions need to find a balance and amalgamation of opposing demands for speed and stability (e.g., by enabling rapid innovation releases while maintaining a reliable IT

service architecture)—a capability referred to as IT ambidexterity in the IS literature (e.g., Gregory *et al.*, 2015).
Most of the research currently available is done abroad, where the job market and working conditions are different from the conditions in Nigeria, questioning if the findings from these researches are applicable in Nigeria. Hence, there is a gap in empirical studies with regards to the relationship between internet of things and Information Technology agility.

Operational Conceptual Framework



Hypothesis
H_{o1}: Internet of things does not significantly correlate with information technology agility of telecommunication companies in Nigeria.

Internet of Things (IoT)
Internet of Things (IoT) is a concept and a paradigm that considers pervasive presence in the environment of a variety of things/objects that through wireless and wired connections and unique addressing schemes are able to interact with each other and cooperate with other things/objects to create new applications/services and reach common goals (Atzori Iera, & Morabito, 2010). In this context the research and development challenges to create a smart world are enormous. A world where the real, digital and the virtual are converging to create smart environments that make energy, transport, cities and many other areas more intelligent. The goal of the Internet of Things is to enable things to be connected anytime, anyplace, with anything and anyone ideally using any path/network and any service. Internet of Things is a new revolution of the Internet. Objects make themselves recognizable and they obtain intelligence by making or enabling context related decisions thanks to the fact that they can communicate information about themselves and they can access information that has been aggregated by other things, or they can be components of complex services.
According to (Bradley, Barbier & Handler, 2013) the five main factors increasing the values associated to the IoT are:
a. Increasing the return on research and innovation investments, reducing time to market, creating new business models and opportunities;
b. Increasing the lifetime of customer and adding more customers;
c. Improve utility services such as supply chain and logistics, to a new and more efficient level;
d. Improve business process with the expense on goods reduced;
e. Increasing the employee productivity and efficiency.
The IoT awareness affects a large number of areas and interested parties. The associated values at manufacture industry, the main target of this thesis, benefits in areas like machine auto diagnosis and assets control through sensors installed in machines allowing a faster response to detected problems and remote monitoring of elements such as temperature, raw materials and humidity, adjusting them automatically. The IoT potential is analysed in (Bradley *et al.*, 2013) with examples of critical improvements such as reduction of materials, energy and costs of automated tools, which is less expensive to manufacture and implement. The potential of IoT extends also to

the automated management, detection and self-healing of the machinery, available resources, product quality and other services. Lastly, increased sales from real-time market assessments and reactions, location-based selling and improve coordination with other products and services (two-sided markets).

Information Technology Agility

Driven by the rapid advancements in digital technologies—understood as an assortment of information, computing, communication, and connectivity technologies—the role of enterprise information technology (IT) is undergoing a fundamental shift (Bharadwaj *et al*., 2013). In the past, the IT function has often been viewed as a functional unit with the mere purpose of providing IT services to increase operational efficiency and making information readily available across the organization (Bharadwaj *et al*., 2013). Today, IT is responsible for a value at stake of up to 40 percent of revenue, 20 percent of operational expenses, and sometimes the very survival of the business (Andersson &Tuddenham, 2014). Business leaders across industries have begun to realize the increasing strategic importance of digital technologies and digital innovation for creating competitive advantage, as innovation cycles and processes gain speed (Fichman *et al*., 2014).

Correspondingly, digital strategy elements often make up an indispensable part of successful business strategies, a development that amplifies the growing influence of IT on the creation and capturing of business value for the firm (Bharadwaj *et al*., 2013; Kohli & Grover, 2008). For instance, digital business strategies encompass the digitization of a firm's offerings (i.e., its products and services), the utilization of digital channels to interact with customers, digital customer engagement, and the provision of ancillary digital services to end-customers (Yoo *et al*., 2012). Eventually, digital technologies have the potential to transform traditional business models into digital business models (Hess *et al*., 2016; Matt *et al*., 2015). Numerous examples in the media industry, financial services, and the automotive sector show how digital technologies have not only changed products and services "but also strategic dimensions such as the scope, scale, speed, and sources of value creation." (Sandberg, 2014). Digitization is not a short-lived phenomenon. Therefore, to remain competitive in the digital era and survive digital disruption, it is imperative for incumbent firms to develop IT-related capabilities that allow leveraging the potential from digital technologies (Bharadwaj *et al*., 2013; Rai *et al*., 2012; Ray *et al*., 2005; Sambamurthy *et al*., 2003). Companies that have begun to recognize the possibilities for strategic differentiation and value creation through digital technologies are now placing additional demands on their IT function (Andersson & Tuddenham, 2014). Beyond reliably managing enterprise IT systems, the IT function is now also expected to support digitization (i.e., building up digital business capabilities). Thus, digitization does not only transform the way value is captured along an industry's value chain (Pagani, 2013), but also reinvents the role of a company's IT function. We refer to the IT function as a separate organizational entity which is primarily responsible for the management of information technology (Guillemette & Paré 2012). Thus, the boundaries of the IT function and other business functions can be clearly identified (Chan, 2002).

Organizational Adaptation Theory

This theory as propounded by Fredricksson in 2018 holds that since the technology is new to the consumer market, is widely debated and is hard to grasp. There is thus unlikely that organizations can approach this subject without performing some changes, i.e. adaptation. Proactive and reactive adaptation are concepts aiding the researcher to analyses the current situation at the investigated organization to understand how the organization perceives artificial intelligence but also how they respond to it (Chen *et al*. 2012; Hrebiniak & Joyce 1985). By utilizing proactive and reactive adaptation in the framework, tools are provided to better understand actions by the organization. Proactive and reactive adaptation helps the researcher to observe and study actions taken and if they are based on internal and/or external demands and how the organization

interpreters them (Hrebiniak & Joyce 1985). Artificial intelligence is a big step in the computational development and is versatile in its applications (Lemley *et al*. 2017). Potential environmental and revenue gains have attracted interest in the technology. The technology has many potential benefits but is simultaneously threatening to make many people redundant (Frey & Osborne 2017). Artificial intelligence has the potential to improve the environment in multiple ways (i.e. planet) and inhibits features to increasing efficiency (i.e. profit). The technology does however threaten many job opportunities (i.e. people) (Frey & Osborne 2017). This aspect needs to be attended when analysing an organizational adaptation towards artificial intelligence since most organizations perceives to have obligations towards their employees (Lindgreen & Swaen 2010).
A prerequisite of implementing artificial intelligence is to make information digitalized and accessible, an aspect that can contribute to mistrust against the technology as some individuals might experience perceived privacy violations. Knowledge about prerequisites, possibilities and limitations of artificial intelligence is necessary to analyse it from a neutral perspective and prevent prejudices. It is important to understand how the technology of artificial intelligence works to assess its usefulness. The theory section includes a section about machine learning and deep learning (which is the basic technology behind artificial intelligence) to provide the reader with essential knowledge of artificial intelligence so that the reader independently can assess the technology.

Methodology

Research Design

The research design adopted in this study by the researcher was the cross sectional correlational survey design.

Population of the Study

The targeted population was obtained from four Telecommunication companies in Nigeria and with offices in Port Harcourt, Rivers State. These companies were: MTN, Global-com, Airtel, and 9mobile. The population consists of these four organizations with a size of three hundred and sixty (360) employees comprising one hundred and one (101) employees of MTN, eighty-five (85) employees of 9mobile, eight-five (85) employees of Airtel and eighty-nine (89) employees of Global-com.

Sample and Sampling Techniques

The sample size for the study was determined using Krejcie and Morgan (1970) sample size determination table. The table was used to obtained the sample size of 186 employees based on the total population of 360 employees in the four Telecommunication companies. The sampling technique was purposive sampling for top and functional management and random sampling for supervisors and workforce. Bowley (1926) proportional allocation formula was used to allocate sample size for each company.

TABLE 1 Summary of Sample Size

S/N	TELECOM COMPANIES	Top Mgt	Functional Mgt	Supervisors	Workforce	Total
1	MTN	5	10	7	30	52
2	9mobile	4	10	7	23	44
3	Airtel	5	11	7	21	44
4	Global-com	5	12	8	21	46
	Total	19	43	29	95	186

Source: Field Survey, 2019.

Methods of Data Analysis

The copies of questionnaire were coded for analysis using SPSS version IBM 23. Descriptive statistics of percentage, mean and standard deviation was and Inferential statistics (Spearman's Rank Order Correlation Co-efficient) were used for data analysis.

Results

Hypotheses 1-3: Internet of Things and agility

Table 2 Analysis of Relationship between Internet of Things and IT agility.

			IoT	ITA
Spearman's rho	IoT	Rho	1.000	.564**
		Sig. (2-tailed)	.	.000
		N	181	181

Source: Source: SPSS Data Output, 2020

The result in table 2 showed that there is a significant correlation between Internet of Things and Information Technology Agility and rate evidenced by the correlation coefficient (rho) of 0.564 at $p< 0.05$. On this premise, the null hypotheses were rejected hence there is a moderate to weak positive relationship between the adaptation to Internet of Things and IT agility of telecommunication firms.

Discussion

Internet of Things and IT Agility:

Result of correlation analysis of Internet of Things and IT agility divulge a low to moderate association between the use of Internet of Things and variables of IT Agility. In all, the study showed a significant positive correlation of Internet of Things with IT agility of the telecom firms. This result is in agreement with the findings of Otieno (2008) which depicted that if technological advancement which include Internet of Things are not properly implemented it can result to colossal increase in competitive advantage of the firm. It also confirms the assertion of Ovia (2000) which stated that increased dependence on the development of information technology would not be far from the high correlation of IT advancement with organizational performance of the telecommunication industry. The situation beyond the borders of Nigeria is not different as other international studies also confirmed the findings of this study. One of such is De Yong, *et al* (2007) who reported that internet adoption improved telecoms firm's profitability in U.S. community.

Conclusions

The study having taken cognizance of necessary precautions and carried out the research, carefully handling data and analyzing it, concludes that there is a positive and significant relationship between study variable (Internet of Things and IT agility)

Based on the result it is concluded the use of various aspects of internet of things has a great effect on the IT agility of telecommunication companies.

Recommendations

Judging from the findings of the study, the researcher hereby makes the following recommendations:

1. Since internet of things positively correlates IT agility, telecommunication firms should improve on their adaptation to internet of things as well as other emerging technological advancement in to further improve their IT agility.
2. Since Competitiveness of a telecom firm's product in the market is dependent on its agility which is dependent on strong cultural practice, it is therefore important that telecommunication firms greatly build a strong organizational in order to adapt to emerging change brought about by the adoption of internet of things

References

Andersson, H. & Tuddenham, P. (2014). Reinventing IT to support digitization, McKinsey & Company (May) (available at http://www.mckinsey.com/insights/business_technology/reinventing_it_to_support_digitization)

Atzori, L., Iera, A. & Morabito, G. (2010). The Internet of Things: A survey of *computer networks*, *54*(15), 2787–2805. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1389128610001568.

Bahrami, M. A., Kiani, M. M., Montazeralfaraj, R., Zadeh, H. F. & Zadeh, M. M. (2016). The mediating role of organizational learning in the relationship of organizational intelligence and organizational agility. *Osong Public Health and Research Perspectives*, *7*(3), 190–196.

Bradley, J., Barbier, J. & Handler, D. (2013). Embracing the Internet of everything to capture your share of $ 14. 4 Trillion. Cisco.

Chen, Y., Chang, C. & Wu, F. (2012). Origins of green innovations: The differences between proactive and reactive green innovations. *Management Decision*. 50(3), 368-398.

Dehning, B., Richardson, V. J. & Zmud, R. W. (2003). The value relevance of announcements of transformational information technology investments*, MIS Quarterly,* (27), 637–656.

Fichman, R. G., Dos Santos, B. L. & Zheng, Z. (2014). Digital innovations as a fundamental and powerful concept in the information systems curriculum, *MIS Quarterly, 38*, 329–353.

Fredriksson, S. (2018). Organizational adaptation towards artificial intelligence: A case study at a public organization, Faculty of Health, Science and Technology unpulish Master thesis, Karlstads universitet.

Frey, C. B. & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*. 114(1), 254-280.

Gartner (2014). Three steps to successfully implementing bimodal-aware IT governance, (available at https://www.gartner.com/doc/2901217/steps-successfully-implementing-bimodalaware-it

Gregory, R. W., Keil, M., Muntermann, J. & Mähring, M. (2015). Paradoxes and the nature of ambidexterity in IT transformation programs, *Information Systems Research*, *26*, 57–80

Guillemette, M. G. & Paré, G. (2012). Toward a new theory of the contribution of the IT function in organizations, *MIS Quarterly 36*, 529–551.

Hess, T., Matt, C., Benlian, A. & Wiesböck, F. (2016). Options for formulating a digital transformation strategy, *MIS Quarterly Executive 15*, 123-139.

Hrebiniak, L. & Joyce, W. (1985). Organizational adaptation: Strategic choice and environmental determinism. *Administrative Science Quarterly*. *30*(3), 336-349.

Lemley, J., Bazrafkan, S. & Corcoran, P. (2017). Deep learning for consumer devices and services: Pushing the limits for machine learning, artificial intelligence, and computer vision*. IEEE Consumer Electronics Magazine*. *6*(2), 48–56.

Lindgreen, A., & Swaen, V. (2010). Corporate social responsibility. *International Journal of Management Reviews. 12*(1), 1-7.

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies, *Business & Information Systems Engineering*, *57*, 339–343.

Pagani, M. (2013). Digital business strategy and value creation: Framing the dynamic cycle of control points, *MIS Quarterly*, *37*, 617–632.

Rai, A., Pavlou, P. A., Im, G. & Du, S. (2012). Interfirm IT capability profiles and communications for cocreating relational value: Evidence from the logistics industry*, MIS Quarterly*, *36*, 233–262.

Ray, G., Muhanna, W. & Barney, J. B. (2005). Information technology and the performance of the customer service process: A resource-based analysis, *MIS Quarterly, 29*, 625-651

Sambamurthy, V., Bharadwaj, A. & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly*, *27*(2), 237–263.

Sandberg, J. (2014). *Investigating coevolution of IT and business strategies*, Umeå University.