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Internet of Things and Organizational Agility in Telecommunication Companies in Nigeria

[1]Prof. Isaac Zeb-Obipi and [2]Jemima Ogechukwuka Irabor-Ighedosa
[1]Department of Management, Faculty of Management Science
Rivers State University, Port Harcourt, [2]Ph.D Student, Department of Management
Faculty of Business Studies, Ignatius Ajuru University of Education, River State, Nigeria

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

Abstract: *This study investigated the relationship between internet of things and organizational 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 organizational agility. Hence the study concludes that hike in internet of things 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, Organizational, Agility, Telecommunication

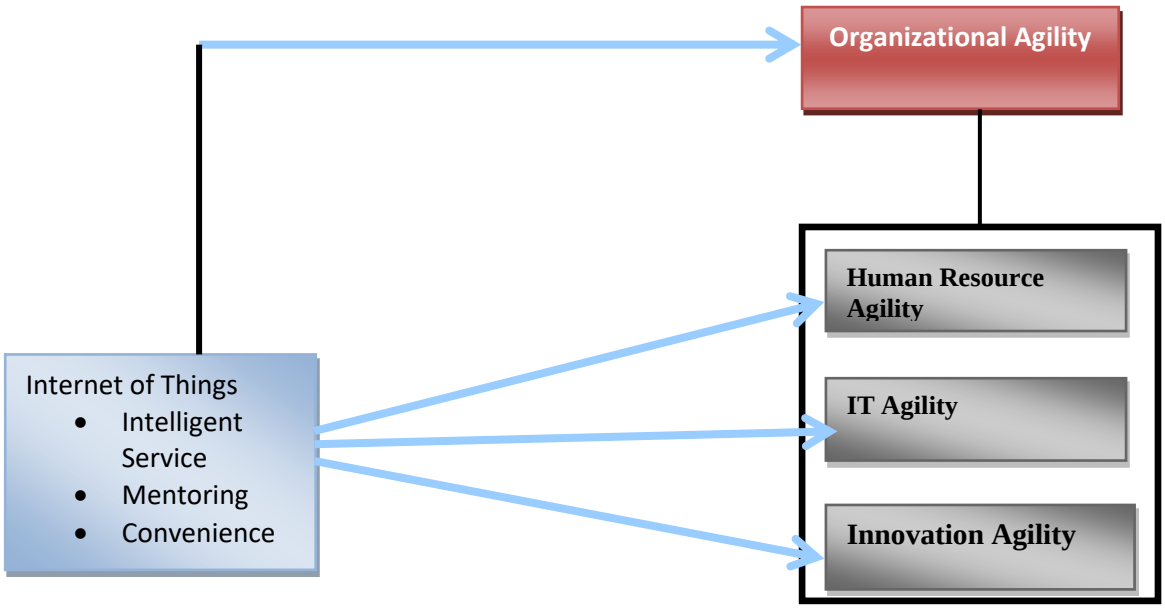
Introduction

More so, today's organizations operate in an environment that rapid changes, make them have adaptive strategies. In fact, organizations problem about being successful in a dynamic and unpredictable environment is known as the most important challenge of today's organizations. Although several mechanisms such as timely production, reengineering, virtual organizations and virtual networks have been introduced, agility is one the most popular. In such an environment, agility has become an important feature that has significant impact on employees' behavior and firm performance. The agility approach that has been introduced and developed since two decades ago is a conscious and comprehensive response to changing needs in competitive environment and obtaining success from the available opportunities. 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.

Agile organizations think beyond mere adaptation to changes, so that they tend to use potential opportunities in a turbulent environment and acquire a particular niche due to their competence and innovation agility (Armstrong, 2000). An agile organizational culture is reflected in Intense customer and market focus with internal systems, structures and processes facilitating this; Anticipation of need, risk and opportunity; Speed of decision making and implementation; Flexibility; Climate conducive to experimentation, innovation agility and shared learning; Employee's empowerment and participation; Team/partnership working across boundaries; Continuous improvement and risk management; and Efficiency and effectiveness (Holbeche, 2011). There are many models for agility, one of them is model of Sharifi and Zhang. Artificial intelligence is a major force driving the need for business agility and at the same time an important capability, which can hinder or enable a firm's level of business agility. Over time, artificial intelligence has developed and matured significantly. Artificial intelligence was relatively expensive in the early days of computing. Efficiency was the primary objective shaping the architecture, while delivering relatively limited performance. Roles and relationships were tightly defined to optimize use of scarce and expensive technology resources (Hagel & Brown, 2001). Different researchers have studied if and how IT resources contribute to higher levels of business agility performance (e.g. Byrd & Turner, 2001; Weill, Subramani, & Broad, 2002; Sambamurthy, Bharadwaj & Grover, 2003). This research builds upon research on information systems investment and application in relation to productivity, firm performance and competitive advantage (Dedrick , Gurbaxani, & Kraemer, 2003; Aral & Weill, 2007). In a recent survey of Cap Gemini (2007) among 300 CIOs worldwide, 87% of respondents believed that the capability of the IT function is critical for achieving business agility. This study seeks to find the relationship between internet of things and organizational agility in telecommunication companies in Nigeria.

Operational Conceptual Framework



Hypotheses

Based on the objectives of the study, the following null hypotheses were formulated:

H_{o1}: Internet of things does not significantly correlate with human resource agility of telecommunication companies in Nigeria.

H_{o2}: Internet of things does not significantly correlate with information technology agility of telecommunication companies in Nigeria.

H_{o3}: Internet of things does not significantly correlate with innovation agility in telecommunication companies in Nigeria.

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.

Internet of Things and Organizational Agility

With the help of the Internet, the supplier, the manufacturer, and the customer will create a single digital ecosystem where all relevant data and information can be accessed immediately in the cloud in order to coordinate activities as efficiently as possible. This is not considered a realistic goal in the foreseeable future by the experts consulted. Customers' expectations come to the forefront for suppliers: They demand speed and flexibility in order fulfilment, and product development. The digital ecosystem also

functions further down: It should be accessible in one place. Thanks to cloud computing, production is completely transformed, and isolated production units merge into a fully integrated, automated, optimized, high-efficiency production process, resulting in a change in the relationship between manufacturers, suppliers and customers (Ehret % Wirtz, 2017). Improving customer relations and responding to customer needs will be achieved by product/service planning based on customers' special needs, innovation in customer service and customization, even including itemized one-piece production volumes. Data analysis enables us to better understand and consider customer needs, which can be used not only for the development of the production process, but also for the creation of a customer-centric supply chain.

IT resources have been identified as one important type of resources in weaving organizational agility (Overby et al., 2006). Agarwal and Sambamurthy (2002) statement that IT plays an important role in corporate agility. As it is clear, information technology is expected to have major effects on organizational agility. In resent time research on information system and practice is subscribing to a common message of agility which consists of: recognition of a business environment that fluctuates quicker than conventional strategic planning cycles; the need to sense environmental fluctuations; the need to respond with options using existing information systems; and organizational readiness to effect the sensing and response. In this article we discuss the internet of things – which is a subset of information technology – and agility. Recognition of an environment and its fluctuations and quick response to them requires information systems. First, the IT function fuses business and technical knowledge to sense the environment; and respond with IT-enabled options for future needs (Sambamurthy et al., 2003). Second, the IT function senses current use of information systems, monitoring and improving the value realized (Overby et al., 2006)

Internet of Things organizes suppliers, manufacturers and customers in a virtual, vertically and horizontally integrated, value chain, so organizations are expected to introduce the appropriate technologies to avoid losing their position and to fully integrate into the customer's network (Stock & Seliger, 2016). Overall, the significant amount of data generated through digitization affects all areas of the company's business, thus improving transparency, integration, and designability, and providing much more information on customer needs and the individual tasks needed to fulfil them. Industry 4.0 also creates completely new value-creating business areas; for example, product design and development, and data security, will become much more important in the future (Porter & Heppelmann, 2014)

IT capabilities can have both direct and indirect impacts on business agility and organizational performance. Haeckel (1999) argues IT capability directly supports sensing and responding capabilities in contemporary environments. Firms increasingly need to process growing amounts of information, for instance detailed tracking & tracing data and RFID data. IT systems enable firms to make sense out of this data, while humans have only limited levels of information processing capacity and are faced with information overload. Similarly, responses in contemporary environments are often too complex for timely implementation without such IT support as communication infrastructure and automation. IT capability is critical for responding to opportunities in IT-driven industries such as financial services, retailing, telecommunications, and hardware/software (Sambamurthy et al., 2003).

Clark, Cavanaugh, Brown, & Sambamurthy (1997) characterize an organization's ability to rapidly develop and deploy critical IT systems as its change-readiness capability, and attribute it primarily to the availability of a skilled internal IS workforce. Effective

collaboration for problem solving, knowledge sharing and innovation is key to realizing the business value of employees (Gray, 2000; Gold et al., 2001). Byrd and Turner (2001) argue that the most important component of a flexible IT infrastructure, responsible for differences in competitive advantage, is IT personnel, followed by integration and modularity. Their results are based on a survey among 207 respondents in medium to large sized companies. The IT personnel construct consists of technical skills, boundary skills (skills and knowledge to assume roles outside area of training or original competences), functional skills (understanding business processes) and technology management (defined as the organizations' ability to deploy IT in the most effective possible manner in support of the business strategies). These findings are congruent with those of Weill (1992), who explains that differences in organizational results from IT investments can be explained by IT personnel. Specifically, the magnitude and quality of the knowledge, skills and experiences of the IT personnel in developing major software applications explain the differences in organizational results. Technical and managerial IT skills typically evolve over long periods of time through the accumulation of experience (Katz, 1974), which explains their tacit nature and importance in contributing to competitive advantage and agility.

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 organizational agility

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

			IoT	HRA	ITA	IA
Spearman's rho	IoT	Rho	1.000	.507**	.564**	.294**
		Sig. (2-tailed)	.	.000	.000	.000
		N	181	181	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 Human resource agility, Information Technology Agility and Innovation Agility rate evidenced by the correlation coefficient (rho) of 0.507, 0.564, 0.294 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 organizational agility of telecommunication firms.

Discussion

Internet of Things and Organizational agility:

Result of correlation analysis of Internet of Things and organizational agility divulge a low to moderate association between the use of Internet of Things and variables of Organizational agility (Human Resource Agility, Information Technology Agility and Innovation Agility). In all, the study showed a significant positive correlation of Internet of Things with organizational 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 organizational agility)

Based on the result it is concluded the use of various aspects of internet of things has a great effect on the organizational 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 organizational agility, telecommunication firms should improve on their adaptation to internet of things as well as other emerging technological advancement

in to further improve their organizational 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

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