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Neural Networks and Organizational Agility in Telecommunication Companies in Nigeria

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Abstract: This study investigated the relationship between neural networks 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, 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 neural networks and organizational agility. Hence the study concludes that hike in neural network 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 neural networks.

Keywords: Neural Networks, Organizational, Agility, Telecommunication

Introduction

Today companies struggle with massive amounts of data they don't know how to handle or even less, how to process. There is a demand for solutions able to process massive amount of data in real-time and simultaneously draw its own conclusions. There is a need for dynamic technology that can manage, control and adapt different processes to sudden changes in the surroundings. Robots and algorithms have previously been able to perform tasks that are monotonous and static with poor abilities to adapt to alterations or changes. Previous technology has also lacked initiative. The capabilities of machine learning are challenging this truth. When training an intelligent algorithm, the code eventually starts making its own assumptions about the sample data and can use these assumptions to adapt to new tasks or do alterations in the current task (LeCun, Bengio & Hinton, 2015). Neural networks are developed by modelling the human brain, to which they are similar in two ways. First, information is acquired by networks in neural networks. Secondly, connections between artificial neurons are used to store information. In neural networks, the artificial network is a processor used to store information and to make it functional (Gelir, 1994). Neural networks consist of the combination of constant non-linear functions (Chenoweth, Obradovic & Stephen, 1996) and the authority of neural networks express the capacity of neural networks (Krose & Smagt, 1996). Neural networks, a simple copy of biological neural networks, have very impressive results despite the superficial connections between neural networks. Neural networks have been

used in many areas (Gelir, 1994). 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).

There are general studies that discuss the possible effects of neural network and organizational agility, but very few can back them up with empirical data. Previous studies examine the subject from an historical (Autor, 2015; James *et al.*, 2017), world economic (Frey & Osborne, 2017) and sustainable (Ramchurn, Kambhampati, Monson & Drew. 2012; Etzioni & Etzioni, 2017; Hengstler, Enkel, & Duelli, 2016) point of view, scrutinizing current and possible implications from an overall perspective. This study intends to determine the influence of neural network and organizational agility in telecommunication companies in Nigeria

Neural Networks and Organizational Agility

In today's business world, with an ever-increasing need for profitability and efficiency, the terms of competition terms and market dynamics change rapidly and naturally Accordingly, it is now needed more than ever to have all business processes keep up with this dynamism. Within the framework of adjusting to this dynamism, agile management methods will perfectly meet the changing business demands since they reveal practical and profitable products and/or results in a rapid and constant way.

In agile methodology, all short-term and product-focused project processes for the operational profitability and efficiency of the organizations include all the functional managers, experts, project team members and mid-level managers. Agile management manages the changes emerging in project processes harmoniously and ensures that rapid, profitable products and results are created. So as to meet the current business demand, it is a requirement to release products (and/or results) in a constant and rapid way, within short cycles.

Agile management ensures that active, agile, profitable and product-focused management has an interactive format via applications, workshops and best-management practices (projeegitimmerkezi, 2014). It is a must for institutions and enterprises to adopt a more flexible approach in their projects and to become more agile in a constantly changing world. Nevertheless, flexible agile approaches might be perceived as daunting or risky for certain institutions which base their projects and programmes on a specific system. Mature agile approaches (agility within the concept of delivery) are required for these project-focused institutions. In addition, agility also offers rapid improvement, change and authorization skills for the team.

For the managers, the advantages of the agile approach to ensure managing successful agile projects are as such: In comparison to traditional projects, it teaches different management styles and how to adopt them to different projects; It ensures that there is active trust and cooperation between business executives and developers in the corporation and it creates transparency in the work done; By combining agility and traditional management methods, it provides a better adaptation to the business environment; By encouraging feedback and efficient control, it accelerates results and thus brings frequent success to management.

Advantages for companies include:

a. It provides a less risky and rapid change with a low-cost;

b. It increases visibility and elaboration in the company management;
c. Instead of developing agile management processes tailored for the company, it ensures that a tested approach is used;
d. Project budget offers adaptation to control, and project plans on the projects as well as better communication; without ignoring the period and scope (makronorm, 2014).

The primary purpose of neural networks and agility provides rapid, flexible and integrated design, production and service for complex products in expanded and globalized supply chains. They also help develop mechanisms which will ensure the sustainability of the enterprise organizations in uncertain conditions and which will restructure their activities in accordance with the unexpected market conditions and increasing market uncertainties. In addition to the changing technological innovations, it is considered critical to use neural network technologies so as to offer rapid product design, product and process development simultaneously.

It is also t is important to use and to develop reorganized agile entrepreneurship application systems in order to boost aesthetic, as well as to have performance optimization and to improve the adjustment skill of neural networks and agility systems in uncertain conditions. It is being applied to several areas such as optimization of product systems, product analysis and design, quality analysis of products (integrate, paper, resource etc.) and control, planning and management analysis (Gershenson, 2003).

There are a number of areas of application for neural networks. Such as:

1. Statistics and Economics: ANNs have been used in statistics and economics since estimations on time series are frequently used in classification (Vriend, 1994). Corporate investors making transactions in the world's stock markets and especially in Wall Street have recently focused on implementing artificial intelligence (AI) and AI techniques for their own portfolios and for the estimations on the general tendency of economics as well as basic indicators. AI-based software used in investment planning is kept classified by the relevant institutions mostly. These financial corporations have their own IT experts who prepare a software tailored for their company and they never leak any information outside the company (Seker, Yildirim, & Berkay, 2004).
2. Insurance and Finance: In the banking sector, they can be used for developing credit applications, for customer analysis, for credit application assessments, and for the estimations on budget investment. Additionally, they are also used for product optimization, development of application policy, valuation, analysis of organizational agility, budget estimates, targeting, and estimation methods (Kharabe, 2013).
3. Space, Automotive and Correspondence: As a system to analyse and to detect failure, ANNs are capable of learning the regular and proper way of functioning for a system, a device, or a component. Thus, they are capable of detecting any possible breakdowns in a system. As a result, ANNs are used in the failure analysis of electrical machinery, planes or their compounds as well as integrated circuits. They are being implemented in the automation of the defence industry, weapons and target monitoring, detecting and differentiating objects/visuals, new detector designs and noise prevention (Duji-ene, 2004).
4. Medicine: Professional medical systems have been developed to provide an answer for the structural problems in medical areas. Professional medical systems are developed upon the recommendations of one or more medical experts. The purpose of professional medical systems is not to replace physicians, rather to make suggestions and provide advice based on patient data. They have several areas of application, such as the analysis of medical signals like EEG and ECG, analysis of cancer cells, prosthesis design, optimization of transplantation timing and optimization of hospital costs (Demirhan, Kilic, & Guler, 2010). Chemical engineering, construction and structural engineering, electrics and electronics engineering, manufacturing and machinery engineering, systems and control engineering are additional fields of use

Due to the dynamic structures of the global economy, developing information technologies, the complexity of data in decision-making mechanisms and their interrelationships, new techniques are needed to be far more efficient in problem-solving than traditional decision-making processes. In order to meet the need, parallel processing mechanisms mimicking the human brain, eliminating uncertainties, and maximizing efficiency have been developed gradually. Agility can meet expectations by constituting an organization that will manage uncertainty by using manpower and information. As for companies, the ones who have the largest profit by analysing the risks and opportunities in the global market are considered agile. The establishment of self-managing teams capable of actualizing their ideas rapidly is the essence of agile methods, and it offers significant opportunities to companies in managing the next generation through such feelings as possessiveness, increased efficiency, etc.

Neural networks are created by mimicking biological neural networks in a computer environment. ANN is an algorithm capable of processing and learning like a brain, accepting constant data input, and seeking conclusions by using current information in case of insufficient data, . Since they are computer systems that can derive new information through learning, constituting new information and discovering without assistance, they both lead the way for new developments and contribute to research on how the human brain functions, which remains to be fully understood. In addition to solving various problems including information classification and information interpretation, they are also successfully applied instead of current available methods in medicine, finance, manufacturing, training and engineering.

When the key features of agility and neural networks are considered, it is seen that they are structures offering creative and talented employees, coordination skill for concurrent activities, proactive approaches, existence of technological information, a rapid adaptation skill to the information obtained by the enterprise, diversification and personalization approach, a structure with a developing authorization and cooperation feature, an approach to realize opportunities and constant learning. The common ground for neural networks and agility is that they encourage feedback and efficient control; they provide rapid results and they offer success for management. They offer lower risk, less cost and more rapid change. In order to keep up with change, globalized supply chains require enterprises to be free from their bulky organizational structures. They should switch to flexible organizational structures with a faster and more efficient decision-making mechanism so that they can provide rapid, flexible and integrated design, manufacturing, and service of complex products.

The fact that this research focuses on neural networks and organizational agility in telecommunication companies and on developing solutions via various methods such as classification, estimation, data conceptualization and solving control problems is certainly going to make a great contribution to the field of telecommunications. Thus, it can be ensured that telecommunication firms in Port Harcourt is represented in the world literature with a sufficient number of studies and that it is equipped with the new technologies of the new millennium. Based on the set objectives: the following null hypotheses were formulated and tested:

H_{o1}: Neural network does not significantly correlate with human resource agility of telecommunication companies in Nigeria

H_{o2}: Neural network does not significantly correlate with information technology agility of telecommunication companies in Nigeria

H_{o3}: Neural network 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.

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: Neural Network and organizational agility

Ho -There is no significant relationship between Neural Network and organizational agility.

The independent variable in this hypothesis was Neural Network, while the dependent variables are Human Resource Agility, Information Technology Agility and Innovation Agility rate. Spearman's Rank Order Correlation Co-efficient was used to test this hypothesis. The result of the analysis was presented on table 4.15.

H_{o1}: Neural network does not significantly correlate with human resource agility of telecommunication companies in Nigeria

H_{o2}: Neural network does not significantly correlate with Information Technology agility of telecommunication companies in Nigeria

H_{o3}: Neural network does not significantly correlate with innovation agility in telecommunication companies in Nigeria

Analysis of Relationship between Neural Network and Organizational agility.

			NN	HRA	ITA	IA
Spearman's rho	ANW	Rho	1.000	.169*	.173*	.187*
		Sig. (2-tailed)	.	.023	.020	.012
		N	181	181	181	181

Source: SPSS Data Output, 2020

The result of the correlation analysis in the table 4.15 showed that Neural Network was significantly and positively correlated with Innovation Agility, Human Resource Agility and Information Technology Agility with the r= 0.169, 0.173, 0.187 at $p<0.05$ respectively. Following the values presented in the table, there is a very weak positive

Neural Network and Organizational agility

Correlation analysis of the relationship between neural network and measures of organizational agility (Human Resource Agility, Information Technology and Innovation Agility) of telecom firms showed a low positive relationship. These findings support the assertion of (Gelir, 1994) which asserts that Neural networks helps the producer or supplier of goods and services to optimize flow of material, information and financial capital in the areas that broadly include: Planning, sourcing, production, inventory management and storage, transportation or logistics and return for excess or defective product. This benefit is more of service provider oriented than the customer as such does not necessarily determine the organizational agility of the firm. According to Jackson & (Johansson, 2003) organizational agility is not a goal in itself, but rather an instrument to adapt to

the ever-changing environment, customer needs, maintain competitive advantage which in the end results in better performance of the organization. However, the view of Goldrat as cited in Hugos (2003) support the former of which he asserts that the things a company can do and the ways that it can compete in its markets are all very much dependent on the effectiveness.

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 (neural network and organizational agility). Based on the result it is concluded the use of various aspects of neural network 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 neural network positively correlates organizational agility, telecommunication firms should improve on their adaptation to neural network system 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 neural network system.

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