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NEURAL NETWORKS AND HUMAN RESOURCE AGILITY IN TELECOMMUNICATION COMPANIES IN NIGERIA

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ABSTRACT

This study investigated the relationship between neural networks and human resource. 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 human resource. Hence the study concludes that hike in neural network improves the human resources 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, Human Resource 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.

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, 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). Information technology units available in neural networks might look like the neurons in the brain and neural networks consist of many information technology units which are inter-connected. Information processing units receive inputs from several different units and output is distributed to the other units as inputs.

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).

The capability in these attributes has open the possibility to replace human labor in a greater extent than previously thought. By outsourcing well defined tasks with regular processes, employees are free to spend their precious time on qualified tasks rather than on routine work (Autor, 2015). This means that the requirements on organizations are increasing to utilize their human capital full potential to the greatest possible extent to create competitive advantage.

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 human resource agility.

Hypothesis

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

Resource Based View

According to the Resource Based View Theory, competitive advantage stems from a firm's unique resources that are valuable, rare, and inimitable (Barney, 1991). Firm resources include both assets and capabilities. Assets are observable and can be valued, such as spatial preemption, brand equity, and patents. In contrast, capabilities are not observable and difficult to quantify; they are the glue that brings the assets together and deploys them advantageously (Makadok, 2001). Because capabilities are deeply embedded in organizational routines, they are idiosyncratic and difficult to imitate or duplicate, which makes them the most likely sources of competitive advantage.

According to RBV capability can transform firm assets into superior performance. Therefore, in relation to this study, these specific capabilities are at the centre stage in determining how an organization responds to changes in the environment in which it operates. In this study, the capabilities are seen in form of artificial intelligence, IT adoption, strategic alliances and human resources management practices. Further, capabilities touch on the intricate aptitude for the firm to offer high quality services to match customer needs and expectations. This to a great extent would enhance agility of the firm.

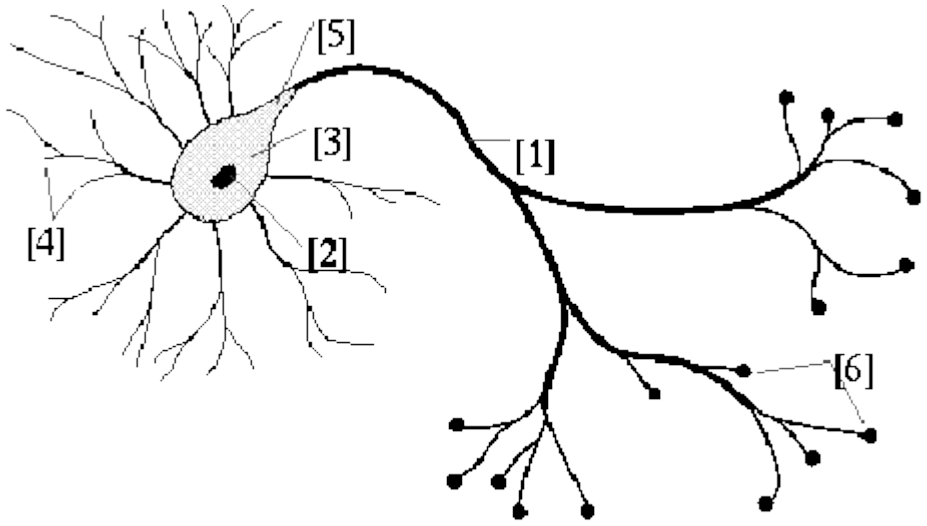
Neural Networks (NN)

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). Information technology units available in neural networks might look like the neurons in the brain and neural networks consist of many information technology units which are inter-connected. Information processing units receive inputs from several different units and output is distributed to the other units as inputs.

Neural networks include input layer, hidden layer and output layer. Input Layer: It is the layer in which input data groups are introduced to the network. Parameters in input layers have to be selected before analysis (Blackkard & Dean, 1999). The number of neurons in an input layer is equal to the number of input data; every input neuron is transmitted to the next layer – which is the hidden layer. Hidden Layer: The hidden layer is the basic function of the network. In this layer, data received from the input layer is processed properly and then transmitted to the output layer (Dag, 2012).

Output layer: Learning takes place in the output layer. Linear units are connected to the output consisting of hidden layers (Abdi, 2003). It is the final layer in the network and it processes the data received from the hidden layer and creates the output. The number of neurons is equal to the number of outputs received by the network. Values obtained are the output values for the problem in the neural network (Dag, 2012).

Neural network has the following features:
1) Non-Linear: Neural networks emerging from the combination of cells are nonlinear and this feature of theirs is spread throughout the network. Neural networks are the most significant tool to solve complex non-linear problems.
2) Fault Tolerance: In artificial networks, fault tolerance is quite high. The reason why neural networks have fault tolerance is that information is scattered around the system in a regular way.
3) Training: Neural networks in neural networks adjusted for a purpose modify their own values and are capable of adapting themselves for the exact solution of the problem.
4) Learning: In order to obtain the data required, algorithms are identified by adjusting the load of neural networks (ANN). This process in which the load is adjusted is called "learning" (Gershenson, 2003). The process of learning is the process defining the relation between the system inputs and outputs. In order for neural networks to learn a problem, input and output data must include sufficient samples as well as a clear definition of the learning cluster.
5) Generalization: Through generalization, neural networks are capable of creating the desired response during the training process – with regard to samples it has never encountered, after studying and learning the problem.
6) Memory: In neural networks, connection loads are the types of memory and memory is distributed by creating local memories. Load values of neural networks represent the information available in the network right at that moment.
In order to analyse neural networks well, it is essential to know the structure of biological neural networks constituting neural networks as well as their functioning. The human brain is a mechanism controlling the activities in the human body through billions of nerve cells (neurons) that have a complex relation with one another. In a human brain, there are more than 10 billion nerve cells and each cell is interconnected with an average of 10,000 cells. Within nerve cells are neurons, by which signals are transmitted as vibrations up to 1000 per second which are formed by a chain of very complex electro-chemical events. A typical nerve cell in this mechanism collects signals from the neighbouring cells through capillary pathways called dendrites and transmit these signals to the brain via axons – a long and slender extension of a nerve cell with thousands of branches. At the end of each axonal branch, there is a knob called a synapse. These knobs transmit the signals they receive from the axons to the brain. Thanks to the signals (data) transmitted to the brain, learning takes place. The biological neural system is a control centre receiving and interpreting information and making decisions accordingly. This control unit consists of reception and reaction nerves. The neural systemis critical that ensuring that human being is capable of understanding all behaviour as well as his surroundings (Gershenson, 2003).
In neural networks, the artificial neuron is a model inspired by natural neurons.



1.Axon 2. Nucleus 3.Soma (Body) 4. Dendrite 5. Axon Hillock 6. Terminals (Synapses)

Figure 2.1: A Biological Neuron depicting a nerve cell consisted of synapse, axon, soma and dendrites

Source: Staub et al (2015),

Natural neurons receive signals through a synapse on the dendrite or membrane. Neurons distribute these signals when the incoming signals are strong enough. Signals may also be sent to another synapse and activate the other neurons there (Gershenson, 2003). The nerve cells shown in Figure 1.1 above are called "neurons" in the medical literature. The neuron is a basic processor receiving stimuli from the biological system, interpreting and converting them into fine outputs. Neurons are very special cells equipped with cellular information as well as particular talents such as processing and transmitting this information. When neurons receive sufficient stimulation, they immediately react to an electrical stimuli coming from an axon (Gershenson, 2003). Neural networks (ANNs)consist of traditional network compounds such as feed forward connections and linear functions (Kramer, 1991). Neural networks have two basic disadvantages. These are local minimum convergence and slow learning speed (Castillo, Guijarro-Berdinas, Fontenla-Romero & Alonso-Betanzos, 2006). Based on their architectural structures, ANNs can be subjected to various classifications such as feed forward networks, feedback networks, memory based networks, radial based networks and module neural networks. Of these network structures, the ones most commonly used in literature are feed forward networks and feedback networks: Perceptron and adaline (adaptive linear neuron). The most important feature of feed forward networks is that they are capable of detecting fake or missing data before the processing is concluded (Benell &Sutcliffe, 2003). Unlike feed forward networks, dynamic features of the network is significant in repetitive networks. In some cases, the activation values of the units go through a process of relaxation. In other applications, the change in the activation values of output neurons is important. Thus, dynamic behaviour creates the output in the network. In feed forward networks, data flows from input units to output units. Data processing might be expanded to the layers of the units; however, there are not any feed forward connections available – that means, connections spread from the outputs of the units in the same layer or previous layer to the outputs of the units (Kurkcu, 2013).

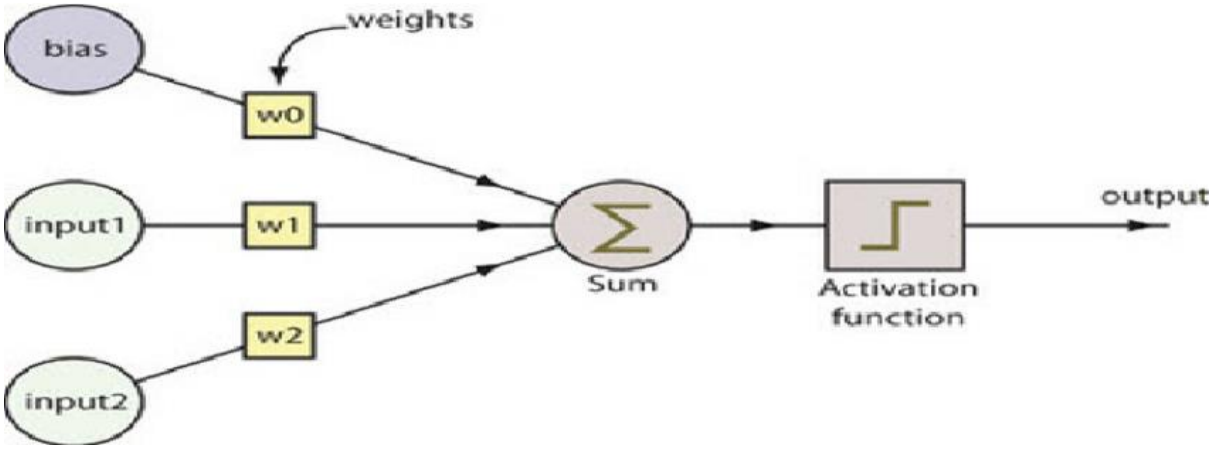


Figure 2.2: General Block Structure of ANN

Source: chip.com (2019)

In figure 2.2 (xi:i = 1……m) refers to the processor of input layer, (w1; 1……m) refers to the load of connection with hidden processor, ™ refers to deviation function, y refers to the processor of output layer. V and ij (-) refers to the load of connection with the output processor.

Human Resource Agility (HRA)

The complexity of the business environment, the increasing development of science and technology, the emergence of growing needs of environment, the diversity and composition of them, the various demands of customers, reduced time of product delivery, as well as the effects from accepting globalization, increased competition, and even de-globalization have led to instability and a tendency to ongoing change, and in general, the lack of predictability of the environment (Khosravi, 2011). Due to this situation, traditional models and past business priorities have lost their ability to face organizational and environmental challenges (Jafarinejad & Shahayi, 2007).

Among the various solutions offered to address these conditions, agility has been noted as the dominant business paradigm in the third millennium and the best option for survival by most manufacturing and service organizations (Sherehiy, Karwowski, & Layer, 2007). In consequence of the organization's attention, many efforts have been made to achieve a desirable and proportionate level of agility. Until recently, it was believed that the agility strategy could be developed through advanced information technology, but based on research it was found that strategic flexibility and agility were more dependent on the staff of the organization than technology. Thus, one of the most fundamental mistakes is to ignore the prominent role of manpower in promoting agility (Abbaspour, Mirkamali, Hesam, Amiri & Moradi, 2014).

Although agility in human resources has been mentioned as a profitable strategy in the dynamic business environment, the lack of agile workforce has been identified as one of the main reasons in the organizations' failures in keeping with market and technology changes (Qin & Nembhard, 2015). Hence, achieving success at the organization level will not be possible unless human resource and the manner of its engagement in processes is noted. The methods of managing and motivating the human capital play a key role in moving individuals towards 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: Neural Network and human resource agility

The independent variable in this hypothesis was Neural Network, while the dependent variables are Human Resource Agility. Spearman's Rank Order Correlation Co-efficient was used to test this hypothesis.

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

Analysis of Relationship between Neural Network and human resource agility.

			NN	HRA
Spearman's rho	ANW	Rho	1.000	.169*
		Sig. (2-tailed)	.	.023
		N	181	181

Source: SPSS Data Output, 2020

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

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 networks and human resource) which also is strongly moderated by organizational culture of the telecommunication firms. Based on the result it is concluded the use of various aspects of artificial intelligence has a great effect on the human resource agility of telecommunication companies.

RECOMMENDATIONS

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

1. Since artificial intelligence positively correlates human resource agility, telecommunication firms should improve on their adaptation to artificial intelligence 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 networks system.

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