

## NEURAL NETWORKS AS A PREDICTOR TO INNOVATIVE AGILITY IN TELECOMMUNICATION COMPANIES IN NIGERIA

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### ABSTRACT

*This study investigated the relationship between neural networks and innovative 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 innovative 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, Innovative, Agility, Telecommunication**

### INTRODUCTION

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). 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. Innovative firms and less innovative firms differ greatly in their risk propensity, attitude toward uncertainty, and acceptance of new technology. Highly innovative firms are more likely to engage in learning and experimenting, are able to cope with high uncertainty and are more prone to taking risks. In addition to innovativeness, firms could differ in terms of how they incubate innovations. While some scholars have argued that new initiatives are more likely to be successfully commercialized if they are separated from the core organization more recent studies have called for better integration of the new initiatives with the rest of the organization to enable their success (Ravichandran, 2017).

This is particularly true in the case of IT-enabled innovations such as the creation of new business models, new channels to access the markets or digital products and services, because such innovations require the firm to leverage existing firm resources in new and novel ways. Moreover, unlike radical product innovations that might be driven by scientific inventions and efforts, IT

enabled innovations often stem from business units and require the use of emerging and new technologies to rethink the activity systems of the firm. Large firms have resource advantages that if properly leveraged could lead to success in innovation efforts such as new business models. However, such resource leverage has to be achieved without the culture, norms and business practices of the core organization impeding the new initiatives. Tight coupling between the new initiatives and the core organization along with close intervention by the senior executives in the management of the innovation efforts are needed to balance these tensions (Govindarajan & Trimble, 2005).

### **Neural Networks**

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 system is critical that ensuring that human being is capable of understanding all behaviour as well as his surroundings (Gershenson, 2003).

### **Innovative Agility**

Thus, the innovation capacity of a firm is both dependent on its innovativeness and the existing resource endowments of the firm. Fig. 2 depicts a framework that characterizes innovation capacity in terms of two dimensions namely, firm innovativeness and the nature of coupling between new initiatives and core activities of the organization. The upper right cell depicts firms that have high innovation capacity because they have an organizational climate that enables

innovative behavior and they are capable of leveraging the resources of the core organization because of the tight coupling of the new initiatives with the core activities of the firm. The upper left and lower right cells depict firms that have moderate innovative capacity.

In the former, while the firm fosters a climate where innovative behavior is encouraged, its ability to leverage firm resources might be limited because of the loose coupling. In the later, firms may be less innovative but have the ability to leverage the resources of the organization to supports initiatives. The lower left cell has low innovation capacity as firms in this cell are less innovative and lack the ability to leverage firm resources effectively because of the loose coupling of the new initiatives with the core activities of the firm.

Agile firms tend to match their asset stocks to the demands imposed on them by their environments. This often entails repurposing existing assets or combining them in novel ways to create new activity systems and business models. While initial attempts to develop IT-enabled business models isolated them as new ventures decoupled from the core organization, firms soon realized the need to exploit synergies between their existing and new business models (Ravichandran, 2017).and derive the benefits of integrating the traditional and electronic channels, to serve customers well. Such integration has not been easy for firms because it requires the ability to orchestrate complementary interactions among key business processes and resources (Barki & Pinsonneault, 2005) and overcome inherent conflicts between traditional work practices and those necessitated by the new business models. However, firms able to accomplish such complementary interactions are likely to enhance their capability to respond to changes in their business environment quickly and create competitive advantage (Oh *et al.*, 2006).

### 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

**H<sub>0</sub>** -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<sub>01</sub>**: Neural network does not significantly correlate with innovation agility in telecommunication companies in Nigeria

#### Analysis of Relationship between Neural Network and Innovative agility.

			NN	IA
Spearman's rho	ANW	Rho	1.000	.187*
		Sig. (2-tailed)	.	.012
		N	181	181

Source: SPSS Data Output, 2020

The result of the correlation analysis in the table 1 showed that Neural Network was significantly and positively correlated with Innovation Agility, with the  $r = 0.187$  at  $p < 0.05$ . Following the values presented in the table, there is a very weak positive correlation between neural network and IT agility. On this premise, the null hypothesis was rejected and the alternative hypothesis accepted.

### CONCLUSIONS

The study having taken cognizance of necessary precautions and carried out the research, carefully handling data and analyses, it concludes that there is a positive and significant relationship between study variable (neural network and innovative agility). Based on the result it is concluded the use of various aspects of neural network has a great effect on the or 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 innovative 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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