

STRUCTURAL CAPITAL MANAGEMENT AND PERFORMANCE OF PUBLIC UNIVERSITIES IN NIGERIA

BY

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Abstract

Organizational function, processes and information technology networks are essential frameworks that provide the tools for retaining, packaging, reinforcing, and transferring knowledge in Nigerian public universities. These influence the performance of universities globally and locally in terms of knowledge generated through transmitting and conducting relevant research that translate into impactful innovation and development of the society. The fast eroding culture of exchange programs, processes and information technology networks of Nigerian public universities had resulted to poor performance. This is evident with close to near bottom position in the global universities ranking, lack of commitment by the government evidenced with low budgetary allocation to the Nigerian education sector which had affected quality of teaching, research output, and quality of service to the society. Therefore, the present study examines the effect of structural capital on the performance of public universities in Nigeria. This study employed cross-sectional survey research design with a total population of eight thousand, five hundred and eighty-nine (8,589). The sample size of 382 was selected out of which 95% responded. Data was collected using semi-structured questionnaire. The data was analyzed using descriptive and OLS regression analysis. The result of analysis revealed that structural capital is significantly related with research and teaching performance but insignificant with community performance. The study concluded that proper management of structural capital of Nigerian public universities promotes research performance and has potentials of improving the teaching performance of the universities. Therefore, the study recommends that university administrators and other stakeholders should create more awareness on the potentials of efficiently managing structural capital of their universities and emphasis should be placed on policies that will improve the quality and relevance of researches in Nigerian public universities. The study also recommends that Nigerian public universities should improve on policies of appointment of academic staff so as to employ qualified personnel.

Keywords: Structural capital, Research, Teaching and Community Performance

INTRODUCTION

The world currently exists on information and knowledge-based economy following the gradual transition from industry based that focused on tangible assets to a very high technology, information and innovation base that focuses on intangible assets (Inyada 2018). Although, tangible assets have been of the utmost importance since they make up large proportion of the organizations' assets, they are traditionally considered the most valuable asset in organizations (Ahangar, 2011). However, knowledge, ability, skills, expertise, experience and attitude of workers which are components of intangible assets are not considered

to be of any importance to organizations (Ekwe, 2013). Consequently, reporting information related to intangible assets, particularly the intellectual capitals (IC), are not usually included in traditional financial statements. This affects the holistic assessment of performance of an entity.

IC reports have been considered to contain a set of indicators that contribute to the improvement of the quality of accounting information in organizations (Ramírez & Gordillo, 2014). Therefore, an International Accounting Standard (IAS 38) on intangible assets states that intangible assets should be recognized if there is to be an expected future economic value attributed to it and such benefit can impact the entity. Adherence to this standard resulted into the quest to measure and report IC so as to provide information which will consequently increase the virility of an entity. In order to evaluate the difference between the book and market value of knowledge-intensive firms, there has been an increasingly importance on intellectual capital (IC) of an entity.

IC helps managers in creating value, revealing the hidden value of firms, and maximizing shareholder wealth (Schiuma & Lerro, 2008). Though the concept of IC was initially developed for profit-oriented organizations, it has now extended from such firms to public institutions such as universities and research centers since universities are considered critical institutional actors in national innovation systems. It is therefore necessary to improve the performance of any university, especially in this new era of knowledge based economy (PKF, 2017). IC is now being recognized as knowledge asset that can increase institutional legitimacy and provide new revenue streams (Ojo, 2016). IC has been considered differently to include organizational processes and procedures, technologies possessed, exclusive privileges, skills of the employees and organizational customers, suppliers, stakeholders and other intangible assets that are not shown in financial statements (Stewart, 1997). This was later classified by Gavious and Russ (2009) to include organizational function, processes and information technology networks (*structural capital*), competency and efficiency of its employees (*human capital*) and relationship with its customers (*relational capital*). The structural capital is a supporting framework that provides the tools for retaining, packaging, reinforcing, and transferring knowledge (Nezam, Ataffar, Isfahani, & Shahin, 2014) and it includes the university system/culture, working process, the information technology system etc. The culture and policies of a university can go a long way in improving the performance. This is evident by the great integrity accorded to both University of Ilorin and Kwara State University as institutions worth attending due to their culture of 'no strike' and students graduating as and when due.

Performance of universities can be determined by the degree of achievement made in relation to their goals which is to generate knowledge through transmission of knowledge through teaching, conducting relevant research that translates into impactful innovation, and development of the society through the production of a well-trained labor force. Performance of universities is very important for the development of any country since a well-trained labor force can only result into the best management of such country's resources. It is therefore no coincidence that the most industrialized and consequently, wealthiest countries in the world today are those with the top-performing universities. The United States of America (USA) and the United Kingdom (UK) are amongst the top five countries with the highest industrial output and so are their universities amongst the top five universities in the world ranking (Times Higher Education World Rankings 2019).

Poor performance of Nigerian universities is no longer news. It is evidenced with close to near bottom position in the global universities ranking (Halidu, 2015). This poor performance has been attributed to the continued lack of commitment by the government with low budgetary allocation to the Nigerian education sector which has in turn resulted to poor quality of teaching, innovation, research output and

the quality of graduates produced by the institutions. Aside from the fact that the funds allocated have never reached the 26% of GDP recommended by United Nations Education, Scientific and Culture Organization (UNESCO) for optimal funding of the whole educational sector, the Nigerian university system today is bedeviled by some other problems such as frequent interruption of the universities' activities (strikes), poor remuneration, poor staff retention coupled with brain drain and poor management of available resources

Despite the effort made by the government, most Nigerian public universities (NPU) are adjudged to be in a very sorry state and are under-performing (FGN Needs Assessment Report 2012). Thus, not until 2017, no Nigerian university had made it to the rank of the first one thousandth in the world and the first five even within Africa in terms of performance. These are attributed to fast eroding culture of exchange programs of Nigerian public universities with their counterparts both within and outside the country resulting in the loss of opportunities to interact and interchange ideas. The know-how and the patent owned by the public universities fail to be of any advantage when competing for performance (Rodrigues & Melo, 2013). Therefore, the present study intends to examine the effect of structural capital on the performance of public universities in Nigeria.

Consequently, the study developed a research question to examine the impact structural capital has on performance of Nigerian Public Universities. A hypothesis to be tested was also developed. This study is focused on structural capital component of intellectual capital and performance of the Nigeria Public Universities as previous studies were mostly conducted in other sectors of the economy and other countries. Since the business of universities is teaching, learning and research and providing their product into the society, the study focused on these duties and therefore, kept their performance within the scope of research, teaching and community services performance. The level of disparity in the North Central Zone of Nigeria regarding ethnicity and religion motivate the researcher to focuses on Nigeria public universities in the North Central Zone of Nigeria.

This study will be of importance to policy makers so as to regulate and monitor university education in Nigeria. Also the Tertiary Education Trust Fund (TETFund), whose mandates includes financing researches and providing infrastructures to public owned universities could use the findings to determine if indeed their mandates to improve human and structural capitals are yielding expected results. The findings of the study will also be of significance as it will provide useful information on how best to manage and leverage on structural capital in universities to improve performance.

LITERATURE REVIEW

Conceptual Review

Intellectual and Structural Capital

Intellectual Capital (IC) was firstly described by John Kenneth Galbraith in 1969 and has since been redefined by different researchers in many ways. Awan and Saeed (2015) are of the opinion that there is no single universal definition that is accepted by every scholar. Among the definitions considered in this study is that by Romano and Briggs (2002) who defined IC as the knowledge acquired and utilized by organizations, which is held in the minds of its members, embodied in its procedures and processes, and stored in its digital and non-digital media. Based on new interpretations, IC can be regarded as a set of knowledge assets that are acquired and controlled by the business and are then important mechanism for value creation (Alipour, 2012). This study emphasized the IC definition by Gavious and Russ (2009) who

defined IC as the enhanced value of a firm attributable to assets, generally of an intangible nature, resulting from an entity's organizational function, processes and information technology networks, the competency and efficiency of its employees and its relationship with its customers.

The definition of Gavious and Russ (2009) states clearly the three most accepted dimensions of IC. They are organizational function, processes and information technology networks (*structural capital*); competency and efficiency of its employees (*human capital*); and, relationship with its customers (*relational capital*). However, all the three components of intellectual capital are important but the focus of this study is on structural capital which is the knowledge owned by an organization and which has been defined differently by scholars as follow. Indiyati (2015) describes it as the type of knowledge that is invisible and associated with 'tacit knowledge'. As such, it is the type of knowledge that is difficult to imitate and cannot be easily transferable. Structural capital can be considered as knowledge-based asset (Zameli1 and Abbas 2015) due to the capability of aiding an organization in achieving competitive advantage. Also, structural capital represents the practical knowledge of an organization. That is the organization's know-how which includes organizational routines and processes, intellectual properties, technological components and the culture of the organization (Zameli1 & Abbas, 2015).

Structural capital has been described in respect to organizational culture that provides a common ways of doing things, specific decision making pattern and value system (Maldonado, 2013). Mumtaz and Abbas (2014) are of opinion that structural capital includes four components which include structure, strategy, system and culture. It is also an organizational culture that fosters knowledge exchange and learning, or encourages experimentation and risk taking. It is an intangible asset that adds value to the organization (Zameli, 2015). Structural capital can also be considered as the strength of the organization. It is exclusively owned by the organization which is why it is referred to as the information that stays with the organization after the representatives have left (Abdulai, Kwon, & Moon, 2012). Similarly, it is known as the knowledge that stays within the institution at the end of the working day (Sanchez, Elena, & Castrillo, 2009).

Performance in University System

The performance of a university system could also be considered as a determinant of economic growth of any country especially a developing one like Nigeria. Therefore, the universities, despite not being profit oriented entities, have been involved in the competition for performance in value-generating processes (Gonzalez-Loureiro and Teixeira, 2011 as cited in Canibano and Sanchez, 2009). Universities are expected to perform the function of economic growth and development (Shehzad, Fareed, Zulfiqar, Shahzad & Latif, 2014) and required to become increasingly competitive in order to valorize their capital. So, they are expected to generate knowledge through conduct of research, transmit knowledge through teaching, and solve societal problems through the production of well-trained labor force and the conduct of relevant research and impactful innovation-- providing community service.

Performance of universities can be determined by the degree of achievement made of their goals, which is to generate knowledge through conduct of research, transmit such knowledge through teaching, conduct relevant research that translate into impactful innovation and development of the society through the production of a well-trained labour force. Performance of universities is very important for the development of any country since a well-trained labour force can only result into the best management of such country's resources. It is therefore no coincidence that the most industrialized and consequently, wealthiest countries in the world today are those with the top-performing universities. Universities as "citadels of knowledge" are involved in three major activities which are the conduction of research,

transmitting knowledge through teaching and training their products to perform services to the society through community services.

Therefore this study centers on university performance in research, teaching, and community service. The first, which is the research performance, focuses on the quality and relevance of researches done in the universities. The second, teaching performance is focused on how the universities succeed in bringing their students to their final goal. The third performance is in respect of community service which is about the services rendered to the community.

Theoretical Review

Knowledge Based Theory

Knowledge based theory emphasized that knowledge is the true resource, which can give any organization a comparative advantage. There are a variety of characteristics and classifications and it is important in all of them that knowledge is special, that information can be used and translated into practice. However, the greatest difference lies between knowledge and beliefs or opinions which have not proved their true value. To underline this, certain concepts of information should be taken into account. Knowledge is classified as knowledge to be used and turned into practice by Stahle and Gronroos (2000). In addition, Nonaka and Takeuchi (1995) described wisdom as a complex process in which the human person is justified in their confidence in the reality and in the loyalty and devotion of their holder. Management-oriented information is essentially a human problem: it is the result and medium for human activity, constrained by human cognitive or other psychological capacity, and by the social and cultural environment.

The division of knowledge in two dimensions: explicit and implicit is the most important classification of knowledge (Polanyi, 1966). This element of knowledge can be articulated and codified relatively easily, e.g. by verbal accounts, numbers, formulae and theoretical patterns, in explicit knowledge. This type of knowledge is logical, structured and systematic, can be easily transferred and stored in libraries, databases and other non-human knowledge stores from one person to another. Tacit awareness is the part of personal, context-dependent and practice-and experience information that makes it extremely difficult to formalize and communicate. In reality, it is argued that the exchange of shared experience and active participation in face-to-face contact with each other in real time can only transmit tacit knowledge to others (Nonaka & Takeuchi, 1995). Spender (1996) suggested a classification of types of information that incorporates two dimensions, one real versus one implicit and another, versus the other private. He argued that information exists at many empirical stages, such as individual knowledge, and social knowledge.

Empirical Review

Empirical review of the impact of structural capital on performance was conducted from related studies in developed countries and developing countries. One of the studies from developed countries was the study of Al-Hawajreh (2013) who examined the impact of structural capital on business performance in Jordan pharmaceutical manufacturing companies. Data was collected through questionnaires which were analyzed with descriptive statistics, correlation, multiple regressions and stepwise regression. The result of the study showed a positive significant relationship between structural capital and Jordanian pharmaceutical manufacturing Companies' Business Performance. The finding is in line with Bayraktaroglu, Calisir and Baskak (2019). However, the study was conducted in profit oriented business.

In 2013, Ramirez assessed the importance of intellectual capital disclosure in Spanish universities. Data was sourced with a structured questionnaire and analyzed through multiple regression analysis. The result

of the study showed that information on intellectual capital should be included in the annual reports of the universities for relevant decision making as it influences the performance of the universities. Also in Spain, Ramirez, Merino and Manzanque (2019) investigated the intellectual capital web reporting by Spanish universities. Content analysis was employed to analyze the websites of 50 universities in the year 2016 and survey approach was employed to assess all members of the Social Councils of Spanish public universities. The secondary data from the study was assessed with a regression analysis. The study found that human capital was the most disclosed category with relational capital being the least frequently disclosed. However, the quality of structural capital disclosures was higher than relational and human capital. Moreover, the results showed that size and university's internationality affect IC disclosure in Spanish public universities.

Studies from developing countries include that of Lu (2012) who examined the impact of intellectual capital on Taiwan University performance. To achieve this insight, the study utilized a two-stage data envelopment analysis to evaluate the cost and teaching and research efficiencies of public universities in Taiwan. Additionally, the research employed truncated-regression to discuss whether intellectual capital affects the operating efficiency of universities. The results demonstrated that the universities are much better at handling cost efficiencies than teaching and research efficiencies. The regression analysis indicated that intellectual capital does play an important role in influencing teaching and research efficiency.

IC and performance of Malaysian public university was explored by Ishak, Kamaluddin and Said, (2014). They examined the factors influencing university performance in Malaysian public university with emphasizes on IC which they measured based on indicators produced through researching previous literatures. Data was gathered through questionnaires which were spread to academics in two public universities in Malaysia. The outcomes of the study provided evidence that intellectual capital influences university performance. But, just two of the intellectual capital constructs which are human capital and development capital have significant good connection toward university performance. Meanwhile structural capital and relational capital do not have significant impact on university performance.

Mumtaz and Abbas (2014) made an empirical investigation of IC and its effect on performance of private universities using Pakistan as a case study. Two-step structural equation modeling was used to test the models to regress the cause and effect relation. The findings depicted that there is very significant effect of intellectual capital on performance of private universities. All the three components of IC (Human, Structural and Relational Capitals) have significant effect on the performance of private universities. The finding was in line with the study of Indiyati (2015) who also studied IC development in higher education and how it improves performance. He concluded that private universities have a valuable human capital, sufficient quality of structural capital, and quite valuable customer capital, so that they have sufficient ability to provide more value for customers than public universities.

Also in Pakistan, Awan and Saeed (2015) examined the relationship between intellectual capital and organizational performance using public sector universities in Southern Punjab-Pakistan as case study. The data was collected through a structured questionnaire and face-to-face interview. Three estimation methods were used to analyze the data. Regression method was used to measure the impact of intellectual capital (independent) variables on the performance (dependent variables) of these Universities. Scorecard and Ratio Analysis was used to compare the output level of intellectual capital and their relative performance. Findings showed that intellectual capital (human, structural and relational capital) and organizational performance has a significant correlation.

In 2017, Bakhtiar and Haider (2017) studied the nexus of intellectual capital with performance in higher education sector through mediation of sense making. Data was collected from twenty (20) public/private universities faculty members, non-faculty members, students and top management with the use of structured questionnaires. In addition to descriptive analysis, structural equation modeling was used to analyze the results. The results of the study indicated that intellectual capital (human, structural and relational capital) have a positive impact on universities performance while weak mediating role of sense making was observed.

Cricelli, Greco, Grimaldi and Llanes (2018) explored the relationship between IC and performance of public universities in emerging countries with evidence from Colombia. Data was sourced from several Colombian officials including the Ministry of Education. For the analysis, the data were clustered based on five performance variables and three IC variables. The results showed how different aspects of IC are associated with University performance. Among other findings, the study identified the particular importance of both students and scholars' international mobility programs for most of the performance variables. The results further showed that the achievement of outstanding research and innovation results is related to the size of university, while education-oriented results are less related to size.

One of the studies in Nigeria, specifically in academic environment, is Abiodun (2016) who examined the effect of intellectual capital on organizational performance in the Nigerian Polytechnic Education Sector. A sample of 400 employees from the NPES in Osun state of Nigeria was obtained. The researcher used questionnaire to collect data for the study while Chi-square method was adopted for data analysis. Findings indicated a notable similar pattern of intellectual capital –organizational performance link as found in Western countries of North America and Europe. The study findings specifically showed that human capital and structural capital have a positive and significant effect on organizational outcomes in the Nigerian education sector.

Other studies from Nigeria were conducted in business environment other than universities environment such as Apiti, Ugwoke and Chiekezie (2017) who examined the impact of intellectual capital management on organizational performance in Nigeria. The study adopted ex-post facto design and the research made use of purely secondary data from annual reports of the four (4) selected beverage companies. Pearson moment correlation coefficient was used to determine the relationship between intellectual capital and organizational reported financial performance, and linear regression was used to determine the impact of intellectual capital on organizational reported financial performance. The findings of the study show that there is a significant relationship between intellectual capital (human capital , structural capital and relational capital) and firm's financial performance and that proper management of intellectual capital has an impact on firms reported financial performance.

Another recent study in Nigeria is Inyada (2018) who assessed the salient issues on the impact of intellectual capital on the financial performance of corporate establishments in Nigeria. Secondary sources of data collection were employed with the help of the Nigerian Stock Exchange Fact Book. The timeframe for this study was five (5) years and five (5) quoted banks out of the listed banks in Nigeria were used based on purposive sampling. The researcher adopted multiple regressions to analyze the data collected. It was discovered that intellectual capital positively and significantly impacted on the financial performance of establishments. Also, physical and structural capitals have positive relationship with the financial performance of the organizations studied.

From the foregoing, one can deduce that studies that examined the relationship between intellectual capital components, particularly, structural capital on universities performance are yet to be in public domain compared to other sectors such as banking industry, manufacturing industry and other listed firms in Nigeria.

METHODOLOGY

Research Design, Population and Sample Size

This study employs cross-sectional survey research design which involves collection of primary data through questionnaire in order to achieve better understanding of relationships between the variables. Regarding the population, there were ninety (90) of the Nigeria public universities as at 2020: forty-seven (47) of them were owned by the Federal government and forty-three (43) were owned by the State government. However, this study is restricted to the North Central zone of Nigeria which has thirteen universities; seven (7) of which are owned by the Federal Government and six (6) by state governments. Thus, the total population of those who responded to the questionnaire was all the total number of full time academic staff of the selected universities which were eight thousand, five hundred and eighty-nine (8,589). The sample size of the respondents for questionnaire was determined by employing Yamane (1967) approach. This approach was chosen to assist in selecting appropriate sample size from population size of eight thousand, five hundred and eighty-nine (8589) academic staff of the Nigerian public universities.

$$n = N/[1 + N(e)^2] \quad (3.1)$$

Where:

n is the sample size

N is the population size

e is the level of precision

$$n = 8,589/[1 + 8,589(0.05)^2]$$

$$n = 8,589/[1 + 8,589(0.0025)]$$

$$n = 8,589/[1 + 21.4725]$$

$$n = 8,589/[22.4725] = 382.2$$

Based on this formula with 5% level of precision, the sample size of ninety-eight (382.2) respondents was arrived at. Hence, three hundred and eighty-two (382) academic members of staff were served with the self-administered structured questionnaire. In order to allow for attrition and even distribution among all the universities, the three hundred eighty-two were prorated to determine the number of each and every of the selected universities and were presented in Table 3.1.

Table 3.1 Distribution of Questionnaire Population and Sample Size

| NAME OF UNIVERSITY | POPULATION | SAMPLE SIZE |
|--|--------------|-------------|
| University of Abuja, Gwagwalada | 631 | 28 |
| University of Agriculture, Makurdi | 811 | 36 |
| Benue State University, Makurdi | 538 | 24 |
| Federal University, Lokoja, Kogi State | 183 | 8 |
| Kogi State University | 720 | 32 |
| University of Ilorin, Kwara State | 1506 | 67 |
| Kwara State University, Malete | 460 | 20 |
| Federal University, Lafia, Nasarawa State | 274 | 12 |
| Nasarawa State University, Keffi | 550 | 25 |
| Federal University of Technology, Minna | 893 | 40 |
| Ibrahim Badamasi Babangida University, Lapai | 246 | 11 |
| University of Jos, Plateau State | 1605 | 71 |
| Plateau State University | 172 | 8 |
| TOTAL | 8,589 | 382 |

Source: Author's computation (2020)

Method of Data Collection and Analysis

Data for this study was sourced through a semi-structured questionnaire administered to three hundred and eighty two top full time professors of the selected public universities as mentioned earlier. The questionnaire was grouped in five sections. Each section contained questions that sought answers to explain the variables. This approach of collecting primary data is to give rise to reasonably large number of observations to be analyzed and give relatively better results from which more accurate inference could be drawn on the subject matter (Asteriou & Hall, 2016). Data from the questionnaire were analyzed with descriptive and inferential statistics. The descriptive statistics include mean, minimum, maximum and standard deviation while the inferential statistic used was ordinary least squares (OLS) method. However, some preliminary test such as normality, correlation and multicollinearity test was conducted prior to OLS regression estimation. The OLS was estimated in line with robust estimates of standard errors in order to correct for likelihood of heteroscedasticity problem.

Model Specification

The empirical models of this study to analyze the relationship between structural capital and performance in Nigerian public universities are specified adapting the model of Cricelli et al. (2018). The model specification of the Cricelli et al. (2018) could be written as follows.

$$P_{it} = f(SC_{it}) \quad (3.2)$$

where:

P = Performance of university i at time t

SC = Structural Capital of university i at time t

Disintegrating university performance into research performance, teaching performance and community performance, the following functional equations are derived.

$$RP_{it} = f(SC_{it}) \quad (3.3) \quad TP_{it} = f(SC_{it})$$

(3.4)

$$CP_{it} = f(SC_{it}) \quad (3.5)$$

The models of this study therefore modifies that of Cricelli et al (2018), by incorporating control variables which are equally important in determining the performance of public universities, these variables include the size (measured by total assets), the age of the university (in years) and ownership (state or federal). As argued by Gonzalez et al. (2011), the age of the university is important factors that influence its performance. Also, in line with the submission of Gonzalez et al. (2011), university ownership matters a lot in the determination of its performance. By controlling for age and ownership, the empirical models of this study are, therefore, specified as follows.

$$RP_{it} = \alpha_0 + \alpha_1 SC_{it} + \alpha_2 Age_{it} + \alpha_3 Own_{it} + \mu_{it} \quad (3.6)$$

$$TP_{it} = \beta_0 + \beta_1 SC_{it} + \beta_2 Age_{it} + \beta_3 Own_{it} + \epsilon_{it} \quad (3.7)$$

$$CP_{it} = \Omega_0 + \Omega_1 SC_{it} + \Omega_2 Age_{it} + \Omega_3 Own_{it} + e_{it} \quad (3.8)$$

Where:

RP= Research Performance of university i at time t

TP= Teaching Performance of university i at time t

CP= Community Performance of university i at time t

SC= Structural Capital of university i at time t

Age = Age of university i at time t

Own = ownership of university

The α , β and Ω are the parameters to be estimated in the respective models

The μ , ϵ and e are the respective white noise error terms

Definition and Measurement of Variables

Definition of variables is conceived as a statement of a particular dimension or elements through which certain variable is measured. Operationalization gives room for specificity and to decisively defining variables into quantifiable factors. In other words, the procedure explains ambiguous concepts and permits them to be assessed quantitatively and empirically. Therefore, all variables employed in this research are defined in line with the intent of the study (Sekaran & Bougie, 2014). The variables (human capital, structural capital, relational capital, research performance, teaching performance and community service performance) are adopted from the previous studies as stated in the previous chapter of the study.

Table 3.2 Definition and Measurement of Variables

| S/N | VARIABLES | SYMBOL | MEASUREMENT | SOURCE | A-PRIOR |
|-----|--------------------------------------|-----------|--|--|---------|
| 2 | STRUCTURAL CAPITAL | SC | Quality and relevance of publications, programs and research work; available in the university. Level of deployment of electronic learning and use of new technologies for teaching. | Creceliet <i>al</i> , (2018); Ramírez & Gordillo (2014) and Paloma (2009) | + |
| 4 | RESEARCH PERFORMANCE | RP | Number of articles published; Number of research grants won. Ratio of the amount of public funds provided for Research and Development projects relative to total budget. | Creceliet <i>al</i> , (2018); Ramírez & Gordillo (2014) and Paloma (2009) | + |
| 5 | TEACHING PERFORMANCE | TP | Number of first class students during graduation. Teaching facility and its accessibility | Creceliet <i>al</i> , (2018); Ramírez & Gordillo (2014) and Paloma (2009) | |
| 6 | COMMUNITY SERVICE PERFORMANCE | CP | Proportion of university programs with extension services and/or community-based experience components for students relative to all programs. Relationship between universities within and outside Nigeria. Number of conferences. | Ana & Edgar (2002) | + |
| 7 | University Age | Age | Year of establishment to date | | |
| 8 | University ownership | Owner | Binary variable which takes 1 if university is owned by federal government and zero if otherwise. | | |

Source: Author's compilation (2020)

RESULTS AND DISCUSSIONS

Assessment of Response Rate of respondents for questionnaire

The study also aimed at recruiting three hundred and eighty-two respondents from the thirteenth Nigerian public universities (NPU) within the North Central geo-political zone of Nigeria. The total number of the respondents was all the full time academic staff members of the NPUs. Out of 382 questionnaires distributed, 364 were returned and properly answered. The analysis of questionnaires in accordance with universities was as described as follow.

Table 4.1 Frequency and Percentage of Response Rate of Questionnaire

| NAME OF UNIVERSITY | No. Distributed | No. Returned | % |
|---|-----------------|--------------|------|
| University of Abuja, Gwagwalada | 28 | 24 | 86% |
| University of Agriculture, Makurdi | 36 | 35 | 97% |
| Benue State University, Makurdi | 24 | 21 | 88% |
| Federal University, Lokoja, Kogi State | 8 | 8 | 100% |
| Kogi State University | 32 | 31 | 97% |
| University of Ilorin. Kwara State | 67 | 67 | 100% |
| Kwara State University, Malete | 20 | 19 | 95% |
| Federal University, Lafia, Nasarawa State | 12 | 12 | 100% |
| Nasarawa State University, Keffi | 25 | 22 | 88% |
| Federal University of Technology, Minna | 40 | 40 | 100% |
| Ibrahim Badamasi Babangida University Lapai | 11 | 10 | 100% |
| University of Jos, Plateau State | 71 | 68 | 96% |
| Plateau State University | 8 | 8 | 100% |
| TOTAL | 382 | 364 | 95% |

Source: Author's computation (2020)

Preliminary Test

According Hair, Black, Babin & Anderson (2010), the study of this nature need to check the variables for normality, multicollinearity and heteroscedasticity to satisfy the basic and underlying assumptions of the multiple regression analysis in line with the suggestion. The result of each test is presented as follows:

Normality

In this study, the normality assumption was diagnosed by checking at both Skewness and Kurtosis at the same time looking at histogram residual plots. Table 4.2 shows the result of the normality test.

Table 4.2: Normality Test (Skewness and Kurtosis)

| Variables | N | Skewness | Kurtosis |
|-----------------------|-----|----------|----------|
| Structural Capital | 364 | -1.454 | 1.477 |
| Research Performance | 364 | -1.650 | 1.572 |
| Teaching Performance | 364 | -1.710 | 1.438 |
| Community Performance | 364 | -1.114 | .086 |

Source: Computation by Author (2020).

Based on the analysis in Table 4.2, the residual appears to be normal and the values of skewness and kurtosis were close to zero. Therefore, the normality assumption was not violated (Afifi & Clark, 1998).

Multicollinearity

The study checked for multicollinearity of the independent variable, structural capital using variance inflated factor (VIF) and tolerance value. Hair et al., (2010) asserted that any VIF exceeding 10 and tolerance value lower than 0.10 indicates a problem of multicollinearity. Table 4.3 below shows the VIF and the Tolerance value of independent variables.

Table 4.3 Multicollinearity Test (VIF and Tolerance)

| Variables | Items | VIF | Tolerance |
|--------------------|-------|-------|-----------|
| Structural Capital | 5 | 1.135 | .881 |

Source: Author's Computations, (2020).

The result in the table 4.3 above shows the absence of multicollinearity among the independent variables due to the fact that the VIF values are less than 10 while the tolerance values are more than .10. An examination of these results indicated that multicollinearity was not a problem.

Heteroscedasticity

Relevant post-estimation diagnostics, particularly, the heteroskedasticity diagnostic was conducted. The result of this test is presented in Table 4.4.

Table 4.4: Heteroskedasticity Diagnostics for the OLS Estimations

| Model | Chi-sq. statistic | p-value |
|-----------------------------|-------------------|---------|
| Research Performance Model | 9.88 | 0.002 |
| Teaching Performance Model | 1.73 | 0.188 |
| Community Performance Model | 0.04 | 0.839 |

Source: Author's Computations, (2020).

From the result presented in Table 4.4, it was clear that the research performance model has an unequal variance with its Chi-squared statistic value of 9.88 and p-value of 0.002, which indicates a significant test result and rejection of the test's null hypothesis that there was equal variance. For teaching and community performance models, on the other hand, the Chi-squared statistic values are 1.73 and 0.04 respectively, with respective p-values of 0.188 and 0.839. These indicated that the test results were not significant for both models and non-rejection of the test's null hypothesis that the models had equal variance.

Descriptive Statistics

This section presents summary of descriptive statistics of data collected. The summary includes mean, minimum, maximum and standard deviation as revealed for each of the variables.

Table 4.5 Minimum, Maximum, Mean and Standard Deviation of the Variables

| Variables | N | Min | Max | Mean | Std. Dev. |
|-----------------------|-----|-----|-----|-------|-----------|
| Structural Capital | 364 | 1 | 5 | 3.889 | 0.965 |
| Research Performance | 364 | 1 | 5 | 4.008 | 1.007 |
| Teaching Performance | 364 | 1 | 5 | 4.008 | 1.060 |
| Community Performance | 364 | 1 | 5 | 3.809 | 1.008 |

Source: Computation by Author (2020).

Table 4.5 shows that teaching performance recorded the highest mean ($M = 4.008$, $SD = 1.060$) and community performance the lowest mean ($M = 3.809$, $SD = 1.008$). The means of all the variables are above the average of three (3) implying that they are in the high level range.

4.4 Result of OLS Regression Analysis

The results of the OLS estimations are presented with references to each of the dependent variables used for university performance. This includes research, teaching and community performance.

Table 4.6: OLS Estimation Result for Research Performance Model

| Variable | Coefficient | Robust Std. Err. | T | p-value |
|-------------|-------------|------------------|-------|---------|
| SC | 0.095 | 0.046 | 2.06 | 0.040 |
| AGE | -0.049 | 0.034 | -1.44 | 0.151 |
| OWN | 0.046 | 0.039 | 1.18 | 0.237 |
| Constant | 2.740 | 0.205 | 13.38 | 0.000 |
| F-statistic | 18.05 | | | 0.000 |
| R-squared | 0.213 | | | |

Source: Author's Computations, (2020).

From the result in Table 4.6, the F-statistic value of 18.05 and its p-value of 0.000 indicate that the overall model is statistically significant and the model is in good fit. The R-squared value of 0.213 indicates that 21.3% of variations in research performance is explained by the model at hand. The result showed that structural capital has statistically significant coefficients with p-values of coefficients being lower than 0.05. This implies that increasing structural capital by a point is favorable and will lead to an increase research performance of these universities by 0.095 points. The control variables, i.e. age and ownership (whether state or federal) are seen to be insignificant given that their p-values are greater than all conventional significance levels.

Table 4.7 shows the result of structural capital and teaching performance.

Table 4.7: OLS Estimation Result for Teaching Performance Model

| Variable | Coefficient | Robust Std. Err. | T | p-value |
|-------------|-------------|------------------|-------|---------|
| SC | 0.648 | 0.065 | 10 | 0.000 |
| AGE | -0.056 | 0.036 | -1.53 | 0.128 |
| OWN | -0.009 | 0.047 | -0.2 | 0.843 |
| Constant | 1.468 | 0.260 | 5.64 | 0.000 |
| F-statistic | 56.61 | | | 0.000 |
| R-squared | 0.472 | | | |

Source: Author's Computations, 2020.

From the result in Table 4.7, the F-statistic value of 56.61 and its p-value of 0.000 indicate that the overall model is statistically significant and the model is in good fit. The R-squared value of 0.472 indicates that 47.2% of variations in teaching performance were explained by the model at hand. The result shows that structural capital have statistically significant coefficients with p-values being lower than 0.01. Therefore, the result implies that increasing structural capital by a point is favorable and will lead to an increase teaching performance of these universities by 0.648 points. The control variables, i.e. age and ownership (whether state or federal) are seen to be insignificant given that their p-values are greater than all conventional significance levels.

Finally, the result of OLS regression analysis is presented in Table 4.8

Table 4.8: OLS Estimation Result for Community Performance Model

| Variable | Coefficient | Robust Std. Err. | T | p-value |
|-------------|-------------|------------------|-------|---------|
| SC | 0.117 | 0.075 | 1.57 | 0.117 |
| AGE | 0.005 | 0.043 | 0.11 | 0.915 |
| OWN | -0.031 | 0.051 | -0.61 | 0.545 |
| Constant | 2.587 | 0.287 | 9.02 | 0.000 |
| F-statistic | 5.88 | | | 0.000 |
| R-squared | 0.075 | | | |

Source: Author's Computations, (2020)

The result of OLS regression in Table 4.8 reveals F-statistic value of 5.88 and its p-value of 0.000. This indicates that the overall model is statistically significant and the model is in good fit. The R-squared value of 0.075 indicates that 7.5% of variations in community performance is explained by the model at hand. The result shows that structural capital has statistically insignificant coefficients. The control variables, i.e. age and ownership (whether state or federal) are seen to be insignificant given that their p-values are greater than all conventional significance levels.

Discussion of findings

In order to provide answer to research question which state aimed to examine the impact of structural capital on performance of Nigerian Public Universities, three sub hypotheses were developed and tested using OLS. The results revealed that, structural capital was significantly related with research and teaching performance but insignificant with community performance. The positive and significant relationship between structural capital and research performance as well as teaching performance is in line with a-prior expectation of this study. Therefore, the null hypotheses for these two set of university performance

(research and teaching) is rejected. It can be restated that structural capital significantly influences the research and teaching performance of Nigerian public universities.

This finding is supported by number of previous studies such as Lu (2012) who specifically confirmed the finding of this study that intellectual capital which encompasses structural capital does play an important role in influencing teaching and research efficiency of university. This was also supported by Al-Hawajreh (2013) that structural capitals enhance performance though in business environment. Mumtaz and Abbas (2014); Indiyati (2015); Awan and Saeed (2015) and Ramirez, Merino and Manzaneque (2019) also concurred that structural capital components of intellectual capitals have significant effect on the performance of private universities. Study in Nigeria by Abiodun (2016) also specifically mentioned show that structural capital has a positive and significant effect on organizational outcomes in the Nigerian education sector.

This finding of this study is supported by the knowledge based theory which emphasizes that the embedded knowledge contains the true resource, which can give any organization a comparative advantage. The theory assumes that there are dimensions of knowledge, one of which is organizational knowledge which is logical, structured and systematic and can be easily transferred and stored in libraries, databases and other non-human knowledge stores from one person to another. This implied that the database and stored information of the universities can result into comparative advantage. Thus the inference that structural capital is positively related to performance is supported by knowledge based theory.

However, the insignificant result obtained with respect to community performance was also in line with some previous studies like Ishak, Kamaluddin and Said, (2014). This made Bakhtiar and Haider (2017) to conclude that structural capital play weak mediating role in the university system.

CONCLUSION AND RECOMMENDATION

Nigerian Public Universities, persistent reports of the poor performance of NPUs call for remedial action in form of finding innovative approach to managing structural capital so as to improve performance of NPUs. Reports on the NPUs' poor position in the global universities ranking is an evidence from the quality of teaching, innovation, research output and the quality of graduates being produced and this has been blamed on the lack of commitment by the government (Halidu, 2015). In view of these stated problems, this study explored the impact of structural capital management on performance of the Nigerian public universities.

Based on the findings obtained from all the above results, the following conclusions were drawn:

- i. Proper management of structural capital of Nigeria public universities will promote the research performance.
- ii. Based on the findings that structural capital has potentials of improving the teaching performance of Nigerian public universities, teaching performance of Nigerian public universities can be independently improved by structural capital.

The following recommendations were made in accordance with the conclusions made earlier.

- i. University administrators and other stakeholders should be more aware of the potentials of efficiently managing structural capital of their universities to improve overall performance.

- ii. Based on the conclusion made as regards structural capital and research performance, it is recommended that emphasis should be placed on policies that will improve the quality and relevance of researches in Nigeria public universities.
- iii. The study also recommends based on conclusion on teaching performance, that Nigerian public universities should improve policies on appointment of academic staff so as to employ qualified personnel.

It is believed that a study of this nature contributes positively to knowledge and practice as regards the management of structural capital in relation to performance of Nigerian public universities. The university's performance has not been considered under these three components in the previous studies in Nigeria context. The choice of area of study, (Nigerian Public Universities located in North Central Zone.) of this kind in Nigeria is a singular move which yielded more evidence and validity to the inference that were made from this study over those of the previous studies. However, it is suggested that a replication of this study be made on a nationwide scale with the hope that the ensuing large scale data to better place shed and additional insights on the overall performance of Nigerian public universities.

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