DO RETURNS ON HUMAN CAPITAL IMPROVE NIGERIAN ECONOMY? EVIDENCE FROM INTELLECTUAL CAPITAL AND PROPERTY

***[1]UZOMBA, PETER CHIKA & [2]IBEINMO FRIDAY COOKEY**

**[1]Corresponding Author: Department of Economics, Federal University Lokoja. Kogi State, Nigeria.*
uzombapc@gmail.com / puzomba@yahoo.com 0803-275-5065

[2]Department of Economics, University of Africa, Toru-Orua, Bayelsa State.
ibeinmocookey@gmail.com 0803-768-3600

ABSTRACT

This study sets out to investigate if returns on human capital improves the Nigerian economy from 1990 to 2019. Return on human capital herein is proxied as returns on intellectual capital (RITC) and intellectual property (RIPR). Two specific objectives and hypotheses guided the study. Relevant data were sourced from the statistical bulletin of Central Bank of Nigeria and World Bank. The logic of our method of study is drawn from Paul's Romer Growth and human capital theories as we employ Autoregressive Distributive Lag (ARDL) and residual diagnostic methods for data analysis. The results reveal that RITC makes significant improvement on RGDP, but RIPR fails to do same. This implies that the two measures of human capital do not have the same effect on the Nigerian economy. On this basis, we conclude that returns on intellectual capital are more significant in improving the Nigerian economy than returns on intellectual property. Consequently, we recommend, among others, that the government should protect peoples' intellectual property by strengthening and reviving the institutions saddled with such responsibilities to sustain and increase the fight against piracy.

Keywords: Human Capital, Intellectual, Capital, Property, RGDP, ARDL
JEL Classification: D23, D24, I26, O34, O4, P14

1. Introduction

Working towards improving the Nigerian economy has been the concern of policy thrusts in the country. Also, successive governments had made efforts in that regards, by paying attention to moving human capital from an undesirable status to a more desirable status. This could be seen on how governments have continued to develop human capital through investment in education, health and research and development, with a policy goal of improving the Nigerian economy through enhanced human capabilities that accumulate into human capital stock and higher productivity through greater employees' effectiveness and

efficiency. Financing of human capital is an investment rather than costs; because expenditure on employees produces desirable returns (in terms of intellectual capital and property) in place of financial or physical capital (Liu & Han, 2013; and Bontis, Janosevic and Dzenopolja, 2015).

Economic literature documents that human capital comprises knowledge, experience, know-how, teamwork capacity, motivation, satisfaction, loyalty, competency, learning capacity, individuals' education, values, creativity, employee flexibility, talent, intangible assets, human capital stock, intellectual property (Bontis, Janosevic & Dzenopoljac, 2015). These capital dimensions represent the tacit knowledge planted in the minds of employees (Hao, Manole & Van-Ark, 2008), providing countries with desirable returns in terms of collective capacity to find innovative solutions, enhancing their problem-solving ability and improving economic fortune for the growth of economy (Ajadi & Adebakin, 2014). Among the dimensions of human capital, the focus of our paper is on returns on intellectual capital and intellectual property.

Intellectual capital summarizes human capital qualities that add values to the growth of an economy with a value chain covering the capacity of the workforce (human capital stock) (Xue & Wang, 2001). Intellectual property, on the other hand, includes; patents, copyrights, trade secrets, and trademarks, industrial design rights, trademarks, plant variety rights, trade dress, trade secrets, plant breeders' rights; which adds up everything an employee knows that dovetails to its competitive edge over other competitors in a business space (Lybecker, 2014). Both intellectual capital and property are products of the human capital composition of an individual; it defines an employee's knowledge and skills that drive the knowledge economy. Intellectual capital and property have been the driving force for business activities that have made investments in information technology, human resources, material resources, advertising, and research and development essential for the sake of meeting and maintaining a country's competitive position and making sure its future viability is sustained.

The foregoing explains why the Organization for Economic Co-operation and Development reports that returns on intellectual capital and property in the United States, Japan, and other parts of Europe, have made tremendous impacts on output and generated reasonable economic fortune for the countries that invested in human capital (OECD, 2011). Naturally, the rationale for investment is to earn returns, save and plan for the future. Governments of nations invest in intellectual capital and property to get returns. Such returns, concerning the contributions of intellectual capital and property, have accounted for the growth and development of Western Countries (OEDC, 2011 & 2013; Leandro, García-Ayuso & Sánchez, cited in Okoye, Offor, & Manukaji, 2019). Also, Okoye, Offor and Manukaji (2019) argue that returns in intellectual assets are essential ingredients and indispensible assets that contribute to a well functioning economy.

In the last decade, the contributions of intellectual capital to the Nigerian economy have increased from ₦49billion to ₦62billion, representing an increase of 26.5% from 2.04%. Also return on intellectual property has an increase by 20.5% from approximately 4.8% (World Bank, 2019). With these returns on intellectual capital and property, one would have expected the Nigerian real gross domestic product to increase more proportionately, but a marginal increase in the volume of national output is the case of the country.

In this regard, empirical evidence (Adelakun, 2011; Ajadi & Adebakin, 2014; Ehimare, Ogaga-Oghene, Obarisiagbon & Okorie, 2014; Obi & Obi 2014; Jaiyeoba, 2015; Adeyemi & Ogunsola, 2016; Ehigiator, 2017) abound on growth in the Nigerian economy. Such rely on OLS regression, non-linear and fixed effects specifications, non-country specific, descriptive correlation, and employed educations and health as direct measures of human capital; whereas, Ogunleye, Owolabi, Sanyaolu, and Lawal (2017) employ intangible assets as measures of human capital. To the knowledge of the authors, all these studies do not take into account the returns (monetary values of stock of human capital and charges on intellectual property) on intellectual capital and property, as measures of human capital, improve real gross domestic products in Nigeria from 1990 to 2019.

Our paper, therefore, contributes to filling this noticeable gap in the extant literature by relying on evidence from returns on intellectual capital and property to address this question; do returns on human capital improve the Nigerian economy? In the light of this question, the objectives of the study include: (1) to examine how return on intellectual capital improve the Nigerian economy; and (2) to investigate how return on intellectual property improve the Nigerian economy. In line with the objectives, we postulated these hypotheses: return on intellectual capital does not significantly improve the Nigerian economy; and return on intellectual property does not significantly improve the Nigerian economy. Following the introduction in the first section, the sequence of this paper goes in this direction; literature reviews (theoretical and empirical reviews) are done in section two, section three presents method of study, as empirical results and discussion are presented in section, and the study has its concluding remarks in section five.

2. Literature Review

2.1. Theoretical Literature

A search for the relationship between human capital and economic growth has aroused an array of economic literature on theoretical and empirical strands. An understanding of this buttresses the need to delineate the importance of human capital in the growth process by measuring specific contributions, otherwise returns, of its components such as intellectual capital and property. In doing that, Endogenous Growth and Human Capital Theories are employed. The former, as proposed by Paul Romer – furthering Solow's growth argument,

argues that economic growth is a direct result of internal processes made up of physical and non-physical compositions. By preserving the essential features of endogenous growth theory, Parke (2012) reports that Romer's model advances the precept of Cobb-Douglas production function by arguing in favour of the addition of knowledge component in the configuration of a production function.

The model presents an argument that achieving increasing returns - in which there is a stable positive equilibrium growth rate – is a function of endogenous accumulation of knowledge. Our study finds its strength within the workings of this theory by arguing that the addition of knowledge capital element in the process of improving the technological and physical capital base of a production system allows for sustenance of economic growth. Hence the need for government to invest in the development of human capital is reiterated – for the reason that the trajectory of economic growth does not sidestep human capital; since intuitively, it portends constant overall returns to scale. Unlike physical capital (bedeviled by inherent diminishing returns on capital), there is no obvious reason why increases in knowledge capital would be subject to diminishing returns because employee's knowledge spillovers (intellectual capital and property) allow for increasing return to scale which cumulates to increase in aggregate output and economic progress (Romer, 1993 cited in Parke, 2012).

The second theory, human capital theory, is of the presumption that investment in human capital – through education (formal, semi-formal, and informal) and health yields returns that improve the output and productivity of labour. This to a degree explains why Becker as cited in Mutamba (2016) argues that such returns instill needed and valuable skills and knowledge that raises workers' capability to significantly increase the level of productivity towards achieving economic growth. It is therefore instructive to argue that returns on human capital are crucial hallmarks of intellectual capital and property that improve the economic growth and development of a nation.

Having reviewed the theories that support the thesis of this study, the paper relies on Romer's-Endogenous-Growth-Human-Capital-Theories as a theoretical framework by arguing that knowledge economy is a return from a well-developed human capital system that derives economic progress of an economy. The framework arouses the interest of the study to argue that the Nigerian economy (measured in terms of real gross domestic products) has not appreciably increased amid increased returns on human capital (measured in terms of monetary contributions of human capital stock - intellectual capital - and charges on intellectual property). This framework recognizes the important and enduring roles play by the human capital element in the growth process of a nation.

2.2. Empirical Literature

To support the two objectives of our study with specific literature, relevant empirical studies are reviewed. For instance, Corrado, Hulten and Sichel (2006) use ARDL to assess the impact of intellectual capital on labour output in the United States. The study reports that the United States had 26% of labour output growth in 1973-1995 and 27% of labour output growth in 1995-2005 as a result of the contribution from intellectual capital. By adopting ARDL cointegration approach to investigate the impact of human capital development on economic growth in Nigeria from 1980-2013, Adeyemi and Ogunsola (2016) report a positive long-run relationship between life expectancy rate, secondary school enrolment, gross capital formation, government expenditure on education; and economic growth.

Marrano, Haskel, and Wallis (2007) apply the methodology of Corrado, Hulten, and Sichel (2006) to examine how intellectual capital impacts on the labour output in the United Kingdom from 1973 to 2005. The study documents that 15% of labour output growth is attributed to investment in intellectual capital. Olalekan (2014) examines the impact of human capital on economic growth in Nigeria, using annual data on education and health from 1980 to 2011, and the Generalized Method of Moment (GMM) techniques. The study provides evidence of a positive relationship between human capital and economic growth in Nigeria. Using OLS methodology and annual time series data from 1980 to 2012, Oladeji (2015) investigates the relationship between education, health care services, and economic growth in Nigeria. His research reports that there is a significant long-run relationship between investment in education and economic growth in Nigeria.

On the account of intellectual property, Verspagen (1999) examining the importance of intellectual property rights in the world economy with emphasis on patents reports that charges from copyrights and trademarks are found important, in the long run, for the dynamic performance of the American economy. The paper further argues that knowledge and immaterial products are becoming more and more important more than ever in the American economy. In line with this argument, Landes, (1969), Maddison, (1991) and Freeman and Soete, (1997) cited in Verspagen (1999) present a line of thought that the advantages of technology are more in the product of intellectual property – which advances economic growth of United States by sustaining the prolonged growth of GDP per capita.

Mokyr (2009) studying intellectual property rights, the industrial revolution, and the beginnings of modern economic growth sources data from selected European countries and employs the econometric method. The study finds that charges from intellectual property rights; otherwise referred to as the contribution of intellectual property rights, and the industrial revolution contributes significantly to modern economic growth. Lerner (2009) using the Augmented Dickey-Fuller (ADF) unit root test and the Ordinary Least Square (OLS) tool to empirically examine the impact of intellectual property rights on innovation

in the United State. The study uses total charges from intellectual property measured as its contributions to solve the puzzles and provides clues that project the importance of innovation to economic growth. The study reports that intellectual property rights are found to have a positive and significant impact on innovativeness.

From the foregoing, it is evident that intellectual capital and intellectual property make a positive and significant impact on economic growth – suggesting that human impact makes a significant impact on the economic growth of nations. However, the studies by Heiens, Leach and McGrath (2007), and Izedonme, Odeyile and Kuegbe (2013) using secondary data and some form of econometric methods to examine the impact of human capital on economic growth report that the former has not asserted due and significant impact on the latter. This suggests that there are mixed reports on the relationship between human capital and economic growth. This gives the impression that the debate on the impact of human capital development on economic growth is inconclusive; hence the need to examine how returns on human capital improves the Nigerian economy, using evidence from intellectual capital and property.

3. Methodology

The study adopts an ex-post facto research design and uses secondary data sourced from World Bank (2019). Following the theoretical framework, the models are specified starting with ARDL functional relationship as presented below:

$$RGDP = f\,(RGDP, RITC, RIPR) \qquad 1$$

Where: *RGDP = Real gross domestic product, as a proxy for the Nigeria's economic growth, RITC = Return on Intellectual Capital, proxied by human capital stock, and RIPR = Return on Intellectual Property proxied by charges on patent, copyright, industrial design, trademarks, plant variety right, trade dress, trade secret, geographical identities.*

ARDL Equations for the Study Variables

$$\Delta In(RGDP)_1=\beta_0+\beta_1 In(RGDP)_{t-1}+\beta_2 In(RITC)_{t-1} + \beta_3 ln(RIPR)_{t-1} + \sum_{i=1}^{p} \theta_{1i}\Delta(RGDP)_{t-1} + \sum_{i=1}^{r} \theta_{2i}\Delta(RITC)_{t-0} + \sum_{i=1}^{s} \theta_{3i}\Delta(RIPR)_{t-0} + \mu_t \qquad 2$$

$$\Delta In(RITC)_1= \beta_0+\beta_1 In(RITC)_{t-1} + \beta_2 ln(RGDP)_{t-1} + \beta_3 In(RIPR)_{t-1} + \sum_{i=1}^{p} \theta_{1i}\Delta(RITC)_{t-1} + \sum_{i=1}^{r} \theta_{2i}\Delta(RGDP)_{t-0} + \sum_{i=1}^{s} \theta_{3i}\Delta(RIPR)_{t-0} + \mu_t \qquad 3$$

$$\Delta In(RIPR)_1= \beta_0 + \beta_1 In(RIPR)_{t-1} + \beta_2 ln(RITC)_{t-1} + \beta_3 In(RGDP)_{t-1} + \sum_{i=1}^{p} \theta_{2i}\Delta(RIPR)_{t-0} + \sum_{i=1}^{r} \theta_{3i}\Delta(RITC)_{t-0} + \sum_{i=1}^{s} \theta_{4i}\Delta(RGDP)_{t-0} + \mu_t \qquad 4$$

Where: *β_0 is the slope of the ARDL regression line, as well as the constant (trend deterministic) for the equation; β_1 –β_3,and 1 –3, are coefficients of the parameters to be estimated; Δ = denotes the first difference operator; $RGDP'_{t1}$ is a vector for the equation; $(RITC'_t)'_1$,and $(RIPR'_t)'_2$ are independent variables allowed to be purely 1(0), 1(I) or cointegraeted; p, r, and s are maximum lags associated with exogenous variables; i is the order of ARDL process and optimal lag length associated with the dependent variables chosen for the purpose of making 'εt' a white noise at level or first-differenced terms (note it may not necessarily be the same); ln = Natural log – introduced in order to make variables be on a common scale, reduce extrema, get rid of exponentials and curtail the effects of outliers on the models – this is necessary because the variables have data in percentage and nominal values; and t – I = the lagged values; μ_t = vector of the uncorrelated random error term with zero mean and constant variance.*

Noteworthy is the fact that this study conducts ARDL regression equations with optimal lag length chosen according to standard criteria of both Schwartz Bayesian Criterion (SBC) and Akaike Information Criterion (AIC), and employs F-test statistical feature for testing the existence of long-run relationship.

The natural log of short-run ARDL test model, using ordinary least squares insinuations, is specified below, should no level relationship is found in the Bound cointegration test.

$$\log RGDP_t = a_o + a_1 \log RITC_t + a_2 \log RIPR_t + \mu_t \quad 5$$

Apriori Expectation: $a_1 > 0; a_2 > 0; 0;$

the regression line or the constant: a1, a2, are the coefficients of parameter estimates; ut is the stochastic error term at time t; and log is the logarithm operator

On the other hand, in case the Bound cointegration test produces a level or long-run relationship, the error correction mechanism (ECM) test is conducted using the estimation bellow:

$$\Delta(LNRGDP)_t = \Psi_0 + \sum_{i=1}^{p} \Psi_{1i}\Delta(LNRGDP)_{t-i} + \sum_{i=0}^{r} \Psi_{2i}\Delta(LNRITC)_{t-i} + \sum_{i=0}^{s} \Psi_{3i}\Delta(LNRIPR)_{t-i} + \beta_1 ECT_{t-1} + \varepsilon_t \quad 6$$

$$\Delta(LNRITC)_t = \Psi_0 + \sum_{i=1}^{p} \Psi_{1i}\Delta(LNRITC)_{t-i} + \sum_{i=0}^{r} \Psi_{2i}\Delta(LNRGDP)_{t-i} + \sum_{i=0}^{s} \Psi_{3i}\Delta(LNRIPR)_{t-i} + \beta_1 ECT_{t-1} + \varepsilon_t \quad 7$$

$$\Delta(LNRIPR)_t = \Psi_0 + \sum_{i=1}^{p} \Psi_{1i}\Delta(LNRIPR)_{t-i} + \sum_{i=0}^{r} \Psi_{2i}\Delta(LNRITC)_{t-i} + \sum_{i=0}^{s} \Psi_{3i}\Delta(LNRGDP)_{t-i} + \beta_1 ECT_{t-1} + \varepsilon_t \quad 8$$

Where: *All other parameters retain their earlier definitions, while ECT is the error correction term – which defines the speed of adjustment in the parameter coefficient of β_1. The ECT explains the degree or percentage of correction of disequilibrium in equations 2 – 4; that is, the extent to which adjustments are made in the previous periods in $RGDP_t$ for the restoration of equilibrium in the subsequent periods using the ARDL models.*

Methods of Data Analysis and Justifications

This paper adopts ARDL method of data analysis by conducting these tests: descriptive and correlation matrix; Philip-Perron unit root; ARDL bounds cointegration; short-run ARDL (for none cointegrating equation(s)); ARDL error correction mechanism (ECM) – for cointegrating equation(s); unrestricted Wald; Granger causality; and residual diagnostic – covering normality; serial correlation; heteroscedasticity.

We are aware that there are many lags in our model specification which is informed by a small sample of 30 years (1990 to 2019), and suggests that the use of higher frequency data would have been better. However, this limitation explains the overall reason why ARDL is adopted on the strength that it is more efficient in dealing with sample size and unbiased long run estimations. Also, it possesses the strength of adding *instrumental-vector* – which contains lagged value of the dependent variable, current and lagged values of the regressors as explanatory variables; and combines both endogenous and exogenous variables in a system of equation, unlike other methods like VAR (see Pesaran, Shin & Smith, 2001; and Narayan, 2005).

Furthermore, the adoption of ARDL is on the potency of mutual or shared relationships that exist among economic variables beyond the time; and it uses the F-statistical feature of lower and upper bounds as judgment scale (Priya, 2018). As a condition that must be met, ARDL estimation requires that no variable in the model should be integrated of order 2 [I(2)]; put differently, the unit test result for all variables must be stationary either at levels or first difference or both; hence they are expected to be integrated of order zero [I(0)] and/or [I(1)].

The use of the study variables is justified by using data on real gross domestic products as a measure of the Nigerian economy (see, for example, Ajadi and Adebakin, 2014); returns on human capital, measured as returns on intellectual capital and property (Xue & Wang, 2001). Return on intellectual capital is measured in terms of contribution of human capital stock (Corrado, Hulten & Sichel, 2006; and Oladeji, 2015); and return on intellectual property is measured in terms of charges on patents, copyrights, industrial design, trademarks, plant variety right, and trade secret (see Verspagen, 1999; Mokyr, 2009; Marrano, Haskel & Wallis, 2007; Olalekan, 2014; Adeyemi & Ogunsola, 2016).

4. Results and Discussion of Findings

Table 4.1: Result of Descriptive Statistics and Correlation Matrix Tests

	LNRGDP	LNRITC	LNRIPR
Mean	38479.63	43416376	1.15E+08
Median	33365.00	42275761	61172135
Maximum	69023.93	60698492	2.59E+08
Minimum	19199.06	30040723	11399110
Std. Dev.	18342.63	9177805.	97082398
Skewness	0.492932	0.294249	0.452556
Kurtosis	1.693350	1.933010	1.417177
Jarque-Bera	3.125806	1.732265	3.878646
Probability	0.209527	0.420575	0.143801
Observations	28	28	28

	LNRGDP	LNRITC	LNRIPR
LNRGDP	1	0.8323	0.8466
LNRITC	0.8323	1	
LNRIPR	0.8466	0.9083	1

Source: *Computed by the Authors with E-Views, 2020.*

Table 4.1 presents the results of descriptive statistical tests conducted with measures of central tendency and dispersion tools. From the results, RGDP has values above the mean value from 1990 to 2005, 2018, and 2019; with a median value lying in-between 2003 and 2004, its maximum value was in 2015, and the minimum value is on 1991 data point. LNRITC falls below the mean value from 1990 to 2007, and 2011; as the median value lies within the neighborhood of 2003 and 2005, with its maximum and minimum values recorded in 2010 and 1993 respectively. On the other hand, RIPR has its data fell below the mean from 1990 to 2007, as the median value lies in 2006, with its maximum and minimum values recorded in 2019 and 2003 respectively.

The result of symmetry in the data measured using skewness reveals that the data are moderately skewed for RGDP, highly skewed for RITC, and RIPR is fair. This is so because their respective values fall in between 0.5 and 1; greater than 1; and between -0.5 and 0.5 for RGDP, RITC and RIPR. Further, in determining the degree of *peakedness* or flatness of the data, it is evident that the three variables have heavier tails (leptokurtic distribution), because their values are greater than zero. Jarque-Bera test value reveals that the data, not the errors, are normally distributed, and the probability value of the result suggests that the data could be used for further analysis.

In determining the direction of the relationship in the study, a correlational matrix test was conducted. Between RGDP and RITC, the result is reported as 0.8323 (83%). In other words, RGDP and RITC are strongly and positively related up to the value of 83%. A very similar thing happens between RGDP and RIPR with a value of 0.8466; suggesting that real gross domestic product and charges on intellectual properties are strongly and positively related.

Table 4.2: Philip-Perron (PP) Unit Root Stationary Test

Variables	PP Stat. at Levels	1% Crit. Value	5% Crit. Value	PP Stat. at first Diff.	1% Crit. Value	5% Crit. Value	Order of integration
In(RGDP)	-1.444991	-3.679322	-2.967767	-5.193606*	-3.689194	-2.971853	I(1)
In(RITC)	1.752268	-3.679322	-2.967767	-3.902928*	-3.689194	-2.971853	I(1)
In(RIPR)	-1.398938	-3.679322	-2.967767	-6.404007*	-3.689194	-2.971853	I(1)

In order to ensure that none of the variables is integrated of order 2 or higher, the Philip Perron (PP) unit root test was employed. The results of the PP unit root test reveals that the variables are stationary at first difference and integrated of order 1 - [that is, I(1)] at 1% and 5% significant levels. Therefore, the time-series data used in this study are stationary at first difference; this is good news and gives us the confidence to proceed with further analyses, irrespectively of the size of the sample.

Equations (Dependent Variables)	Statistical Values		Critical Value Bounds at 5%		Decision on Cointegration	Decision on Next Action
	F-values	t-values	I(0) Bound	I(1) Bound		
LNRGDP	0.519463	-0.984235	2.86	4.01	No, retain H_o	Estimate ARDL SROLS
LNRITC	204.5669	8.119700	2.86	4.01	Yes, reject Ho	Estimate ECM
LNRIPR	0.963163	-2.016336	2.86	4.01	No, retain H_o	Estimate ARDL SROLS

Note: *ARDL =Autoregressive Distributive Lag; SROLS = Short Run Ordinary Least*

Squares. Ho = Null Hypothesis. ECM = Error Correction Model
Source: *An Extract from ARDL Bound Test Result Computed by the Authors with E-Views, 2020.*

There are two hypothetical postulations in this study – first, return on intellectual capital does not significantly improve the Nigerian economy; and second, return on intellectual property does not significantly improve the Nigerian economy.

Hypothesis One (Ho_1): Return on intellectual capital does not significantly improve Nigerian economy.
The results show that in the return on intellectual capital (RITC) equation, the F-value is 204.5669, and t-value of 8.119700, with critical values of 2.86 and 4.01 for "I(0)" Bounds

and "I(1)" Bounds respectively at 5% level of significance. This result reveals that the value of F-value (204.5669) is greater than both values of "I(0)" Bounds (2.86) and "I(1)" Bounds (4.01), as such we reject the null hypothesis. This is confirmed and corroborated by the absolute value of t-stat (8.119700) which again, is greater than both values of "I(0)" Bounds (2.86) and "I(1)" Bounds (4.01) testes at 5% level of significance. On this basis we confidently reject the null hypothesis; hence there is significant improvement from return on intellectual capital to real gross domestic product in Nigeria. Inspired by this result, we conclude that return on intellectual capital (RITC) which is proxied as human capital stock has, in the long run significantly improved the Nigerian real gross domestic product within the period of study.

Hypothesis Two (Ho_2): Return on intellectual property does not significantly improve the Nigerian economy.

The results report that in the return on intellectual property (RIPR) equation, the F-value has the value of 0.963163, t-value has the value of -2.016336, and critical values of 2.86 and 4.01 for "I(0)" Bounds and "I(1)" Bounds respectively at 5% level of significance. These results reveal that the value of F-value (0.963163) is less than both values of "I(0)" Bounds (2.86) and "I(1)" Bounds (4.01), as such we cannot reject the null hypothesis. To be double sure, we considered the absolute value of t-stat, which is (2.016336). This again is less than both values of "I (0)" Bounds (2.86) and "I(1)" Bounds (4.01) testes at a 5% level of significance. So the F-stat is confirmed and supported. This means that the null hypothesis is retained. Therefore there is no significant improvement from return on intellectual property to the Nigerian economy. In other words, charges on intellectual properties (such as patents, trademarks, copyrights, etc) have not significantly improved the Nigerian economy.

Table 4.4: Result of Estimated ARDL Short Run OLS Regression for None-cointgrating Equations
Selected Model: ARDL (1, 0)

Variable	Coefficient	Std. Error	t-Statistics	Prob.*
LNRGDP (-1)	0.748360	0.233124	3.210143	0.0040
LNRIPR	4.88E-06	6.97E-05	0.070061	0.9448
C	-64834.02	68848.78	-0.941687	0.3566
R-squared	0.813171	Mean dependent var	37975.99	

*Note: p-values and any subsequent tests do not account for model selection
Source: *Authors' Computation, 2020.*

The table presents the result of the short-run static ARDL regression done with the RGDP ARDL regression equation, 29 inclusive observations after adjustment, and the Akaike Info Criterion (AIC) selection criterion – which assigns lag 1 to RGDP and 0 to INPR. Although a long-run relationship was not empirically established between RGDP and RIPR, as reported by the Bound cointegration test, the ARDL short-run test reveals that the value of the short-run coefficient of return on intellectual properties (charges on patent, copyright, industrial design, trademarks, plant variety right, trade dress, trade secret, geographical location) is 4.88E-06. This suggests that as return on intellectual properties increases by 1 unit at the current time, real gross domestic product increases by 4.88E-06 unit.

In other words, a 100 percent increase in return on intellectual properties brings about a 488 percent increase in real gross domestic product in the Nigerian economy, *ceteris paribus.* More interestingly, the result appears with the right sign as expected by the theoretical expectation (apriori expectation) – that, increase in return on intellectual property brings about an increase in real gross domestic product; also, it reveals that 81% changes that occur in RGDP could be attributed to changes in return on intellectual property. However, the probability value reveals that the return on intellectual properties is not significant. This confirms why the variable failed to cointegrate with real gross domestic product in Nigeria.

Table 4.5: Results of Estimated ARDL-ECM (-1) Test for Cointegrated Equation Dependent Variable: D (LNRGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-14290.73	11577.42	-1.234362	0.3049
D(LNRITC(-1))	0.142094	0.070228	2.023310	0.1362
D(LNRITC(-2))	-0.104057	0.044186	-2.354956	0.0999
D(LNRITC(-3))	-0.030075	0.035642	-0.843812	0.4607
D(LNRITC(-4))	0.007625	0.022443	0.339774	0.7564
ECM(-1)	-3.732063	1.284972	-2.904393	0.0623
R-squared	0.989586	Mean dependent var	155.8000	

Selection Criteria: LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; and HQ: Hannan-Quinn information criterion.
Source: *Authors' Computation, 2020.*

Table 4.5 reports the result of the ARDL error correction model analyzed with 4 lag lengths selected using the relevant selection criteria. This suggests that the time lag it would take to reconcile economic actions and their consequences between the return on intellectual capital and real gross domestic products. In other words, it would take about four years for corrective effects of return on intellectual capital to smooth out or respond to an adverse economic effect by improving real gross domestic products.

The ECM coefficient value of (-3.732063) goes further to suggest that it would take about 373% speed of adjustment to correct the previous errors in the subsequent period. The probability value of 0.0623 is greater than the 5% level of significance – indicating that the return on intellectual capital does not significantly improve real gross domestic products. This explains why it would take such a long period and speed of adjustment to correct the errors and return normalcy or equilibrium in the short run of the model. The value of R square, of 0.989586, still supports the fact that the ECM model has a high power of determination of changes that occur in the Nigerian economy; as a result of changes that happen in return on intellectual capital.

Table 4.6: Results of Estimated Wald Unrestricted Coefficient Diagnostic Test

Equations (Dependent Variables)	Wald Test F-Stat.	Chi-Square	Prob.	df	Level of Significance	Decision
LNRGDP	104.3836	626.3015	0.0000	(6,22) 6	0.05	Reject Ho: Significant
LNRITC	342.8795	2400.157	0.0002	(7, 3) 7	0.05	Reject Ho: Significant
LNRIPR	303.7292	1822.375	0.0000	(6, 23) 6	0.05	Reject Ho: Significant

Source: *An Extract from ARDL-Wald Result Output Computed by the Author with E-Views, 2020.*

From the table, the result of the Wald test reveals that the three variables significantly contribute to the models. This is revealed by their respective values of 0.0000, 0.0002, and 0.0000 which are less than the 5% critical value. Supported by this, the values of Wald test

F-stat (104.3836, 342.8795, and 303.7292) are less than the value of Chi-square (626.3015, 2400.157, and 1822.375). Therefore the null hypothesis that the variables do not contribute something significant to the model is rejected. To this end, it is concluded that the inclusion of the variables in the models earns good justification, as they are found to be significant in making meaningful contributions in the models.

Table 4.7: Results of Estimated ARDL Pairwise Granger Causality Tests for the Study

Null Hypotheses	Obs.	F-Statistic	Prob.	Decision	Direction of Forecast
LNRITC does not Granger Cause LNRGDP	28	1.31677	0.2875	Accept Ho	Unidirectional
LNRGDP does not Granger Cause LNRITC		4.01581	0.0319	Reject Ho	
LNRIPR does not Granger Cause LNRGDP	28	0.36325	0.6993	Accept Ho	Zero Directional
LNRGDP does not Granger Cause LNRIPR		2.86807	0.0773	Accept Ho	

Source: *Authors' Computation, 2020.*

The result of the Granger causality test between LNRITC and LNRGDP shows that the former does not Granger cause the latter, but the latter does. This means that there is a unidirectional Granger causality between the variables. However, either LNRIPR or LNRGDP does Granger cause each other, hence zero or independent Granger causality exists between the two variables. By implication, it means that real gross domestic products can be used to forecast return on intellectual capital.

Table 4.8: Result of Estimated ARDL Residual Diagnostic Tests

Equations (Dependent Variables)	**Result of Histogram Normality Test**		**Breusch-Godfrey Serial Correlation LM Test**		**Heteroscedasticity: Breusch-Pagan-Godfrey Test**	
	Probability Value	**Jarque-Bera Value**	**F.Stat**	**Prob. Value**	**F.Stat. Value**	**Prob. Value**
LNRGDP	0.0000	227.6694	1.415979	0.2689	1.587659	0.1978
LNRITC	0.0002	17.26706	2.945135	0.0474	0.799022	0.5969
LNRIPR	0.0316	2.306426	1.706110	0.1902	0.505103	0.7693

Source: *Authors' Computation, 2020.*

To ensure the robustness of our results for policy relevance, residual diagnostic tests are conducted using histogram normality, Breusch_Godfrey Serial Correlation LM and Heteroscedasticity approaches. For the three equations, the result shows that the errors in the variables are not normally distributed – because their probability values are less than 5% level. From the Breusch_Godfrey Serial Correlation LM results, we can infer that the errors in the data distributions of the variables are not serially correlated – because their F-stat values are greater than 5% level. Heteroscedasticity_Breusch-Pagan-Godfrey test result shows that the variables are said to be homoscedasticity F-stat values greater than 5% level.

Discussion of Results

Providing empirical answers to the question – do returns on human capital improve the Nigerian economy, using evidence from intellectual capital and property is the core mandate of this study. The study uses the ARDL approach, as a method of data analysis, to address the question. With respect to the first objective of the study, the results are such that a positive and strong relationship is found between RITC and RGDP. A long-run relationship is found between RITC and RGDP as revealed by the ARDL Bound test result. This means that return on intellectual capital measured in terms of human capital stock has significant long-run improvement on the Nigerian economy. The ECM result implies that the long-run relationship found between RITC and RGDP has 373% speed of adjustment, though not found to be significant. Interestingly, RITC makes a significant contribution to the models as evidenced in the Wald test result; but it cannot be used to forecast RGDP as revealed by the Granger causality test result.

The results suggest that the stock of human capital is not inimical to the Nigerian economy. This is not surprising because, as a consequence of a high rate of employment, an increase in investment in human capital produces needed returns on intellectual capital that improves the fortune of an economy. This buttresses the point that the course for moving an economy from resource-based to knowledge-based requires ample investment in education for the sole purpose of equipping people with the right skills and knowledge for the transformation of an economy. The result is a validation of our theoretical framework that the addition of well-developed capital of the intellect produced returns put on an economy on the path of growth and development.

This is in line with the study by Corrado, Hulten, and Sichel (2006) who report that intellectual capital made 26% and 27% to labour output growth in 1973 – 1995, and 1995-2005. Also, Adeyemi and Ogunsola (2016) report a positive long-run relationship between the life expectancy rate, secondary school enrolment, gross capital formation, government

expenditure on education (as measures of human capital development); and economic growth in Nigeria. Using secondary data from the United Kingdom, Marrano, Haskel, and Wallis (2007) say that labour output growth recorded a 15% increase when intellectual capital was included in the production configuration. Oladeji (2015) argues that there is a significant long-run relationship between investment in education (as a proxy of intellectual capital) and economic growth in Nigeria. The study by Olalekan (2014) is not left out – as it provides evidence of a positive relationship between human capital and economic growth in Nigeria.

However, Heiens, Leach, and McGrath (2007), and Izedonme, Odeyile and Kuegbe (2013) disagree with the report of our study by arguing otherwise - that human capital does not most often assert due and significant impact on economic growth. This deviation from our result could be attributed to the difference in data set and outlays, as well as the methodology used. It also deepens the notion that the debate between the direction of the relationship between intellectual capital and economic growth remains inconclusive.

By way of discussing the second objective, the results indicate that a positive and strong relationship is found between RIPR and RGDP, but a long-run relationship could not be established between RIPR and RGDP, as shown in the ARDL Bound test result. This implies that return on intellectual property; in other words, charges on patent, copyright, industrial design, trademarks, plant variety right, trade secret; do not improve the Nigerian economy within the period of the study. Although, the Wald test result shows that it has the ability to make a meaningful contribution to RGDP; unfortunately, it cannot be used to forecast RGDP as evidenced in the Granger causality result. Little wonder why the mean value of RIPR falls far below the mean value than RITC.

These results could be attributed to the high level of piracy in Nigeria; which negatively affects the outputs and inventions of intellectuals. More to this, is that people are being persuaded by their socio-economic status to go for pirated products (which are relatively cheaper); also patents are no longer respectably patronized - rather people resort to fake and substandard things. This chains the economy to the extent of destructing the potential benefits of returns on intellectual property – and, weakens its ability to make significant contributions that could sustain the Nigerian economy in the long run. The results disagree with the implicit theoretical assumption that intellectual property (IP) increases the wealth of countries. As well, it is implicative from the result that the main purpose of intellectual property law – which is to encourage the creation of a wide variety of intellectual goods, has not been achieved, and raises a question mark on the enforcement of property rights and receipt of economic incentives for creativity and innovations.

By supporting our empirical argument Rod and Foster (2006) argue that the return on intellectual property that serves as economic incentives and stimulus for innovation is eroding. Such suspected erosion produces negative outcome that makes firms to rarely invest in intangible experience (intellectual property) (Heiens, Leach & McGrath, 2007); and create an insignificant relationship between the intellectual property variables and organizational performance (Izedonme, Odeyile & Kuegbe, 2013).

However, Verspagen (1999) argues in a contradictory manner. He submits that charges on copyrights and trademarks, in the long run, are found important for the dynamic performance of the American economy. Also Landes, (1969), Maddison, (1991), and Freeman and Soete, (1997) cited in Verspagen (1999) argue that the advantages of technology are more in the product of intellectual property. Mokyr (2009) disagrees with our result but arguing that charges from intellectual property rights; otherwise referred to as the contribution of intellectual property rights, and industrial revolution contribute significantly to the modern economic growth. Lerner (2009) presents an argument that total charges from intellectual property provide clues use to solve economic puzzles because they have a positive and significant impact on innovation. Unfortunately, the assertion by Lybecker (2014) that a robust intellectual property rights regime is beneficial to economic development, fails to earn credence by the findings of our study.

5. Concluding Remarks

When studying whether or otherwise, intellectual capital and property improve the Nigerian economy, one has to account for the returns that accrue from the investment on intellectual capital and property, and how these returns have improved the overall economy of the country.

Based on the results, we therefore conclude that returns on intellectual capital are more significant in improving the Nigerian economy than the returns on intellectual property. This is on the strength that the former contains a direct human capital dimension that is central to contributing to production in both goods and services through employment. However, the latter still has some prospects that need to be harnessed through effective enforcement of relevant laws. Therefore, we recommend that to sustain and improve the contribution of returns on intellectual property, the government must as a matter of policy necessity, sustain and improve job creation policies to continue to absorb the pilled stock of human capital.

Also, it is recommended that the government should protect peoples' intellectual property in terms of patents, trademarks and copyrights, by strengthening and reviving the institutions saddled with such responsibilities to increase and sustain the fight against piracy. Also, the study contributes to the extant literature by empirically validating that Romer's Endogenous Growth and Human Capital Theories are relevant in explaining how intellectual capital improves the Nigerian economy but does not validate the potency of intellectual property.

By way of limitation, there was a challenge in getting data for returns on intellectual capital and property from 1980 to 2019 for Nigeria; hence the study period was reduced to 30 years. Nonetheless, the accuracy, validity, and significance of the results are not affected; and can be used to generalize how intellectual capital and property improve the Nigerian economy.

REFERENCES

Adelakun, O. J. (2011). Human capital development and economic growth in Nigeria. *European Journal of Business and Management, 12(5), 31 - 42.*

Adeyemi, P. A. & Ogunsola, A. J. (2016). The impact of human capital development on economic growth in Nigeria: ARDL Approach. *IOSR Journal of Humanities and Social Science, 10(3), 37 – 52.*

Ajadi, O. T. & Adebakin, A. B. (2014). Human capital development as correlate of economic growth in Nigeria. The African symposium: *An Online Journal of the African Educational Research Network, 14(7), 133 – 139.*

Bontis, N., Janosevic, S., & Dzenopoljac, V. (2015). Intellectual capital in Serbia's hotel industry. *International Journal of Contemporary Hospitality Management, 27(6), 1365-1384.*

Corrado, C., Hulten, C & Siche, D. (2006). *Intangible capital and economic growth,* NBER Working Paper No. 11948, *National Bureau of Economic Research*, Cambridge, *MA.*

Ehigiator, B. O. (2017). *The service sector in Nigeria: An escalator for new economic growth.* Lund University, School of Economics and Management.

Ehimare, O. A., Ogaga-Oghene, J. O., Obarisiagbon, E. I., & Okorie, E. U. (2014). The Nigerian government expenditure on human capital development: an efficiency analysis. *European Journal of Business and Social Sciences, 3(7), 1 – 13.*

Hao, J., Manole, V. & Van Ark, B. (2008). Intangible capital and growth – an international comparison, *Economics Program Working Paper Series, EPWP No. 08-14, Conference Board Inc., New York, December.*

Heiens, R. A., Leach, R. T. & McGrath, L. C. (2007). The contribution of intangible assets and expenditures to shareholder value. *Journal of Strategic Marketing, 15(2), 149-159.*

Izedonme, P. F., Odeyile, L. G. & Kuegbe, K. (2013). Human resource accounting and its impact on organizational performance. *Journal of Economics and Sustainable Development, 4(15), 50-56.*

Jaiyeoba, S. V. (2015). Human capital investment and economic growth in Nigeria. *African Research Review, 9(1), 30-46.*

Lerner, J. (2009). The empirical impact of intellectual property rights on innovation: puzzles and clues. *The American Economic Review, 99(2), 343 – 348.*

Liu, B. & Han, G. (2013). The impact of research and development on economic growth and productivity in the US States. Pepperdine University, *School of Public Policy Working Papers, Paper 48.*

Lybecker, K. (2014). *The economic case for strong protection for intellectual property. IP Watchdog.* Com2May Available from URL: http://www.ipwatchdog.com/2014/05/02/the-economic-case-for-strong-protection

Mokyr, J. (2009). Intellectual property rights, the industrial revolution, and the beginnings of modern economic growth. *The American Economic Review, 99(2), 349 – 355.*

Marrano, G., Haskel, J. & Wallis, D. (2007). How much does the UK invest in intangible assets? *Department of Economics Working Paper* No. 578, Queen Mary, University of London.

Mutamba, C. (2016). *An exploration and critique of the use of human capital theory in human resource development research.* See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/296640161

Narayan, P. K. (2005). The saving and investment nexus for China: evidence from cointegration tests. *Applied Economics, 37(17), 1979-1990, DOI: 10.1080/00036840500278103.*

Obi, Z. C. & Obi, C. O. (2014). Impact of government expenditure on education: The Nigerian experience. *International Journal of Business and Finance Management Research, 2(4), 42 - 48.*

OECD (2011).Valuation issues in transfer pricing of intangibles. Quarterly Report of OECD, 2011, Volume 4.

OECD (2013). Supporting investment in knowledge capital, growth and innovation. *www.oecd.org/eco/workingpapers.*

Ogunleye, O. O., Owolabi, O. A., Sanyaolu, O. A., & Lawal, O. O (2017), Human capital development and economic growth in Nigeria, *IJRDO-Journal of Business Management ISSN: 2455-6661.*

Okoye, P. V. C., Offor, N. & Manukaji, I. J. (2019). Effect of intangible assets on performance of quoted companies in Nigeria. *International Journal of Innovative Finance and Economics Research, 7(3), 58-66.*

Parke, J. (2012). Theories of endogenous growth: economics 314 coursebook.

Pesaran, M. H., Shin, Y. & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16(4), 289–326. DOI: 10.1002/jae.616.*

Peters, R.H. & Taylor, L.A. (2015) Intangible capital and the investment-q relation. *Journal of Financial Economics, 123(7), 251 – 272.*

Priya, D. (2018). An empirical analysis on consumer perception towards product organized. *International Journal in Management & Social Science, 6(178), 2321-1784.*

Rod, F. & Foster, N. (2006). The role of intellectual property rights in technology transfer and economic growth": theory and evidence, In cooperation with Olga Memedovic United Nations Industrial Development Organization (UNIDO), available: *https://www.unido.org/sites/default/files/2009-04*

Verspagen, B. (2019). *Intellectual property rights in the world economy with emphasis on patents.* Being a paper presented at World Intellectual Property Organization (WIPO) Arab Regional Symposium on the Economic Importance of Intellectual Property Rights, Muscat, Sultanate of Oman, February 22-24, 1999.

World Bank (2019), World Development Indicators (WDI) publication *https://databank.worldbank.org/reports.aspx?source=2&series*=BM.GSR.ROYL. CD

World Education News & Reviews (WENR), (2013). An Overview of Education- in-Nigeria.wenr.wes.org/2013/07.

Xue Y. & Wang, Z. (2001). Value of intangible assets information disclosure and its correlation- empirical evidence from Shanghai Stock Market. *Accounting Research, 1 (1):40-47.*