

# THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

## Information Technology (IT) and Business: Two Unavoidable Paths to Africa's Future

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### **Abstract:**

*The role of information technology (IT) and business in the socio-economic development of countries on the African continent; and in the world at large, cannot be overemphasized. IT usage is believed to have undergone rapid and massive growth since its introduction several years ago; and remains the leading source of repository information. However, effective adaption and implementation of information technology along with business by most African economies has been marred by a number of factors. The purpose of this research was to examine how African economies could harness information technology and business resources at their disposal to accelerate development and growth of the continent. The quantitative approach to scientific inquiry was applied to the current research. Specifically, a cross-sectional design was adapted and used in the study. This allowed the researchers to gather relevant research data over a specific period of time. Data required for the research were obtained mainly from secondary sources including text books, peer-reviewed articles published in journals, research papers, newspaper publications; Google Search Engine, Index Mundi, financial websites such as Tradingeconomics.com; and electronic databases of the World Bank and World Economic Outlook, among others. Annual data on Africa and World's total gross domestic products (GDPs) for the period 2008 through 2017; and data on percentage contribution of Africa to global GDP during the period were computed and used in the study. Regression models and descriptive statistics were used to describe the research variables; and to evaluate their behavior over the stated time frame in the African and global economies. Findings from the research revealed positive relationship between business and Africa's total GDP; positive relationship between IT and Africa's total GDP; and positive relationship between Africa's regional GDP contribution and World's total GDP during the period. The findings revealed Africa's regional GDP contribution accounts for about 55.15% of the variation in World's total GDP. However, in real terms, Africa's regional GDP contribution to the World's GDP in 2017 was the least among six (6) sampled regions across the globe. The findings revealed the respective GDPs of the United Kingdom (UK) and France in 2017 were more than Africa's total GDP during the same period. Recommendation was made for various African leaders to ensure existing national laws or enactments related to investments in information technology by local and foreign investors are activated and implemented; and where necessary, reviewed to serve as an effective attractive tool to all investors. Leaders of African economies with less technological sophistry are entreated to tap into the sterling initiatives of Ghana's current political administration in digitization. Effective digitization of various sectors of African economies would facilitate the release of economic data in a timely manner to enhance accuracy in annual estimation of Africa's total GDP; and the latter's contribution to the World's total GDP. African leaders must formulate and implement policies through their respective central banks to transition from collateral based lending to performance based lending to young graduates from various tertiary institutions with crafty business ideas, but lack the financial muscle to transform those ideas into practicable and profitable business initiatives and ventures. Relatively advanced African economies should develop strategies and diplomatic ties that would accelerate economic development and growth of smaller and struggling economies in Africa. It is imperative for the various sub-regional bodies in Africa to strive to add "real" socio-economic meaning to their formation and presence.*

**Keywords:** Business development, economic rankings, GDP of Africa, global GDP, information technology

### **1. Introduction**

The role of information technology (IT) and business in the socio-economic development of countries on the African continent; and in the world at large, cannot be overemphasized. Information technology and business play a monumental role in the economic success of advanced countries such as the United States of America (USA), China, Great

Britain, Germany, Japan, Netherlands, Singapore, among others. To this end, strategic adaption and implementation of key information technology and business concepts in the emerging economies of Africa would yield positive dividends.

Tech Target (2016) describes information technology as the art of using infrastructure, networking, storage, computer, and other physical devices and processes for the purpose of creating, processing, storing, securing, and exchanging all forms of electronic data. The definition of IT, a terminology first used in the Harvard Review in 1958, helps to distinguish between general-purpose machines and purpose-built machines. General-purpose machines refer to computing machines that are programmed for multiple tasks or functions. An example is a machine that is used to print, scan, make photocopies, and fax documents. Thus, a general-purpose machine performs more than one function. Purpose-built machines are machines designed to perform specific or limited functions. An example is a machine designed for printing, scanning, making photocopies, or sending and receiving fax only. Generally, a purpose-built machine does not perform more than one function.

Venkatraman (1997) describes information technology as a legion of elements of information systems including investment centers, profit centers, service centers, and cost centers. Collectively, the foregoing elements are called value centers. Venkatraman (1997) identifies the foregoing four key business areas in which information technology comes in handy to facilitate transaction processes and profit maximization. Venkatraman's (1997) definition depicts the interconnectivity between information technology and business in the contemporary global environment of commerce.

A business refers to situations in which individuals, firms and economic systems exchange goods and services for another or money. With the exception of non-profit organizations, firms established in various jurisdictions seek to maximize profits and minimize losses. Realization of the foregoing objective hinges essentially on the firm's ability to raise the needed capital for investment; attract a significant number of customers; produce reasonable quantities to meet customers' needs; and convince customers to effectively patronize the finished goods and services at competitive prices.

### *1.1. Background of the Study*

Throughout the world, information technology and business constitute important components of total economic output. This affirms the need for leaders of African economies to pay close and important attention to these components that could positively define and shape their respective economies; and positively enhance Africa's regional development and growth. Discussion in this section is categorized into two sub-themes: information technology development in Africa and business development in Africa.

#### 1.1.1. Information Technology (IT) Development in Africa

There is a correlation between knowledge and information. A continent whose human capital exudes knowledge, information and innovation charts the positive cause of economic development and growth with relative ease. Gradually, the continent of Africa is on this noble cause of development. The pace of development in Africa is facilitated by improved information technology. It is becoming increasingly difficult to operate or run an establishment without an information technology device. Professionals require education and constant training to be continually abreast of current technological trends in a modern economy.

Improved knowledge in information technology ensures effective utilization of existing equipment; it helps organizations to resolve complex technological problems with relative ease. In spite of the seeming challenges associated with the use of information technology, it is widely believed that constant education on the use of protective tools such as computer screen shields and reading glasses could stem the negative tide. These challenges notwithstanding, the positive economic impact of information technology on the socio-economic development and growth of countries with strong leanings towards it is unheralded. Countries in Africa need to review their development models to facilitate equitable distribution of their resources and wealth; and eventual growth of their economies. This would ensure some amount of economic emancipation. African countries require information technology to enhance connectivity, create employment avenues, and improve access to basic services. Thus, information technology serves as a fulcrum to socio-economic development and transformation.

Massive investment in education infrastructure including classroom blocks, text books and other learning aids, with limited attention to information technology, would be an exercise in futility; it would be inimical to efforts aimed at addressing current and future development needs of Africa. Throughout the world, information technology is becoming a necessity and not a luxury. This affirms the reason why some heads of states across the world, including Ghana, have thought it necessary to encourage and enforce the teaching of information technology in schools, even from the primary level to the tertiary level. This initiative is enforced, generally, through the respective countries' Ministry and Department of Education. Development of information technology in schools is not limited to public institutions; it is extended to private institutions as well. For instance, in Ghana, some private institutions have computer laboratories for their pupils. This is intended to facilitate learning with hands-on or practical experience. Similar facilities are available to pupils enrolled in most private institutions in Nigeria; and in other countries on the African continent.

In Ghana, the former President John Mahama-led government promised to introduce use of tablets to pupils on a pilot basis in 2017 as part of efforts aimed at improving on use of information technology. The pilot scheme was expected to involve provision of tablets to pupils in selected schools. The eventual outcome of the pilot study was envisaged to inform policy makers on how to advance in the course of improving information technology usage in Ghana; and to affect, positively, the developmental efforts of the economy. The success stories of some predecessors in information technology such as China and India could guide policy makers in Ghana and in other economies. The efforts of the government and private sector in Ghana would ensure pupils are exposed to the art of information technology at a tender age.

Efforts of the current political administration in Ghana led by President Nana Akufo-Addo and Vice President Alhaji Dr. Mahamudu Bawumia (Head of current Ghana's Economic Management Team) to digitize the economy are indicative of Ghana's resolve to accelerate efforts aimed at combining information technology with business to facilitate national development and growth. Countries like China, United States, India, Mauritius; and many European countries have advanced considerably in the use of information technology. Individuals in the aforementioned economies are introduced to IT at various levels and at an early stage in their education and professional career, although medical experts have identified some health challenges to the early exposure, such as eye (sight or vision) problems.

### 1.1.2. Business Development in Africa

The African continent is endowed with many natural resources – gold, diamond, manganese, bauxite, iron ore, crude oil, cocoa, timber, among others. These natural endowments affirm Africa's prospects for business development are very high. Available statistics reveal the African continent continues to attract foreign investors into various sectors of the countries' economies. In 2015, the total number of projects embarked on through foreign direct investments (FDIs) in Africa increased from 666 to 705 projects, representing about 6% increase. Again, in 2015, although the total foreign direct investments in projects in Africa increased in number, the total value of projects decreased from US\$87.5 billion to US\$66.5 billion. In percentage terms, the negative US\$21 billion (US\$66.5b - US\$87.5b = - US\$21 billion) reduction in the total value of Africa's foreign direct investments in the referenced year (2015) represented -24%. Information and communications technology (ICT), power, and construction accounted for about 44% of the total foreign direct investment (FDI) projects in Africa in 2015.

In 2017, Ghana's current President, Nana Addo Dankwah Akufo-Addo, introduced the free Senior High School (free SHS) system through Ghana's Ministry of Education. The principal objective is to ensure every Ghanaian child, irrespective of the parents' financial background, accesses secondary level of education at a relatively no cost in the country. The vision of President Akufo-Addo is to ensure secondary level of education becomes the basic to everyone in the next ten (10) years and more. President Akufo-Addo sees the free SHS system as a giant step towards inculcating entrepreneurial spirit among the youth in Ghana. In addition, President Akufo-Addo introduced the Nation Builder's Corps (NaBCo) program to provide an initial one hundred thousand (1,000) young graduates from various tertiary institutions in the country the opportunity to work, acquire working experience, and save modestly towards the establishment of business of their choice after a three-year period. A replication of Ghana's youth development program in other African economies would help minimize the high levels of unemployment and crime rates among African youths.

A belief commonly held among business experts is, the institution of right structures and implementation of relevant and appropriate business legislation would result in the following positives: creation of new markets and expansion of existing ones; constant supply of raw materials; lower production costs; increased sales and profits; rapid growing markets; improved communications level; higher interest in overseas investments and profits; protection for domestic markets (protectionism); improved technological and management know-how; and geographic diversification for sales and profit stability.

### *1.2. Problem Statement*

Information technology usage is believed to have undergone rapid and massive growth since its introduction several years ago; and remains the leading source of repository information (Levis, Helfert and Brady, 2008). Levis et al. (2008) shared information technology usage (specifically the Internet) in Europe increased by 221.5%; increased by 244.7% throughout the world; and increased by 144.2% and 162.8% respectively in the United Kingdom (UK) and Ireland between the years 2000 and 2007. Information technology users in Ireland alone during the period under review were over 2.06 million of the total population. Dynamics in the global business environment call for review and rethinking of existing trade practices to assure organizations of resounding success in their spheres of trade endeavors.

Information technology has become an integral part of business activities in contemporary periods. Most governments around the world have realized the need for them to pay special attention to information technology and business. For instance, in South Korea, the government has thought it necessary to be actively involved in the promotion of electronic commerce by providing support for other key stakeholders in the economy. However, effective adaptation and implementation of information technology along with business by most African and other economies has been muscled by a number of factors including limited product range and service differentiation, lack of clear marketing strategy, high costs of logistics, and the absence of clear-cut features for customers on firms' websites (Atcharyachanvanich, Sonehara and Okada, 2008).

Data released by the World Bank (as cited in Worldometers, 2019) revealed the respective global nominal gross domestic product (Nominal GDP) for the fiscal years 2014, 2015, 2016, and 2017 as \$79,319,858,280,899, \$75,037,186,502,550, \$76,146,112,644,153, and \$80,934,771,028,340. However, Africa's actual contribution to the global nominal gross domestic product in 2017 was \$2,255,232,664,962, representing about 3.07% internal growth; and only about 2.79% contribution to the global Nominal GDP. Evidently, Africa's contribution to the global Nominal GDP in 2017 was relatively low compared with 35.79% by Asia; 26.11% by North America; 25.04% by Europe; and 6.66% by Latin America and the Caribbean.

Although data on information technology and its contributions to business expansion and economic growth of other continents may be accessed with relative ease, reliable statistics on information technology as a catalyst for increased business opportunities and activities; and ultimate surge in socio-economic development and growth of the African continent over the past decade or more remain a challenge to many researchers. The imminent question is: why is

Africa's regional contribution to global GDP relatively low when arguably, it remains the continent most endowed with rich natural resources than any other continent across the globe?

The general management problem is failure of leaders of various African economies to efficiently harness information technology and business resources to assure significant contribution of these resources to the economic development and growth of their respective economies and the entire African continent. Though evidence of this phenomenon exists, there are no scientific studies to establish, clearly, the implications for Africa's future development and growth; and contribution to global GDP.

The specific management problem is how leaders of various African economies could tap into the rich expertise of available and committed human capital to ensure due diligence and economic utilization of available financial resources to facilitate development and growth of their respective economies and the entire African continent through business and information technology applications. The purpose of this research was to examine how African economies could harness information technology and business resources at their disposal to accelerate development and growth of the continent as a whole.

### *1.3. Research Objectives*

#### 1.3.1. General Objective

The overarching objective of this study was to examine how various African economies could harness information technology and business resources at their disposal to accelerate development and growth of the African continent.

#### 1.3.2. Specific Objectives

Specifically, the study sought to achieve the following objectives:

- Evaluate trends and challenges associated with the implementation of information technology and business strategies in Africa.
- Examine the relative contributions of information technology and business to the overall gross domestic product (GDP) of Africa.
- Assess the economic significance of Africa's regional contribution to global total gross domestic product.
- Make recommendations to engender successful adaption and implementation of information technology and business strategies by various African economies to increase Africa's total gross domestic product; and enhance the region's contribution to global total GDP.

## **2. Literature Review**

The current research was conducted under the topic: "Information Technology and Business: Two Unavoidable Paths to Africa's Future." The main purpose of this study was to examine how various African economies could ensure effective utilization of information technology and business to advance the collective cause of the African continent in terms of development and growth. A review of related and existing literature in the research area is presented in this section. Stated differently, this section presents a synthesis of literature related to the study. Discussion in this section reveals relationship between the reviewed literature and research objectives. Data required for discussion in this section were obtained from text books, peer-reviewed articles published in journals, research papers, newspaper publications; and Google Search Engine, among others. The following key words were used to generate relevant information from the Google Search Engine and other sources: business development, business theory, information technology, information technology and business, and information technology challenges. Discussions in this section were preceded by a theoretical framework. The following sub-themes were used in this section: Policies and strategies for business development, information technology as an essential tool for business development, and combating security challenges in information technology. Discussions in this section contributed significantly to the study objective. That is, identifying challenges inherent in information technology and business development; and how African economies could strategically harness the limited resources at their disposal to maximize the contributions of IT and business to economic development and growth.

### *2.1. Theoretical Framework*

Different theories have been formulated by various seminal thinkers to underlie and explain the operations, performance, success and failure of diverse businesses across the globe. Notable among these protagonist theories include five competitive forces by Michael Porter; emotional intelligence by Daniel Goleman; decision theory by Daniel Kahneman; disruptive innovation by Clay Christensen; the hedgehog concept by Jim Collins; emergence over authority by Joi Ito; purpose over profit by Simon Sinek; managing oneself and theory of the business by Peter F. Drucker (Kumar, 2018).

Theory of the Business as propounded by Drucker (1994) formed the basis of the current research. Stated differently, the theory of the business as expounded by Drucker (1994) constituted the theoretical underpinnings of the present study. Kumar (2018) describes Peter F. Drucker as the doyen of management science. Drucker (1994) argued most existing management techniques address the issue of "how to do" in businesses. However, the issue of "what to do" is increasingly becoming a nemesis to managements in private organizations, government agencies, and religious organizations across the globe. He noted large corporate bodies with remarkable operational successes have become victims of what to do syndrome; successful organizations of yesterday are struggling to break-even in their sales and revenue mobilization efforts. Drucker (1994) attributed what to do challenge saddled with organizations, both large and

small, to the non-reality or outmoded nature of the assumptions on which these organizations were established and being run. These assumptions include an organization's ability to identify customers and competitors; identify markets; identify customers' values and behavior; dictate an organization's decisions on dos and don'ts; and conceptual definition of meaningful results by the implied organization. Further, Drucker (1994) defined these assumptions to include strengths and weaknesses of a firm; and a firm's technology and its dynamics.

He noted a valid theory that is characterized by clarity, consistency and focus remains extraordinarily powerful; and that, the operational challenges saddled with corporate giants in recent years can be attributed to the fact that the theory of business of these organizations no longer works. Drucker (1994) observed, usually, attributes such as mammoth bureaucracies, arrogance, complacency, and sluggishness are associated with operational challenges that confront large corporate bodies. However, this is not a plausible explanation to the challenges. He affirmed the realities faced with every organization have witnessed significant changes, but the theory of the business remains unchanged; and this forms the basis of challenges in most organizations.

Drucker (1994) generally categorized theory of the business into three sets of assumptions: assumptions about the environment, specific mission, and core competencies. Assumptions about the environment relate to an organization's considerations for key factors such as society and its structure, customers, technology, markets; and what the organization is paid for. A specific mission defines the direction of the organization, provides customers with a clearer understanding of what the organization stands for; and defines what the firm considers as meaningful results. Core competencies outline steps initiated by the organization to ensure the realization of its mission; and to have an edge over its competitors. He averred, though these assumptions sound deceptively simple, reaching clear, consistent, and valid theory of the business is predicated on years of hard work, thinking, and experimenting.

According to Drucker (1994), there are four specifications of a valid theory of the business. These include the need for all assumptions about the environment, mission, and core competencies of an organization to fit reality; the need for interdependence of assumptions among the environment, mission, and core competencies. That is, all the areas must fit one another; the theory of the business must be understood and known throughout the firm; and the need for constant testing of the theory of the business.

He noted though the theory of a business can be so powerful and last for a considerable period, it becomes obsolete over time. Usually, organizations become defensive when their business theory is becoming obsolete; they attempt to patch, but patching never works. Symptoms of obsolescence call for rethinking and examining the sets of assumptions to determine the one that reflects or those that reflect reality accurately. The obsolescence of a theory implies it is a degenerative and "life-threatening" disease to the affected organization. To cure a degenerative theory requires executives to take decisive actions; they do not have to procrastinate.

To address challenges associated with the implementation of theory of the business, Drucker (1994) proffered three major solutions: preventive care, early diagnosis, and cure. Preventive care stresses on the need for the organization to develop systematic monitoring and testing of its theory of the business. He categorized preventive care into abandonment and non-customers. Abandonment emphasizes on the organization reviewing its policy, products, services, and distribution channels every three years for efficiency and effectiveness. It is imperative for management to study what goes on outside the business; it is important to study non-customers, they out-number the customers of an organization. For instance, if a firm has 20% of a country's consumer population, 80% ( $100\% - 20\% = 80\%$ ) of the consumer population is outside the firm; the 80% (non-customers) out-number the 20% (customers). To determine what is trending or the level of technological advancement of consumers in a given jurisdiction, it is imperative for management to focus attention on non-customers.

Early diagnosis stresses the need for management to pay attention to warning signs early enough. Generally, theory of the business becomes obsolete when the original objectives of a firm are achieved. Realization of a firm's objectives does not call for celebrations; it calls for rethinking and reassessing existing theory of the business to adapt new measures that would propel the firm to higher management heights. Drucker (1994) believed a firm has necessarily outgrown its theory when it doubles or triples in size within a relatively short period of time; such growth calls for deeper policies, habits, and assumptions. Further, validity of the theory of the business becomes questionable when the firm or its competitor shows signs of unexpected success or failure. These signals must be taken seriously by managements of organizations.

To cure the "malaise," Drucker (1994) averred the establishment, maintenance, and restoration of a business theory are predicated on hard work and conscientiousness, not on ingenuity and cleverness. Realization of an organization's set objectives and rapid growth hinges on serious rethinking of the theory of the business. Finally, unexpected success is a challenge to the organization's sets of assumptions, not necessarily a credit to management.

## *2.2. Policies and Strategies for Business Development*

Abubakari, Asamoah and Agyemang (2018) examined Ghana's 40-Year National Development Plan and how that could serve as a catalyst for her sustainable development while serving as model and guide to other economies across the globe. The research data were analyzed using descriptive statistics. Findings from the study revealed how Ghana intends to implement her development plans for the next forty (40) years. The research outcomes outlined Ghana's conscientious efforts to map out a plan that would guide her long-term development to minimize the level of "slippage" in the development process. Framers of Ghana's long-term development plan were not oblivious of socio-economic dynamics that could render some aspects of the plan and projects outmoded in future periods. To this end, Ghana's forty-year national development plan is not "cast in stone." Stated differently, Ghana's long-term development plan is not absolute; it is flexible and creates room for modification during the prescribed years for implementation. Abubakari et al. (2018)

affirmed Ghana's resolve to pursue rigorous and sustainable development agenda intended to ensure equitable distribution of development across the country. Ghana's long-term development plan was developed with the ensuing underpinning objectives: ensuring effective management of population growth; expanding infrastructural facilities; increasing petroleum revenues; and encouraging spatial planning. Ghana's forty-year national development plan is very comprehensive and expected to be implemented to accelerate socio-economic development and growth.

He (2008) evaluated characteristics of interest rates in order to add theoretical and practical meaning to the process of marketing interest rates in China. He (2008) examined the characteristics of daily and monthly interest rates and their spreads using the Chinese interbank repo interest rates as the index. He (2008) sought to examine the relationship among Chinese interbank repo interest rates with different maturity periods. The researcher examined reality of the Chinese financial market by adapting and implementing the traditional unit root test, Augmented Dickey-Fuller (ADF), and the unit root test in the exponential non-linear smooth transition autoregressive (ESTAR) framework. The research findings showed repo interest rates with different maturities have different characteristics; lists of daily and monthly interest rates are integrated by the first order, that is, test based on the proposition by Kapetanios, Shin and Snell (2003). An application of ADF showed the spread of daily and monthly interest rates is not stable. However, the spread is stable when the ESTAR is applied; and the equilibrium relationship between daily and monthly repo interest rates in the long run is stable when linear adjustment is applied. He (2008) showed varied statistical tools that could be applied to the measurement of relations between and among interest rates with different maturities in an economy. Though the research was limited to the Chinese financial market, extensive use of statistical models and illustrations affirms generalization of the research outcomes.

Zheng, Yan and Wei (2008) evaluated the relationship between equity structure and performance of financial institutions. Data required for the research were drawn from annual reports of six (6) of the fourteen (14) public listed main stream banks in China. Findings from the research revealed a significant relationship between banks' performance and the first major equity structure or shareholding as reflected in corporate governance. The researchers found no correlation between performance of the top five (5) banks and equity structure; and between the top ten (10) banks and equity structure in China. However, a correlation between the top ten banks and their equity structure is derived when the statistical tool, sum of squares, is applied to the analysis.

Moro (2008) sought to fill the gap created in academic discourse in the areas of revenue maximization and profit maximization on one hand, and theory of the firm on the other, by demonstrating and presenting a complete endogenous growth theory of an organization characterized by profit maximization. The research outcomes showed among others, the existence of three (3) significant values of the equilibrium capital-labor ratio in the static and dynamic analysis of theory of the firm. These include ratios for profit maximization and revenue maximization by the firm; and ratio for revenue maximization subject to minimum acceptable return on capital constraints, provided the latter is binding on the former. The dynamic analysis indicated the firm's endogenous growth is guaranteed when it satisfies the maximization rule. That is, ensuring a balance between the rate of marginal substitution (represented by the substitution between labor and capital) and the ratio of wage rate over discount rate. However, in a static analysis, equilibrium of the revenue maximizing firm is derived when average product of labor equals average wage rate. Moro (2008) adds to the plethora of knowledge in the subject area.

### *2.3. Information Technology as an Essential Tool for Business Development*

Wang, Lin and Huang (2008) adapted quantitative techniques to assess how organizations could effectively outsource for information systems (IS) functions which are considered to be outside their core competencies in the contemporary business environment. Wang et al. (2008) found outsourcing decisions on information systems are premised on multiple attributes. Based on the foregoing, Wang et al. affirmed the need for organizations to consider some key factors in their outsourcing decisions. These include quality, environmental, strategic, and economic factors. In making useful outsourcing decisions on information systems, Wang et al. recommended use of improved ELECTRE III and analytic hierarchy process (AHP) developed by Saaty (1980) as aids. The latter is useful to structural analysis of outsourcing challenges and determination of weights of identified criteria while the former helps in final ranking. In terms of application and outsourcing decision on information systems, Wang et al. found the hybrid method as the most suitable decision making tool. In spite of its noted limitations including use of a small company as case study and use of simplified AHP method, findings from the research add to the body of knowledge in outsourcing. The study could be replicated using larger corporate bodies and advanced AHP methods to enhance generalization of the findings.

Levis et al. reviewed the role of quality website designs in the success story of electronic businesses in Ireland. Specifically, Levis et al. sought to examine technical quality issues inherent in websites owned and operated by electronic business owners in Ireland. Levis et al. sampled twenty-one (21) firms and evaluated the main characteristics and structure of their websites using various validation criteria including contrast colors supporting readability and understanding, professional appearance, and site map, among others. Findings emanating from the study revealed some firms adhered to the selected criteria while others defaulted. The researchers concluded today's Internet users expect to experience personalized interaction with websites. Thus, websites that are not well-structured and interactive would seldom attract Internet users to increase sales of electronic businesses. Quality and reliability of websites must be assured to increase interactivity and eventual increase in revenues of electronic businesses. Web developers must emphasize on information quality management principles to ensure only reliable and proven data are entered into computer systems.

Atcharyachanvanich et al. (2008) investigated the relevance of continuous online purchases to the profitability of electronic businesses. Specifically, Atcharyachanvanich et al. examined the perceived benefits that encourage customers in Korea to engage in online purchases. The researchers analyzed nine hundred and ninety-eight (998) questionnaires

administered to and retrieved from online Korean customers, using multiple regression analysis. Findings emanating from the study noted both intrinsic and extrinsic benefits are the underlying factors that promote online purchases among Korean customers. Some of the intrinsic benefits measured by the researchers in the study included fashion, pleasure and novelty whereas some extrinsic benefits measured included money savings and time. The research outcomes are expected to influence products and services offered by electronic business; and equip electronic businesses with the requisite tools to strategically retain exiting and attract new customers. Due to many commitments and engagements, customers are beginning to consider sources that are less time-consuming for purchasing purposes. Thus, an organization that invests in information technology and ensures its sustainability is likely to have significant edge over its rivals in the competitive trade environment. Atcharyachanvanich et al. corroborate Levis et al. on the growing importance of information technology in modern business; the findings are quite evident: an economy that is desirous of rigorous development and growth must pay attention to information technology infrastructure; and ensure the latter moves in tandem with business initiatives.

Cao and Chen (2008) drew on available patent data from 1985 to 2005 to examine innovations adapted by multinational companies (MNCs) in the pharmaceutical sector in China to advance their day-to-day operations and expansions. The researchers sought to assess the role of foreign capital and its attendant stratagem in the overall innovative competitiveness at the national level. The overall objective of Cao and Chen (2008) was to provide, empirically, new evidence on the characters of competitive technology among multinational companies. Findings from the study affirmed the significant role of foreign capital in the Chinese pharmaceutical sector in terms of size and scope over time. The findings revealed large and advanced economies called "Tech-leaders," are always exploring new technology capabilities to broaden the scope of their products while smaller economies have two strategies to choose from: specializing technologically in an existing sub-sector with comparative advantage or expanding the scope of her product technology with a potentially low technology. The research outcomes underscored the need for governments to tailor public policy to suit their technological conditions. Governments must strive to attract foreign investment to their economies to derive technology transfer and other benefits such as industry expansion and tax revenues.

Ye, Li, Xu and Xhao (2008) examined challenges inherent in supply chain processes related to single vendor and single buyer inventory. Ye et al. (2008) assumed the buyer and vendor represent two distinct entities with varying interests and benefits. The researchers assumed the buyer and vendor take their individual rationalities into consideration. Ye et al. developed two effective benefit sharing theories to coordinate accruing benefits between the buyer and vendor; and to realize the Pareto dominance of the entire supply chain. The researchers proposed two supply chain modes: centralized and decentralized modes. Under the centralized and decentralized modes, the researchers recommended use of supply chain optimization with controllable lead time. Conclusions drawn by Ye et al. affirmed the need for replication of the current study in other jurisdictions to enhance generalization of the research outcomes.

#### *2.4. Combating Security Challenges in Information Technology*

Ji, Smith-Chao and Min (2008) sought to demonstrate how the conceptual framework developed by Zachman (1987) could be applied to the conceptual model advanced by Wang, Yuan, and Archer (2006) to comprehensively and completely provide a broader view of identity theft challenges. Findings from the study revealed any initiative intended to combat identity theft would require the coordinated and collaborated efforts of key stakeholders including identity protectors, checkers, issuers, and owners. Considerations for identity theft issues by firms and system designers when designing systems would be useful to collaborated efforts aimed at minimizing the incidental effect of identity thefts on victims and economies in general. Ji et al. (2008) noted the development of information technology is very essential to automation of collaborative tasks intended to combat identity thefts, albeit some manual processes and human interventions cannot be ruled out. Although these findings are made public and therefore accessible to perpetrators of identity thefts, it is hoped system designers would draw on their ingenuity to have an edge over system hackers; the former would draw on their rich expertise to curb identity thefts by the latter. Ji et al.'s study was conducted with emphasis on perspectives of system planners. This creates room for further studies to be conducted to elicit system builder, owner, and designer's perspectives to enhance generalization of the findings. This limitation notwithstanding, findings from the research add to the body of knowledge in the domain of identity information protection.

Liang (2008) proposed a methodology that is suitable for logistics information systems that are reconfigurable. The proposed methodology would help system designers to effectively investigate and build logistics information systems that could support different supply chain processes. Liang (2008) recommended use of the soft component technology for the development of logistics information systems architecture to positively affect the systems' application capabilities. Application of the soft component technology helps to ensure system planners' efficiency; ensures speed and flexibility in reconfiguration of new systems; and reduces time and cost involved in the development of new systems. Liang (2008) expands existing procedure for development of logistics information systems and completion of logistics tasks.

### **3. Research Methodology**

The quantitative approach to scientific inquiry was applied to the current research. Specifically, a cross-sectional design, an example of survey design, was adapted and used in the study. This allowed the researchers to gather relevant research data over a specific period of time (Ashley, Takyi & Obeng, 2016; Creswell, 2009; Frankfort-Nachmias and Nachmias, 2008). Data required for the research were obtained mainly from secondary sources including text books, peer-reviewed articles published in journals, research papers, newspaper publications; Google Search Engine, Index Mundi, financial websites such as Tradingeconomics.com; and electronic databases of the World Bank and World Economic Outlook, among others. Annual data on Africa and World's total gross domestic products (GDPs) for the period 2008

through 2017; and data on percentage contribution of Africa to global GDP during the period were computed and used in the study.

### 3.1. Analytical Tools

Regression models and descriptive statistics were used to describe the research variables; and to evaluate their behavior over the stated time frame in the African and global economies. Measures such as the range and standard deviation were employed to describe the extent of dispersion about the central tendency (Ashley et al., 2016; Creswell, 2009; Frankfort-Nachmias & Nachmias, 2008). These measures were used to describe trends in Africa and World's total GDP for selected time periods.

### 3.2. Research Variables

The independent research variables were information technology and business while the dependent research variable was the level of development and growth in African economies, represented by Africa's total GDP.

### 3.3. Regression Model

Regression statistical model was adapted to measure the effect and level of interaction of information technology and business on Africa's total GDP; and the effect and level of interaction of Africa's regional GDP on global GDP. The Microsoft Excel analytical software was used in the research. Diagrams and tables were derived from Microsoft Excel to explain the research data.

### 3.4. Research Hypotheses

The study tested the causal relationship among information technology (IT), business and level of development in African economies; and between Africa and the global economy using the following null and research or alternative hypotheses:

#### 3.4.1. Research Hypothesis One

- $H_0: \mu_1 = \mu_2$ ; this implies business does not have strong effect on Africa's total GDP
- $H_1: \mu_1 \neq \mu_2$ ; this implies business has strong influence on Africa's total GDP

#### 3.4.2. Research Hypothesis Two

- $H_0: \mu_1 = \mu_2$ ; this implies IT does not have strong effect on Africa's total GDP
- $H_1: \mu_1 \neq \mu_2$ ; this implies IT has strong influence on Africa's total GDP

#### 3.4.3. Research Hypothesis Three

- $H_0: \mu_1 = \mu_2$ ; this implies Africa's total GDP has no significant effect on total GDP of the global economy
- $H_1: \mu_1 \neq \mu_2$ ; this implies Africa's total GDP has significant effect on total GDP of the global economy

## 4. Research Findings and Discussions

### 4.1. Information Technology and Business Development Challenges in Africa

One of the significant findings emanating from the current research revealed effective utilization of information technology in businesses, academic institutions and social environments in Africa is affected by a number of pertinent factors: relatively small number of people with interest in technology usage; limited number of people with the requisite skill and equipment to access and benefit from electronic information networks; relatively high costs of technology software, information and equipment in many parts of Africa; and limited access to and non-availability of physical infrastructure in the telecommunications industry.

Some health experts have bemoaned the negative implication for early introduction of a child to technology devices such as computers. It is believed constant exposure of the eyes to the computer screen would affect the victim's vision in future. Other factors are high cost of telecommunication operations; monopolization of the telecommunications industry in some African countries; strong and restrictive government regulations in some African economies; and limited networking and cooperation at the interregional level. The research findings revealed some socio-economic factors affect equal access to information technology in Africa – epidemic and endemic diseases, ignorance, high malnutrition, protracted civil wars, and poor economic performance, among others; and African governments' focus on short-term projects rather than long-term infrastructural development, an essential tool for sustainable economic growth.

Findings emanating from the present study identified some challenges saddled with investors on the African continent. These include relatively low Internet connectivity in Africa; and two (2) in three (3) Africans lack access to electricity. This negatively impacts on economic productivity on the continent. Other challenges include lack of constant power supply for businesses in Africa; exposure of people on the African continent to global warming; low level of infrastructural development in some parts of the continent – poor roads, undeveloped railroads, and airports with limited international standards; organization of classes under trees in countries such as Ghana and South Africa, which has negative effect on development of individuals to meet the manpower needs of organisations established on the continent; and bureaucratic process of establishing businesses in many African countries as evidenced in the World Bank Group's economic rankings for 2016, using June 2015 as a benchmark.



#### 4.2. Africa's Contribution to World GDP

Data in Figure 1 and Appendix A depict the distribution of gross domestic products (GDPs) of six (6) regions (Arab World, Asia & Pacific, European Union, Latin America & Caribbean, North America, and Sub-Saharan Africa), and World's GDP; and the contribution of each region to the World's total gross domestic product in 2017. Data in Figure 1 reveal the world's total gross domestic product in 2017 was about \$80.94 trillion. The region with the highest GDP contribution to global GDP in 2017 was Asia and Pacific (about \$27.34 trillion). The GDP value (about \$27.34 trillion) for Asia and Pacific was computed by adding the respective GDP values for East Asia and Pacific (\$23.995 trillion) and South Asia (\$3.345 trillion) as presented by the World Bank (2019) for the 2017 fiscal year. North America's contribution to the global GDP during the period was about \$21.139 trillion, representing about 26.12%; and the second highest contributor. European Union's total GDP of about \$17.339 trillion was the third highest contribution to the world's GDP in 2017, representing about 21.42%. The least contributor to the global GDP in 2017 was Sub-Saharan Africa with a total GDP of about \$1.67 trillion. Similar regional GDP data released by Worldometers (2019) showed Africa's total GDP for 2017 at about \$2.26 trillion (specifically, \$2,255,232,664,962).

However, it is not clear whether World Bank's (2019) categorization of the Arab World Region (See Figure 1 and Appendix A) included the Arab countries in the Northern part of Africa and therefore, their GDP values were excluded from the figure released for Sub-Saharan Africa (\$1.67 trillion). The foregoing notwithstanding, comparisons on regional basis indicate Africa's regional GDP and eventual contribution to the global GDP is relatively low. The respective GDP values for the United Kingdom (about \$2.638 trillion) and France (about \$2.583 trillion) for 2017 as released by the World Bank (2019) were more than Africa's total GDP recorded in 2017, assuming the latter's total GDP during the period under review was about \$2.26 trillion; and not \$1.67 trillion as captured in the World Bank's (2019) release. It is worth emphasizing comparison of GDPs of different economies based on current prices when the purchasing power differentials in the compared economies are high could affect validity of the results. However, proponents of GDP values at current prices believe from a business perspective, these values provide a fair idea about the size of the market. Therefore, measurement of GDP based on current prices rather than purchasing power parity (PPP) helps to assess the relative size of the market at issue. In terms of population size and natural resources, there is no gainsaying the entire African continent has a comparative advantage over the respective economies of the United Kingdom and France. However, the IT and business structures in the United Kingdom and France are well developed compared with those prevailing in African economies. The economic advantage in information technology and business accounts significantly for the United Kingdom and France's high and strong respective GDP values over Africa's total GDP value in 2017; and in prior periods.

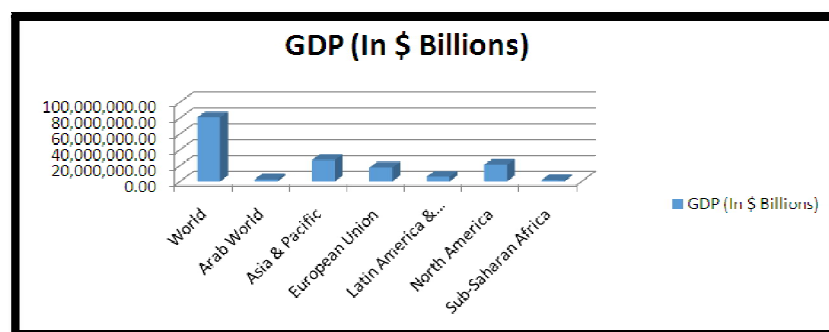


Figure 1: World GDP by Regions

Findings from the current research revealed most regional gross domestic product values attributed to Africa are inaccurate. For instance, Africa's total GDP released by the World Bank in 2014 was \$2.74 trillion. This excluded data for Eritrea during the period. Similarly, Africa's total GDP presented in 2015 by the World Bank was \$2.24 trillion. This excluded data for seven (7) African economies (Mwiti, 2016). This to some extent, account for Africa's relatively low contribution to the World's total GDP. Mwiti (2016) attributed inaccuracies in Africa's total estimated GDP to factors such as measurement of GDP of many economies based on the market values of goods and services; with little attention or recourse to the System of National Account prescribed by the United Nations after World War II, and revised in 2008 to guide economies in the measurements of economic output. To ensure compliance by member countries, the World Bank reviews, routinely, the prescribed measures. This initiative notwithstanding, the World Bank (as cited in Mwiti, 2016) notes the presence of significant discrepancies between actual practice and international standards among some member countries. The foregoing GDP values (\$2.74 trillion and \$2.24 trillion) attributed to Africa may be Nominal since GDP values at current prices for Africa during the period (2008 through 2017) showed no GDP value more than \$2 trillion.

Figure 2 and Appendix D depict the relative contributions of Africa to global GDPs over a ten-year period, 2008 through 2017. The GDP values used in the analysis were based on current prices. Data in Figure 2 affirm Africa's regional GDP contribution to the World's GDP in 2008 was about \$1.21 trillion, representing about 1.87% of the size of the global economy during the period. The data show steady increase in global GDP over the ten-year period. The least World GDP was recorded in 2009 (about 63.29 trillion), while 2017 presented the highest GDP value (about \$80.25 trillion). Africa's contribution to the global GDP in percentage terms, witnessed a steady increase from 2008 through 2015; a sharp decline in 2016 (from 2.20% in 2015 to 1.99% in 2016); and a steady increase in 2017 (2.08%).

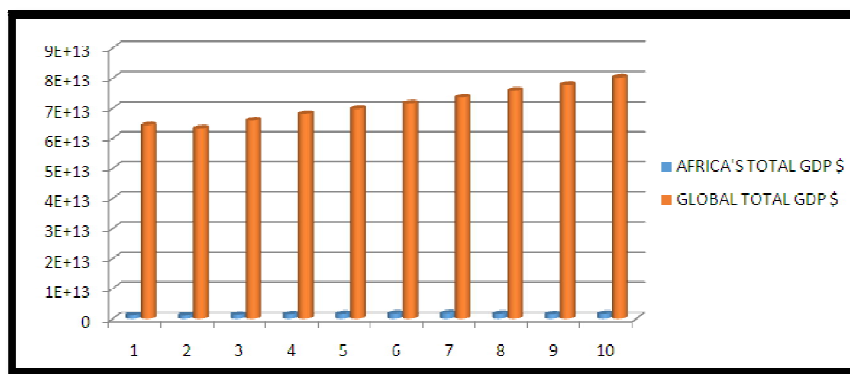


Figure 2: Africa's GDP Relative to Global GDP

Details of computed percentage values for Africa's GDP relative to the global GDP values for 2008 through 2017 are presented in Appendix E. These percentage values were computed using data in Figure 2, Appendix D, and other sources. Percentage values for the data on Africa's GDP in Figure 2 were computed using the following formula:

$$\% \text{ of Cont (t)} = ((\text{AGDPt} \div \text{WGDPT}) \times 100\%)$$

Where:

% of Cont (t) = Africa's percentage contribution to world's gross domestic product for period t

AGDPt = Africa's gross domestic product for period t

WGDPT = World's gross domestic product for period t

#### 4.3. Descriptive Statistics

Descriptive statistical test was conducted to ascertain the magnitude of Africa's total GDP during the period under review – 2008 through 2017. Figure 3 provides a statistical description of Africa's total GDP values. The highest GDP value (about \$1.67 trillion) was recorded in 2017. The range of Africa's GDP during the period is 6.82. Results in Figure 3 depict respective mean and median of 1.54 and 1.59; and a standard deviation of 2.27. The latter tells us the extent to which the observations were dispersed around the central tendency. The mode explains the variable with the highest frequency in the data. Figure 3 shows no absolute value (#N/A) for the mode. This implies no GDP value was repeated during the period.

Descriptive Statistics	
Mean	1.53581E+12
Standard Error	71666568864
Median	1.59284E+12
Mode	#N/A
Standard Deviation	2.2663E+11
Sample Variance	5.1361E+22
Kurtosis	-0.577560293
Skewness	-0.719207896
Range	6.81951E+11
Minimum	1.1467E+12
Maximum	1.82865E+12
Sum	1.53581E+13
Count	10
Largest(1)	1.82865E+12
Smallest(1)	1.1467E+12
Confidence Level (95.0%)	1.62121E+11

Table 1: Africa's Total GDP - 2008 - 2017

The output in Table 1 shows respective Kurtosis and standard error values of -0.58 and 717. The standard error value indicates the extent to which the coefficients are significantly different from zero. The skewness of the distribution is -0.72 while the sample variance is 5.14. The evidence suggests it may be out of place to argue Africa's regional GDP contribution to World GDP is insignificant.

#### 4.4. Rankings of African Economies

The World Bank Group (2016) released the economic rankings of 189 countries based on the following criteria: ease of doing business, starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency. A careful review revealed the top-ten world economies are geographically situated in Asia, Europe and North America. The top-ten world economies as released by the World Bank Group (2016) included Singapore, New Zealand, Denmark, Republic of Korea, Hong Kong SAR, China, United Kingdom (UK), United States (US), Sweden, Norway, and

Finland. The World Bank Group's (2016) release revealed no African country forms part of the top-thirty economies in the world in 2016. Table 1 presents a list of African countries and their economic rankings. For the purpose of this research, the African countries were selected from the total economic rankings with emphasis on their positions in the rankings. Data in Table 1 indicate forty-eight (48) African countries were included in the world economic rankings in 2016.

(32)* 1** Mauritius	(144)* 17** Mali	(165)* 33** Guinea
(72)* 2** Botswana	(145)* 18** Papua New Guinea	(166)* 34** Sao Tome and Principe
(73)* 3** South Africa	(146)* 19** Ethiopia	(168)* 35** Mauritania
(74)* 4** Tunisia	(147)* 20** Sierra Leone	(169)* 36** Nigeria
(75)* 5** Morocco	(150)* 21** Togo	(172)* 37** Cameroon
(97)* 6** Zambia	(151)* 22** The Gambia	(176)* 38** Republic of Congo
(105)* 7** Swaziland	(152)* 23** Burundi	(178)* 39** Guinea Bissau
(108)* 8** Kenya	(153)* 24** Senegal	(179)* 40** Liberia
(114)* 9** Ghana	(154)* 25** Comoros Island	(180)* 41** Equatorial Guinea
(115)* 10** Lesotho	(155)* 26** Zimbabwe	(181)* 42** Angola
(131)* 11** Egypt	(158)* 27** Benin	(183)* 43** Chad
(133)* 12** Mozambique	(159)* 28** Sudan	(184)* 44** Dem. Rep. of Congo
(139)* 13** Tanzania	(160)* 29** Niger	(185)* 45** Central African Republic
(141)* 14** Malawi	(162)* 30** Gabon	(187)* 46** South Sudan
(142)* 15** Cote D'Ivoire	(163)* 31** Algeria	(188)* 47** Libya
(143)* 16** Burkina Faso	(164)* 32** Madagascar	(189)* 48** Eritrea

Table 2: Economic Rankings of African Countries

Source: World Bank Group (2016)

\* Original Position in the World Economic Rankings (Wers)

\*\* Position in the African Economic Rankings Based on the Wers

The researchers reviewed the World Bank Group's (2016) release and assessed Africa's economic rankings in isolation to determine countries on the African continent with effective governance policies that promote information technology and business; and which are attractive to both foreign and local investors. The above listings present the "top-ten" African economies with strong investor-friendly regulations as Mauritius, Botswana, South Africa, Tunisia, Morocco, Zambia, Swaziland, Kenya, Ghana, and Lesotho. Data in Table 2 depict two (2) figures associated with each economy. The figure in parenthesis or bracket indicates the implied country's world economic ranking as presented by the World Bank Group (2016) while the figure not in parenthesis connotes the implied country's African economic ranking after rearranging all the African countries in their order of appearance in the world economic rankings. Table 2 tells us Mauritius placed 32<sup>nd</sup> and 1<sup>st</sup> in the respective world and African economic rankings in 2016. Mauritius' ranking as the leading African economy with the strongest investor-friendly policies is buttressed by her role as the richest country in Africa with a per capita income of \$21,700. Mauritius remains a strong "player" in the information technology business in Africa and across the globe.

Per the World Bank Group's (2016) release, Ghana was ranked 9<sup>th</sup> in Africa and 1<sup>st</sup> in West Africa as the "best" place to transact business. The foregoing implies on the African continent and in West Africa, Ghana was ranked as the 9<sup>th</sup> and 1<sup>st</sup> best place for investors to invest their limited capital and be assured of the socio-economic and political safety of their investments. The World Bank Group's (2016) release suggested Ghana is the most preferred destination for foreign investors in the West African sub-region. The release affirmed efforts of previous Ghanaian governments, and most especially the current Ghanaian government at strengthening the country's micro- and macroeconomic policies to align with the socio-economic conditions and cultural values of Ghana, Africa, and the global economy. This initiative accentuates and advances the nation's course to make information technology and business an integral part of her current and future development agenda.

Similarly, the respective rankings of La Cote D'Ivoire and Nigeria in Africa and the West African sub-region as depicted in Table 2 above were 15<sup>th</sup> and 2<sup>nd</sup>; and 36<sup>th</sup> and 12<sup>th</sup>. La Cote D'Ivoire's respective rankings as the 15<sup>th</sup> and 2<sup>nd</sup> best place in Africa and West Africa to do business to some extent, contradicts the suggestion and pronouncement gaining currency in the Ghanaian economic discourse that businesses in Ghana are relocating to neighboring La Cote D'Ivoire because the latter's investment policies are friendlier to foreign investors than investment policies prevailing in the former.

The economies of Kenya and Ethiopia are springing up, they depict positive economic outlooks. Since 2005, Ethiopia has witnessed an average growth rate of 10.8%. With a recorded GDP of US\$8.23 billion in 2000, Ethiopia's estimated GDP for 2016 was US\$69.21 billion, about US\$40 million more than the estimated GDP (US\$69.17 billion) for Kenya in the same year. In the year 2000, Kenya's GDP was US\$14.1 billion, about 71.6% more than the GDP value recorded by Ethiopia in the same year. The respective GDPs of Kenya and Ethiopia in 2015 were US\$63.39 billion and US\$61.62 billion. This affirms the prevalence of healthy economic rivalry between Kenya and Ethiopia in the eastern part of the African continent.

Oil discoveries in Kenya in 2012 (Ngamia-1) and 2016 (South Lokichar Basin) in commercial quantities are likely to shore up the country's economic fortunes in subsequent years. Ethiopia recently constructed a dam at the cost of US\$5 billion. The dam is expected to generate 6,000 megawatts of electricity to supply the country's households and industry,

and to have excess for export. It is estimated Ethiopia would generate about US\$1 billion in revenue from sale of electricity domestically and internationally. Thus, the project (dam) is expected to payback the cost incurred in five years. All things being equal, revenues generated in the sixth and subsequent years would be profits to the economy. In addition to construction of the dam, the Ethiopian government has embarked on massive infrastructural development in the country. This has boosted investor confidence and enhanced the country's chances of attracting additional investors from other African countries, Asia, Europe, North America, and South America.

South Africa remained the largest economy in Africa with an estimated gross domestic product of US\$301 billion in 2015. It is worth emphasising South Africa's economic dominance on the continent was not borne out of actual increase in total GDP, it was as a result of appreciation of the South African Rand relative to the indexed currency, that is, the United States Dollar. Nigeria and Egypt were the respective second and third largest economies in Africa with respective estimated gross domestic products of US\$296 billion and US\$276 billion in the same year. The respective positions of Nigeria and Egypt in the World Bank Group's (2016) rankings are indicative of the existence of somewhat "blur" administrative processes in the establishment of businesses in those countries. It is imperative for South Africa, Nigeria and Egypt's roles as the leading economies in Africa to reflect in the ease of doing businesses in those countries.

The researchers are not clamoring for a "laissez-faire" approach to the award of business certificates to investors, especially foreign investors, in the foregoing countries. However, governments of the aforementioned economies have an obligation to ensure all administrative bottlenecks, implicit and explicit, that are inimical to their economic advancements are removed to boost foreign and local investor confidence and attract new investors.

Data in Table 2 indicates Eritrea was ranked 189<sup>th</sup> on the list of economies released by the World Bank Group (2016). Ostensibly, it is the last country in the rankings. Perhaps, a review of Eritrea's economic performance for the past twenty-five (25) years would help us appreciate the country's position on the list. In the year 2000, Eritrea recorded a GDP of negative 13.12%. However, through improved economic policies, measures and performance, Eritrea's GDP increased from negative 13.12% to positive 21.25% in 2001. The dramatic turnaround in Eritrea's economic performance in 2001 is commendable. Unfortunately, the country's newly-found economic "rhythm" in 2001 could not be sustained over a long period.

Eritrea has been ravaged by civil unrest at the border with Ethiopia. This conflict has persisted since Eritrea's breakaway from Ethiopia as a sovereign state in Africa. Statistical figures released by Trading Economics (2016) revealed Eritrea's average GDP from 1991 to 2015 was 4.53%. The country's highest GDP (21.25%) and lowest GDP (-13.12%) were recorded in 2001 and 2000 respectively. Eritrea's respective GDP growth rates in 2014 and 2015 were 1.7% and 0.3%. The slow growth rates in Eritrea in the past decade may be attributed to less-friendly investment policies, which shy investors away from the country. In line with the popular adage, "the animal prefers to prey on friendly grounds," foreign investors would be strongly interested in channeling their capital into countries with the friendliest investment policies, vice versa.

The World Bank Group's (2016) release depicted most African economies in the middle and bottom ranks. This implies many countries on the continent have an arduous task on hand; it is imperative for the countries to "step-up" their economic "games" to equal or overtake their rivals on other continents. The emerging economies on the African continent should revise their existing investment laws and policies to attract more foreign investors to accelerate their economic development and growth.

#### 4.5. Results

One-way analysis of variance (ANOVA) test was conducted as part of the regression analysis to ascertain the influence of the independent variables (business and IT) on the dependent variable (Africa's total GDP); and to affirm the influence of Africa's GDP (independent variable) on the World's GDP (dependent variable). The ANOVA is given by the formula:

$$F = \frac{MS_{\text{between}}}{MS_{\text{within}}}, \text{ in which}$$

$$MS_{\text{between}} = \frac{SS_{\text{between}}}{df_{\text{between}}};$$

$$MS_{\text{within}} = \frac{SS_{\text{within}}}{df_{\text{within}}}$$

Where:

MS = Mean squared

SS = Sum of squares

The degrees of freedom (df) under the ANOVA is computed as follows:

$$\text{degrees of freedom (total)} = n - 1$$

$$\text{degrees of freedom (between)} = k - 1$$

$$\text{degrees of freedom (within)} = n - k$$

Where:

n = Sample size

k = Number of groups or levels

##### 4.5.1. Test of Hypothesis One

The alternative hypothesis under the first hypothesis (in section 3.4.1) sought to test whether business has strong influence on the level of development in African economies. Output from the statistical analysis on research hypothesis one is presented in the following section.

## 4.5.1.1. Model Summary

The regression analysis outputs are presented in Tables 2 through 4 and Figure 3. Summary constitutes an important aspect of a regression model. An overall description of the regression model is presented in Table 2. Values for R, R<sup>2</sup>, and adjusted R<sup>2</sup> are displayed in Table 2. The value of the multiple correlation coefficients between the independent variable (business) and the dependent variable (Africa's total GDP) is presented in the R row. The R<sup>2</sup> value in Table 2 tells us the extent to which variability in the dependent variable is accounted for by the independent variable. The R<sup>2</sup> value implies business accounts for about 14.94% (0.1493574 x 100% = 14.94%) of the variation in Africa's total GDP. The results suggest about 85.06% (100% - 14.94% = 85.06%) of the outcome is explained by external random factors.

Regression Statistics	
Multiple R	0.386467814
R Square	0.149357371
Adjusted R Square	0.043027043
Standard Error	2.217E+11
Observations	10

Table 3: Summary Output

One of the measures that determine the generalizability of the regression model is the adjusted R<sup>2</sup>. Generally, an ideal adjusted R<sup>2</sup> value is closer to zero or the R<sup>2</sup> value. The adjusted R<sup>2</sup> value (0.043027043) in Table 3 is significantly different from the observed value of R<sup>2</sup> (0.149357371), but close to zero implying the cross-validity of this regression model is good; the model may accurately predict the same dependent variable from the given independent variable in a different group of participants (Field, 2009, p. 221). The R<sup>2</sup> significance was computed using an F-ratio. The ideal F-ratio formula for measuring R<sup>2</sup> significance is:

$$F = \frac{(N - k - 1) R^2}{k(1 - R^2)}$$

$$k(1 - R^2)$$

Where:

R<sup>2</sup> = Unadjusted value

N = Number of cases or participants in the study

k = Number of independent variables in the regression model

Value for the F-ratio was determined as follows:

$$F = \frac{(10 - 1 - 1) 0.149357371}{1(1 - 0.149357371)}$$

$$= \frac{1.194858968}{0.850642629}$$

$$= 1.404654$$

$$0.850642629$$

$$= 1.404654$$

Our computations revealed the change in the amount of variance that can be explained gives rise to an F-ratio of 1.404654, which is equivalent to the F-value (1.404654) in Table 3. This F-ratio shows a significant value (p = 0.014349, p < 0.05) as presented in Table 4.

## 4.5.1.2. ANOVA

The ANOVA helps to determine whether or not regression analysis provides better and significant prediction on the outcome than the mean. Data in Table 3 show degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 8 (10 - 2 = 8); total degrees of freedom (df) of 9 (10 - 1 = 9), and an F-value of 1.404654.

	df	SS	MS	F	Significance F
Regression	1	6.90403E+22	6.9E+22	1.404654	0.26995522
Residual	8	3.93208E+23	4.92E+22		
Total	9	4.62249E+23			

Table 4: ANOVA

Data in Table 4 depict the model sum of squares (SSM) value, represented by Regression; the residual sum of squares (SSR) value, represented by Residual; the total sum of squares (SST) value, represented by Total; and the degrees of freedom (df) for each group of squares. The degree of freedom for the SSM is 1, comprising the one independent variable (business). The sum of squares divided by the degrees of freedom gives us the mean squares (MS). That is, 6.90403E+22 ÷ 1 = 6.9E+22.

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.1184E+12	3.59102E+11	3.114429	0.014349	2.90307E+11	1.95E+12	2.9E+11	1.94649E+12
X Variable 1	1.154852331	0.974409933	1.185181	0.269955	-1.092141001	3.401846	-1.09214	3.401845664

Table 5: Model Parameters

#### 4.5.1.3. Model Parameters

A normal probability plot on the relationship between business and Africa's total GDP is presented in Figure 3. The figure depicts a steady rise in comparative values over the period. Table 5 presents results on the parameters of the regression model. Data in Table 5 show the coefficients, standard error, test statistic, significance, and confidence intervals for the coefficients. The coefficients in Table 5 hint us on the contribution of the independent variable (business) to the regression model. Generally, a positive coefficient connotes a positive relationship between the independent variable and the dependent variable; a negative value symbolizes a negative relationship between the two variables. Results in Table 4 show a positive coefficient value (1.154852). This means there is a positive relationship between business and Africa's total GDP; the results suggest business has a significant influence on Africa's total GDP.

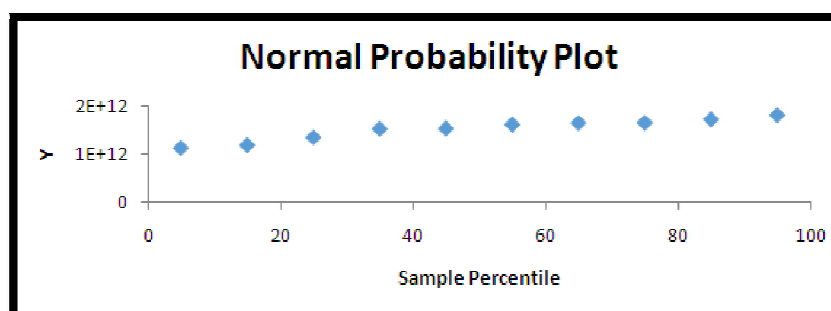


Figure 3: Normal Probability Plot on Business and Africa's GDP

The magnitude of the t-test in Table 4 tells us the independent variable (business) has a strong impact on the dependent variable (Africa's total GDP). A standard error is identified with the coefficients in the table. The standard error shows the extent to which the coefficients would vary in different research samples (Field, 2009). The respective Upper 95% values for the Intercept and X Variable 1 in Table 4 are 1946487583659.41 and 3.40184566374635.

#### 4.5.1.4. Report on P -Value and Confidence Interval

Table 4 depicts P value of 0.014349 and positive coefficient value of 1.154852331. These values are significant at Alpha level  $\alpha = 0.05$ . The table further shows a confidence interval of -1.092141001 and 3.40184566374635. The Alpha level, a priori, for this study is  $\alpha = 0.05$ . This implies there is a 5 per cent probability that we would be wrong; there is a 5 per cent likelihood the population mean would not fall within the interval (Bowerman, O'Connell, and Orris, 2004; Frankfort-Nachmias and Nachmias, 2008). However, we are 95% certain that our conclusions would be right. Again, the Microsoft Excel output in Table 3 shows degrees of freedom (between) of 1 ( $2 - 1 = 1$ ); degrees of freedom (within) of 8 ( $10 - 2 = 8$ ); total degrees of freedom (df) of 9 ( $10 - 1 = 9$ ), and an F-ratio of 1.404654. These values could be interpreted as:

$F(1, 8) = 1.404654, p < 0.05$ , two-tailed.

#### 4.5.1.5. Interpretation and Rejection of Null Hypothesis

The foregoing results indicate business has a strong influence on Africa's total GDP. Therefore, we reject the null hypothesis ( $H_0: \mu_1 = \mu_2$ ), and accept the alternative hypothesis ( $H_1: \mu_1 \neq \mu_2$ ) which states business has a strong influence on Africa's total GDP.

#### 4.5.2. Test of Hypothesis Two

The alternative hypothesis under the second hypothesis (in section 3.4.2) sought to test whether information technology has strong influence on the level of development in African economies. Results from the statistical analysis on research hypothesis two are presented in the following section.

## 4.5.2.1. Model Summary

Results from the regression analysis are presented in Tables 5 through 7 and Figure 4. As noted earlier, Summary constitutes an important aspect of a regression model. An overall description of the regression model is presented in Table 5. Values for R, R<sup>2</sup>, and adjusted R<sup>2</sup> are displayed in Table 5. The R row in the table shows the value of the multiple correlation coefficients between the independent variable and the dependent variable. The R<sup>2</sup> value in Table 5 depicts the extent to which variability in the dependent variable (Africa's total GDP) is accounted for by the independent variable (information technology). The R<sup>2</sup> value implies information technology accounts for about 54.20% (0.541947206 x 100% = 54.1947% = 54.20%) of the variation in Africa's total GDP. The results suggest about 45.80% (100% - 54.20% = 45.80%) of the outcome is explained by external random factors.

Regression Statistics	
Multiple R	0.736170636
R Square	0.541947206
Adjusted R Square	0.484690607
Standard Error	1.62686E+11
Observations	10

Table 6: Model Summary

The adjusted R<sup>2</sup> is one of the measures that determine the generalizability of the regression model. An ideal adjusted R<sup>2</sup> value is closer to zero or the R<sup>2</sup> value. The adjusted R<sup>2</sup> value (0.484690607) is significantly different from the observed value of R<sup>2</sup> (0.541947206) implying the cross-validity of this regression model is low; the model may not predict accurately, the same dependent variable from the given independent variable in a different group of participants (Field, 2009, p. 221). The R<sup>2</sup> significance was computed using an F-ratio. The ideal F-ratio formula adapted to measure the R<sup>2</sup> significance is:

$$F = \frac{(N - k - 1) R^2}{k(1 - R^2)}$$

Where:

R<sup>2</sup> = Unadjusted value

N = Number of cases or participants in the study

k = Number of independent variables in the regression model

Value for the F-ratio was determined as follows:

$$F = \frac{(10 - 1 - 1) 0.541947206}{1(1 - 0.541947206)}$$

$$= \frac{4.335577648}{0.458052794}$$

$$= 9.4652$$

$$= 9.4652$$

$$= 9.4652$$

Results from our computations showed the change in the amount of variance that can be explained gives rise to an F-ratio of 9.4652, which is equivalent to the F-value (9.4652) in Table 6. This F-ratio depicts a significant value ( $p = 0.015196$ ,  $p < 0.05$ ) as presented in Table 6.

## 4.5.2.2. ANOVA

Statistical data on the ANOVA in Table 6 helps to determine whether or not regression analysis provides better and significant prediction on the outcome than the mean. Figures in Table 6 show degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 8 (10 - 2 = 8); total degrees of freedom (df) of 9 (10 - 1 = 9), and an F-value of 9.4652.

	df	SS	MS	F	Significance F
Regression	1	2.5051E+23	2.51E+23	9.465236	0.015195911
Residual	8	2.1173E+23	2.65E+22		
Total	9	4.6225E+23			

Table 7: ANOVA

Table 7 outlines the model sum of squares (SSM) value, represented by Regression; the residual sum of squares (SSR) value, represented by Residual; the total sum of squares (SST) value, represented by Total; and the degrees of freedom (df) for each group of squares. The degree of freedom for the SSM is 1, comprising the one independent variable (information technology). The sum of squares divided by the degrees of freedom gives us the mean squares (MS). That is,  $2.5051E+23 \div 1 = 2.51E+23$ .



	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-7.2566E+11	7.3686E+11	-0.9848	0.353566	-2.42487E+12	9.74E+11	-2.4E+12	9.74E+11
X Variable 1	98879170764	3.2139E+10	3.076562	0.015196	24765353711	1.73E+11	2.48E+10	1.73E+11

Table 8: Model Parameters

#### 4.5.2.3. Model Parameters

Results on the parameters of the regression model are presented in Table 8. Data in the table depict the test statistic, significance, coefficients, standard error, and confidence intervals for the coefficients. The coefficients in Table 8 reveal the contribution of the independent variable (information technology) to the regression model. Generally, a positive coefficient connotes a positive relationship between the independent variable and the dependent variable while a negative value is indicative of a negative relationship between the two variables. Data in Table 7 show a positive coefficient value (98879170764). This means there is a positive relationship between information technology and Africa's total GDP; the results suggest IT has significant influence on Africa's total GDP. A normal probability plot on the relationship between information technology and Africa's total GDP is presented in Figure 4. Data in the figure depict a steady rise in comparative values over the research period.

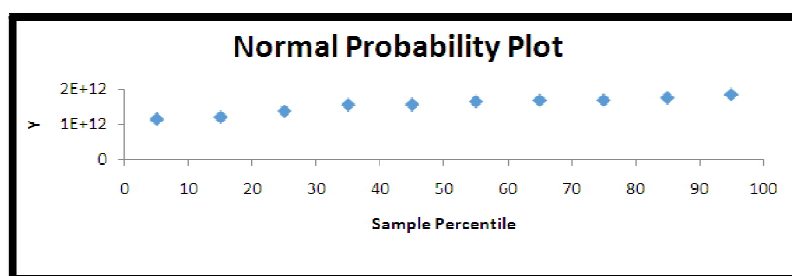


Figure 4: Normal Probability Plot on IT and Africa's GDP

A standard error is identified with the coefficients in Table 7. The standard error shows the extent to which the coefficients would vary in different research samples (Field, 2009). Table 7 shows respective Upper95% values for the Intercept and X Variable 1 as 973545565825.681 and 172992987816.602.

#### 4.5.2.4. Report on P -Value and Confidence Interval

Data in Table 7 show P value of 0.015196 and positive coefficient value of 98879170764. These values are significant at Alpha level  $\alpha = 0.05$ . The table further shows a confidence interval of 24765353711 and 172992987816.602. The Alpha level, a priori, for this study is  $\alpha = 0.05$ . This implies there is a 5 per cent probability that we would be wrong; there is a 5 per cent likelihood the population mean would not fall within the interval (Bowerman et al., 2004; Frankfort-Nachmias and Nachmias, 2008). However, we are 95% certain that our conclusions would be right. Again, the Microsoft Excel output in Table 7 depicts degrees of freedom (between) of 1 ( $2 - 1 = 1$ ); degrees of freedom (within) of 8 ( $10 - 2 = 8$ ); total degrees of freedom (df) of 9 ( $10 - 1 = 9$ ); and an F-ratio of 9.4652. These values could be interpreted as:  $F(1, 8) = 9.4652, p < 0.05$ , two-tailed.

#### 4.5.2.5. Interpretation and Rejection of Null Hypothesis

The foregoing results indicate information technology has a strong influence on Africa's total GDP. Therefore, we reject the null hypothesis ( $H_0: \mu_1 = \mu_2$ ), and accept the alternative hypothesis ( $H_1: \mu_1 \neq \mu_2$ ) which states information technology has a strong influence on Africa's total GDP.

#### 4.5.3. Test of Hypothesis Three

The alternative hypothesis under the third hypothesis (in section 3.4.3) sought to test whether Africa's regional GDP contribution has strong influence on the World's total GDP. Results from the statistical analysis on research hypothesis three are presented in the following section.



## 4.5.3.1. Model Summary

Data derived from the regression analysis on hypothesis three are presented in Tables 7 through 10, and Figure 5. One of the important components of a regression model is its Summary. Table 9 presents an overall description of the regression model. Values for R, R<sup>2</sup>, and adjusted R<sup>2</sup> are displayed in Table 9. The value of the multiple correlation coefficients between the independent variable and the dependent variable is presented in the R row. The R<sup>2</sup> value in Table 8 reveals the extent to which variability in the dependent variable is accounted for by the independent variable (Africa's total GDP). The R<sup>2</sup> value implies Africa's regional GDP accounts for about 55.15% (0.551460971 x 100% = 55.15%) of the variation in the World's total GDP. The results suggest about 44.85% (100% - 55.15% = 44.85%) of the outcome is explained by external random factors.

Regression Statistics	
Multiple R	0.742604182
R Square	0.551460971
Adjusted R Square	0.495393593
Standard Error	4.10415E+12
Observations	10

Table 9: Model Summary

The adjusted R<sup>2</sup> has been identified as one of the measures that determine the generalizability of the regression model. Generally, an ideal adjusted R<sup>2</sup> value is closer to zero or the R<sup>2</sup> value. The adjusted R<sup>2</sup> value (0.495393593) is significantly different from the observed value of R<sup>2</sup> (0.551460971) implying the cross-validity of this regression model is low; the model may not accurately predict the same dependent variable from the given independent variable in a different group of participants (Field, 2009, p. 221). We computed the R<sup>2</sup> significance using an F-ratio. The ideal F-ratio formula adapted and used in measuring the R<sup>2</sup> significance is:

$$F = \frac{(N - k - 1) R^2}{k(1 - R^2)}$$

Where:

R<sup>2</sup> = Unadjusted value

N = Number of cases or participants in the study

k = Number of independent variables in the regression model

Value for the F-ratio was determined as follows:

$$F = \frac{(10 - 1 - 1) 0.551460971}{1(1 - 0.551460971)}$$

$$= \frac{4.411687768}{0.448539029}$$

$$= 9.8356832$$

$$= 9.8356832$$

Results from the computations revealed the change in the amount of variance that can be explained gives rise to an F-ratio of 9.8356832, which is equivalent to the F-value (9.8356832) in Table 10. This F-ratio is significant ( $p = 0.002$ ,  $p < 0.05$ ) as shown in Table 10.

## 4.5.3.2. ANOVA

In order to determine whether or not the regression analysis provides better and significant prediction on the outcome than the mean, the ANOVA was applied. Data in Table 9 show degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 8 (10 - 2 = 8); total degrees of freedom (df) of 9 (10 - 1 = 9), and an F-value of 9.8356832.

	df	SS	MS	F	Significance F
Regression	1	1.6567E+26	1.6567E+26	9.8356832	0.013884884
Residual	8	1.3475E+26	1.6844E+25		
Total	9	3.0042E+26			

Table 10: ANOVA

The model sum of squares (SSM) value, represented by Regression; the residual sum of squares (SSR) value, represented by Residual; the total sum of squares (SST) value, represented by Total; and the degrees of freedom (df) for each group of squares are outlined in Table 9. The degree of freedom for the SSM is 1, comprising the one independent variable (Africa's total GDP). The mean squares (MS) value in Table 9 equals the sum of squares divided by the degrees of freedom. That is,  $1.65672456502665E+26 \div 1 = 1.6567E+26$ .

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	4.20209E+13	9.3613E+12	4.48878276	0.002032	2.04337E+13	6.36E+13	2.04E+13	6.36E+13
X Variable 1	18.93159864	6.03649748	3.13618927	0.0138849	5.011410502	32.85179	5.011411	32.85179

Table 11: Model Parameters

#### 4.5.3.3. Model Parameters

Table 11 presents results on the parameters of the regression model. Data in the table show the test statistic, significance, coefficients, standard error, and confidence intervals for the coefficients. The coefficients in Table 11 indicate the contribution of the independent variable (Africa's total GDP) to the regression model. Generally, a positive coefficient connotes a positive relationship between the independent variable and the dependent variable; a negative value is indicative of a negative relationship between the two variables. Results in Table 11 depict a positive coefficient value (18.93159864). This means there is a positive relationship between Africa's total GDP and World's total GDP; the results suggest Africa's regional GDP has significant influence on World's total GDP.

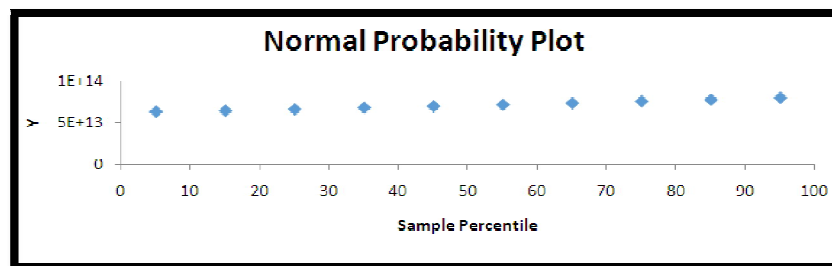


Figure 5: Normal Probability Plot on Africa and World's GDP

The magnitude of the t-test in Table 3 reveals the independent variable (Africa's total GDP) has a strong impact on the dependent variable (World's total GDP). A standard error is identified with the coefficients in the table. The standard error shows the extent to which the coefficients would vary in different research samples (Field, 2009). The respective Upper 95% values for the Intercept and X Variable 1 in Table 10 are 63608077028034 and 32.8517867805729.

#### 4.5.3.4. Report on P -Value and Confidence Interval

Statistical values in Table 10 depict P value of 0.002 and positive coefficient value of 18.93159864. These values are significant at Alpha level  $\alpha = 0.05$ . The table further shows a confidence interval of 5.01141050233464 and 32.8517867805729. The Alpha level, a priori, for this study is  $\alpha = 0.05$ . This implies there is a 5 per cent probability that we would be wrong; there is a 5 per cent likelihood the population mean would not fall within the interval (Bowerman et al.; Frankfort-Nachmias and Nachmias, 2008). However, we are 95% certain that our conclusions would be right. Again, the Microsoft Excel output in Table 9 shows degrees of freedom (between) of 1 ( $2 - 1 = 1$ ); degrees of freedom (within) of 8 ( $10 - 2 = 8$ ); total degrees of freedom (df) of 9 ( $10 - 1 = 9$ ), and an F-ratio of 9.8356832. These values could be interpreted as:

$F(1, 8) = 9.8356832, p < 0.05$ , two-tailed.

#### 4.5.3.5. Interpretation and Rejection of Null Hypothesis

The foregoing results indicate Africa's total GDP has a strong influence on World's total GDP. Therefore, we reject the null hypothesis ( $H_0: \mu_1 = \mu_2$ ), and accept the alternative hypothesis ( $H_1: \mu_1 \neq \mu_2$ ) which states Africa's regional GDP contribution has a strong influence on World's total GDP.

## 5. Recommendations

Undoubtedly, the path to Africa's sustainable development and growth is checked, but could be eased by the numerous natural resources at its disposal. The greatest challenge however, lies with strategic harnessing of those resources to the economic benefit of the African population. In view of the foregoing, the ensuing recommendations are proffered:

- It is imperative for various African leaders to consider information technology and business as the bedrock of their development success, prosperity, and perpetuity. Information technology and business should form an integral part of African leaders' scheme of programmes aimed at ensuring equitable distribution of resources and development of various communities. Various existing national laws or enactments related to investments in information technology by local and foreign investors must be activated and implemented and where necessary, reviewed to serve as an effective attractive tool to all investors. Mauritius has set a very good pace in information technology development on the African continent. Her success story should serve as a model for other African economies; and developing economies in other Regions around the world.
- The current Government of Ghana under the leadership of President Akufo-Addo and the Vice President, Alhaji Dr. Bawumia, is ensuring thorough digitization of the Ghanaian economy. Leaders of other African economies with less technological sophistry are entreated to tap into the sterling initiatives of Ghana's current political administration. Effective digitization of various sectors of African economies would facilitate the release of national economic data in a timely manner to enhance accuracy in annual estimation of Africa's total GDP; and the latter's contribution to the World's total GDP. Overreliance on manual documentation to the neglect of digital documentation in the 21<sup>st</sup> century poses serious administrative challenges to many African economies. Effective digitization would enhance the ease of doing business in African economies; and serve as an attractive tool for direct foreign investments.

- Consistent with Cao and Chen (2008), we recommend the need for African governments to assume the role of a “god-father” by supporting public research in the area of technology; assisting in education and training; equipping tertiary institutions to be abreast of modern technology and its usage to ease technology knowledge transfer to students; and by encouraging private institutions to invest in information technology. This initiatives would ignite innovative support among indigenous people and companies; and encourage them to financially support research and development (R&D) programs to ease the overall burden on governments as the propeller of information technology and business in their respective economies. A government that implements this innovation stands the chance of maintaining a technology hub in her Region; and becoming the financial “bee hive” of foreign investors and foreign direct investments. Foreign direct investments in an African economy would produce the “trickle-down” effect with relative ease. That is, the presence of multinational companies would facilitate the innovativeness and competitiveness of local or indigenous firms in information technology and business, two essential variables for efficient utilization of limited resources; and effective development and growth of African economies and the African continent. Development of “healthy” rivalry among indigenous firms in the information technology industry could extend their innovative frontiers beyond their immediate economies to the global level.
- Available statistics on population trends across the globe reveal Africa has the youngest population. Further, most young graduates in Africa come from less affluent homes. As a result, it becomes very challenging for these young graduates to translate their innovative entrepreneurial ideas into practice. To address this phenomenon, it is incumbent on various African leaders to formulate and implement policies through their respective central banks to transition from collateral based lending to performance based lending to young graduates from various tertiary institutions with crafty business ideas, but lack the financial muscle to transform those ideas into practicable and profitable business initiatives and ventures. A policy on performance based lending would accelerate the discovery and development of many renowned business stalwarts on the African continent. The performance based lending concept argues, since it is difficult for most young graduates in Africa to provide the collateral required to secure a loan, approval for loan applications submitted by these young graduates should be based on the economic relevance of their proposed business ventures. Further, each banking institution is expected to strengthen its Business Development Division; assign a Representative to interact, constantly, with the young entrepreneur after loan approval. The bank’s representative would share business ideas with the young entrepreneur, embark on routine visits to the business site; and collaborate to address pertinent business operation challenges. This initiative would assure the eventual success of the business, allow the young entrepreneur to pay the principal loan and any interest that may be connected to it. It would facilitate the discovery of more business talents and ease the perennial challenges associated with effective management of businesses on the African continent over time.
- Economic emancipation of the top-notch economies in Africa such as the South African, Nigerian, Egyptian, Ethiopian, Kenyan, Mauritian, and Ghanaian economies, among others, is meaningless unless it is positively correlated with the economic liberation of countries such as Eritrea, Somalia, and Malawi, and others, on the continent. The implication is leaders of the relatively advanced economies in Africa, including South African, Nigerian, Egyptian, Ethiopian, Kenyan, Mauritian, Ghanaian, and Rwandan leaders, among others, should develop strategies and diplomatic ties that would accelerate the economic development and growth of the smaller and struggling economies on the African continent.
- The initiatives of leaders of the “well-endowed” African economies should help transform the economies of the “less-endowed;” the initiatives should help curb famine by improving on food production and supply; and developing their infrastructural base to attract investors. Leaders of the less-endowed economies should be prepared to “open-up” to their colleagues in the well-endowed economies to effectively dialogue and chart a common course that would inure to the socio-economic good of the continent.
- All else held constant, improved infrastructural development including information technology; and review of investment laws in the less-endowed economies would enhance their chances of attracting more foreign investors and investments, which are essential requirements for economic development and growth. This would also help to address challenges associated with the timely release of economic data by some African economies, which affect values estimated as Africa’s regional GDP contribution to the World’s total GDP as witnessed in 2014 and 2015.
- Although the African Union (AU) and its sub-regional bodies such the Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD), Arab Maghreb Union (UMA), East African Community (EAC), Economic Community of Central African States (ECCAC), Common Market for Southern and Eastern Africa (COMESA), and the Community of Sahel-Saharan States (CEN-SAD) were formed to facilitate trade and foster peace and unity among member countries, the direct and immediate impact of the regional and sub-regional bodies on especially, less endowed economies in Africa is yet to be felt strongly. The various sub-regional bodies in Africa must strive to add “real” socio-economic meaning to their formation and presence.
- Initiatives of the economically endowed countries in Africa should complement efforts of the various sub-regional bodies. Through this initiative, we are likely to witness accelerated development and growth across the continent. The co-operation between Tanzania and Uganda; and between Kenya and Uganda are shining examples of how African economies could be developed through smaller economic groupings. The rationale

behind these unions to assure the countries of steady and accelerated economic development and growth; the rationale must manifest practically in the lives of the peoples.

- Collectively, African leaders could enhance the positive economic posture of the continent. That is, they could improve the continent's current outlook as the most preferred destination for foreign investors; and destination for foreign direct and indirect investments. They could improve on Africa's regional contribution to global total GDP. Achievement of these economic feats would hinge on the concerted efforts of all African leaders and peoples therein.

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### Appendix

Region	GDP (In \$ Billions)
World	80,934,771.03
Arab World	2,584,531.24
Asia & Pacific	27,339,475.24*
European Union	17,338,846.09
Latin America & Caribbean	5,972,061.11
North America	21,138,837.44
Sub-Saharan Africa	1,670,997.00

Table 12: GDP by Region - 2017

\*Asia & Pacific value = East Asia & Pacific (2017) \$23,994,899.22 + South Asia (2017) \$3,344,576.02 = \$27,339,475.24

Year	Africa's Total GDP \$	Merchandise Exports \$
2008	1.20569E+12	3.64095E+11
2009	1.1467E+12	2.66366E+11
2010	1.36687E+12	3.64169E+11
2011	1.55175E+12	4.59747E+11
2012	1.63394E+12	4.50289E+11
2013	1.74111E+12	4.22417E+11
2014	1.82865E+12	4.24003E+11
2015	1.66682E+12	2.91755E+11
2016	1.54556E+12	2.611E+11
2017	1.671E+12	3.10468E+11

Table 13: Africa's Total GDP & Business Values For Selected Years

YEAR	Africa's Total GDP \$	CC&OS \$
2008	1.20569E+12	20.26372583
2009	1.1467E+12	20.41194301
2010	1.36687E+12	22.37226895
2011	1.55175E+12	23.10985573
2012	1.63394E+12	22.802508
2013	1.74111E+12	22.74504735
2014	1.82865E+12	23.63898193
2015	1.66682E+12	25.94508936
2016	1.54556E+12	24.41834872
2017	1.671E+12	23.00254421

Table 14: Africa's Total GDP & I.T. Values for Selected Years

Year	Africa's Total Gdp \$	Global Total GDP \$
2008	1.20569E+12	64,399,690,013,189
2009	1.1467E+12	63,278,666,091,537
2010	1.36687E+12	66,036,387,107,063
2011	1.55175E+12	68,117,537,705,699
2012	1.63394E+12	69,835,075,997,485
2013	1.74111E+12	71,687,932,799,352
2014	1.82865E+12	73,725,379,037,299
2015	1.66682E+12	75,834,189,927,314
2016	1.54556E+12	77,796,772,093,915
2017	1.671E+12	80,250,107,912,599

Table 15: Africa's GDP Relative to Global GDP for Selected Years

YEAR	AFRICA'S GDP \$	WORLD'S GDP \$	%
2008	1205692144867.48	64,399,690,013,189	$0.018722 \times 100\% = 1.87\%$
2009	1146698676955.96	63,278,666,091,537	$0.018121 \times 100\% = 1.81\%$
2010	1366865426507.47	66,036,387,107,063	$0.020699 \times 100\% = 2.07\%$
2011	1551745804818.65	68,117,537,705,699	$0.022780 \times 100\% = 2.28\%$
2012	1633940723030.13	69,835,075,997,485	$0.023397 \times 100\% = 2.34\%$
2013	1741111663500.39	71,687,932,799,352	$0.024287 \times 100\% = 2.43\%$
2014	1828649539123.92	73,725,379,037,299	$0.024804 \times 100\% = 2.48\%$
2015	1666817704670.18	75,834,189,927,314	$0.021980 \times 100\% = 2.20\%$
2016	1545564345010.71	77,796,772,093,915	$0.019867 \times 100\% = 1.99\%$
2017	1670997004350.11	80,250,107,912,599	$0.020822 \times 100\% = 2.08\%$

Table 16: Africa's GDP as a Percentage of Global GDP - Calculations

\*Formula for Appendix E: % of Cont (t) = ((AGDPt ÷ WGDPT) x 100%). Where:

% of Cont(t) = Africa's percentage contribution to the world's gross domestic product for period t

AGDPt = Africa's gross domestic product for period t

WGDPT = World's gross domestic product for period t