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# Augmented Intelligence and Corporate Adaptability of Tertiary Institutions in Rivers State

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**Abstract:** *This study investigated the relationship between augmented intelligence and corporate adaptability of tertiary institutions in Rivers State. The study was anchored on the activity theory. The study was conducted at the micro level with individual staff of the tertiary institutions serving as unit of analysis. A cross-sectional survey research design was adopted while a structured questionnaire was used to collect primary data. The final analysis of the study was based on data collected from 197 respondents. The Spearman's rank order correlation statistic was used to test the hypotheses formulated for the study. It was found that a significant relationship exist between augmented intelligence and corporate adaptability as all the dimensions of augmented intelligence (human intelligence and artificial intelligence) covered in the study posted positive and statistically significant connection with corporate adaptability. The study concludes that augmented intelligence, manifested as human intelligence and artificial intelligence, significantly enhances corporate adaptability of tertiary institutions in Rivers State; and recommends that tertiary institutions in Rivers State that desire improved corporate adaptability should adopt augmented intelligence by automating tasks that are better performed by machines and using human skills in tasks that require human intelligence; and also provide trainings and empowerment programmes that gives employees the skills needed to adapt to changing work environment.*

**Keywords:** *Artificial intelligence, augmented intelligence, corporate adaptability, human intelligence*

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## INTRODUCTION

Long-term prosperity and sustainability is increasingly considered a strategic feat in business in lieu of the pervasiveness of business failure in recent times (Ateke & Nwulu, 2018). Increased globalization, convoluted business processes, advances in technology, and rapid information flows have revolutionized the business-scape (Harcourt & Ateke, 2018) and has made “intelligence” the most essential factor to business sustenance. This change could either be positive or negative depending on how organizations adapt to it (Lee, Vargo & Seville, 2013). Organizations must be adaptive to change in today's world of work, if they must remain resilient. Resilience can be nurtured and it is expedient that every employee in any organization is groomed to see positivity in every difficulty; work out a mechanism to recuperate after a setback in such a manner like an issue never occurred. Organizations are to develop resilience in employees through the provision of enabling factors of which technology is considered for building employee capacity. Employee resilience is knowledge based and this is actualized



through learning and understanding the external and internal trends in the world of business.

Technology has overtime changed organizations, people, process and practices. Organizations have upgraded operations to create a balance between machine intelligence and unique abilities of workforce. The advancement of technology and its applications are important components in the organization; employees must focus strongly on technological development for global relevance. Organizations are becoming more dynamic with technological advancement which affects its process and policies as well as its employees. The impact of the future of work has become a motivational factor that improves the evolvement of employees' experience; and the maintenance of positive adjustment under challenging condition; which fosters the strength and survival of the organizations (Ungar, 2011; Vogus & Sutcliffe. 2007) anchored on corporate adaptability is paramount. Such adaptability predisposes employees to adopt and adapt to changes, challenges and uncertainty that is introduced through technological innovation.

Developments in technology induce organizations to hook up with new realities of economic and social experiences that transcends into expansion, productivity and profit. Innovation is a driving force for any organization desiring growth. Adaptability facilitates the synchronization of human intelligence with innovation both as a process and an outcome. Smits and Jimenez and San-Valle (2011) believe that innovation is a conceptualized process or outcome. Most definitions of innovation emphasize the adoption of new ideas that are accepted by employees and diffused into the organization as policies. The world is moving towards artificial intelligence as systems become more digitalized and complex. Artificial intelligence plays an assistive role to human intelligence, highlighting the fact that cognitive technology is programmed to enhance human intelligence and not replace it, hence, the concept of augmented intelligence. Technology augments and empowers human capacities disrupting analogue human activities. Artificial intelligence offers employees information and connectivity, unimagined opportunities as well as unprecedented threats if not fully comprehended and managed. Artificial intelligence will amplify human effectiveness but also has the capacity to threaten human autonomy hence the need for perfect augmentation. Augmented intelligence creates greater surveillance, more interactions and high economic equalities.

Augmented intelligence technologies do not seek to replace human intelligence, but instead seeks to assist humans with their work. Artificial intelligence targets to create systems that can run without humans whereas augmented intelligence creates system that make humans better. Managers in organizations are to determine what tasks needs total automation, what tasks needs augmentation, and what tasks to leave to employees. According to Munday (2019), 72% percent of employees are worried about the future, it is believed that artificial intelligence will perform human tasks and subsequently replace the human worker beginning with low income workers e.g. picking robots are replacing field workers, driverless cars will replace taxi drivers and so on. It is important that organizations get more optimistic and evaluate how artificial intelligence will drastically affect job roles. The truth is the employees' fears are real; artificial intelligence is actually designed to relegate human intelligence but augmented intelligence promotes human intelligence and aids employees in working faster and smarter. The purpose of this study therefore is to determine the extent to which augmented intelligence influence corporate adaptability of tertiary institutions in Rivers State.



## **LITERATURE REVIEW**

### **Theoretical Foundation**

This study is underpinned by the activity theory. Activity theory begins with the notion of activity. An activity is seen as a system of human “doing” whereby a subject works on an object in order to obtain a desired outcome. In order to do this, the subject employs tools which may be external. The activity theory was developed by Havighurst (1961) and expanded by Vygotsky (1978) and Leontiev (1978). The activity theory originated from the socio-cultural tradition of the Russia Psychology which focuses on individual activity in maintaining social interactions. It is understood to be purposeful, transformative and develops interactions between actors: Social strata, hierarchical structure of activity and division of activities as actors in the system. Activity theory helps explain how social artifacts and social organization mediate social action. Proponents of the activity theory sought to explain human activities as systemic and socially situated phenomena that go beyond the paradigms of reflexology (interpretation of behavior in terms of reflex actions). According to Bedny and Karwowski (2006), activity theory is designed to enhance human and computer interactions in carrying out definite tasks: Application to human performance and work design giving room for learning. Thus, activity theory is fundamental to information systems management and for developing data models (Nardi, 1996).

### **Concept of Augmented Intelligence**

The idea of intelligent organization can be seen from different perspectives including organizational learning and knowledge management. Smart organizations have a huge intellectual capacity base that is embedded into learning as a culture. Yolles (1999) saw learning culture in line with a system of belief, attitudes, values, behavioral norms and meanings and the maintenance of learning structures that are responsive to learners, motivates the knowledge creation processes and provides opportunities for the application of new knowledge. The learning organization is capable of responding to variation that is adaptive and thus responding to the perception of a changing environment, or being proactive and responding to a perception of need for organizational improvement. We operate an intelligent organization where knowledgeable workers are pivotal to innovation and development for growth. The technological advancement and information systems birthed artificial intelligence in organizations as a new breed of knowledge; this breed had no plans of retaining humans at the workplace in the future. The needs of connecting artificial intelligence’s full potential started with the explorations of organization’s opportunities and make them artificial intelligent-fueled organization. Augmented intelligence however, seeks to leverage the advantages of artificial intelligences and human intelligence in order to create better, smarter organizations that create greater surveillance, more interactions and high economic equalities. In essence, augmented intelligence creates systems that make humans work better by providing machine assistance that enhance human performance. The implementation of augmented intelligence in an organization requires managers to determine tasks that need total automation; tasks that need human performance and tasks that need augmentation. This study thus views human and artificial intelligences as dimensions of augmented intelligence.

**Human Intelligence:** Whyte (2016) conceive intelligence as the general mental ability for reasoning, problem solving and learning. Intelligence thus integrates cognitive functions such as perception, attention, memory, language or planning; and relies on measures that are

standardized via testing with those results in social outcomes such as educational achievement, job performance, health and longevity. The intelligence described here is human. Everyone is created with some level of intelligence which serves as the basic intelligence for all; which can be nurtured and groomed into enhanced intelligence. The connection between intelligence and human body according to Churchland (2012) and Searle (2015) are inextricably connected: Intelligence is an emergent property of having a body. Although, intelligence today is also system-based and not only of human organs; we must recognize that we need more input on our thinking processes, which are embodied in our senses and requires bodies to work. Cognition, problem solving and learning are critical aspects of human intelligence. People reason about everything from learning to problem solving. Modest and extremely complex social interactions can be learned during one's lifespan: There are general individual differences in thinking abilities, problem solving and learning. The future of humanity is in co-evolution with technology and technology plays an important role in augmenting human activities of working and learning. Sensory augmentations that can allow people to perceive more, focus better and act more effectively are all strategies for augmenting, not just perception, but also intelligence. The senses are not always associated with intelligence, because the tendency for people when discussing intelligence is to think more or less in terms of the brain in the vat of early science fiction and philosophy.

**Artificial Intelligence:** Artificial Intelligence is the zenith of human intelligence displayed: It is the ultimate augmentation of human thinking converted into a technological platform. Artificial intelligence finds its definition from the progress in human innovation. Artificial intelligence is seen in many industries/section in the world of business; transforming the way humans use technology to communicate and transact (financially, socially and otherwise), and to retrieve information. Artificial intelligence is a mechanism for creative disruption (Carroll, 2020). Artificial intelligence which is also referred to as machine intelligence is intelligence demonstrated by machines compared to the natural intelligence depicted by humans. Artificial intelligence is a term used to describe machines or computer related technology that mimics cognitive functions associated with the human mind for learning, retaining and problem solving (Carroll, 2020). Artificial intelligence is the ability of a computer system or machine technology to think, learn and retain, artificial intelligence is geared towards making machines smart (Carroll, 2020). Artificial intelligence is an old concept that finds metamorphically reinventions of itself.

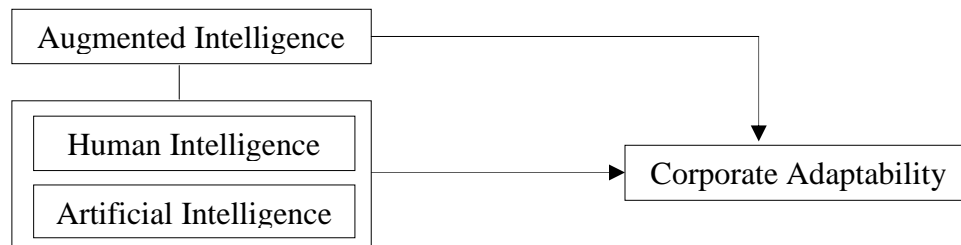
### **Concept of Corporate Adaptability**

Adaptability is the ability to change something or oneself to fit occurring changes (Andrese & Gronau, 2005). Ahiauzu and Jaja (2015) posit that most firms easily cope with normal conditions and moderate deviations from the norm, but find it challenging to cope with exposure to extreme events that lie outside their coping range. Corporate adaptability thus describes “context specific organizational capabilities that facilitate continuous evolvement to keep up with the needs of the operating environment” (Meyer & Allen, 1991) in Ateke and Nwulu (2018). It is the degree to which an organization has the ability to alter behavior, structures and systems in order to survive in the wake of environmental change (Denison, 2007). Adaptability can further be seen as the ability of a system to adapt itself efficiently and fast to changing circumstances and unexpected disturbances in the environment. It describes an organization's ability to constantly and

continuously evolve to match or exceed the needs of its operating “environment before those needs become critical (Hamel & Valikangas, 2003). For House (2010), adaptability connotes “making suitable to requirements or conditions; adjusting or modifying fittingly”. Ateke and Nwulu (2018) aver that the availability of human resources with requisite skills and knowledge is a critical contributor to adaptive capacity. Adaptability therefore is concerned with the capacity and the ability to adjust a business to suit new situations. It is not just being really good and doing very well at some particular thing, is the ability of companies to be really good at learning how to do new things as the need arises in their operating environment. The companies that thrive are very quick to read and act on the observation of signs of change. They have simulated and worked on rapid experimentation, frequently and economically with their products and services. They have also re-evaluated their business models, processes and strategies to ensure ability to cope with change. Based on the forgoing, this study hypothesizes as follows:

Ho<sub>1</sub>: Human intelligence has no significant influence on corporate adaptability of tertiary institutions in Rivers State.

Ho<sub>2</sub>: Artificial intelligence has no significant influence on corporate adaptability of tertiary institutions in Rivers State.



**Fig. 1:** Conceptual frame work of augmented intelligence and corporate adaptability.

## **METHODOLOGY**

This study examined the relationship between augmented intelligence and corporate adaptability. The study adopts a survey research design. The population of the study comprised three tertiary institutions in Rivers State. The study however, was premised on data collected from 197 respondents from these institutions. A structured questionnaire served as the instrument of the study; while the hypotheses were tested using the Spearman’s rank order correlation coefficient with the aid of the statistical package for social sciences (SPSS).

## RESULTS AND DISCUSSIONS

### Statistical Analysis for Augmented Intelligence and Corporate Adaptability

**Table 1: Correlation Matrix of Augmented Intelligence and Corporate Adaptability**

			Human n	Artificial l	Adaptability y
Spearman's rho	Human	Correlation Coefficient	1.000	.442**	.491**
		Sig. (2-tailed)	.	.000	.000
		N	197	197	197
	Artificial	Correlation Coefficient	.442**	1.000	.620**
		Sig. (2-tailed)	.000	.	.000
		N	197	197	197

Source: SPSS output of data analysis on augmented intelligence and corporate adaptability (2020)

The result of the test of relationship reveals that human intelligence is significantly associated with corporate adaptability with a rho coefficient of .491\*\* and a probability value of 0.000. The values represent a moderate positive and statistically significant relationship between the variables. Also, the test of relationship reveals that artificial intelligence and corporate adaptability are correlated. This is in view of the rho coefficient of .620 probability value of 0.000 produced by the test. These values suggest that a strong positive and statistically significant connection exists between artificial intelligence and corporate adaptability. Based on these results, the study rejects the null hypotheses; as the evidence of the analysis indicates that human and artificial intelligences significantly relates to corporate adaptability.

The findings of this study support the findings of Andrese and Gronau (2005) that organizational intelligence has positive effects on and organizational resilience. Corporate adaptability as used in this study is an aspect of organizational resilience. Also, the current finding aligns with the finding of Munday (2019) that 72% percent of employees are worried about the future, believing that artificial intelligence will perform human tasks and subsequently replace the human worker beginning with low income workers. The findings further corroborate the position that the positive adjustment under challenging conditions fosters strength and survival of organizations (Vogus & Sutcliffe, 2007).

## CONCLUSION AND RECOMMENDATIONS

The objective of this study was to determine the extent to which augmented intelligence (human and artificial intelligence) relates to corporate adaptability of tertiary institutions in Rivers State. The results show that augmented intelligence relates positively to corporate adaptability; as both dimensions of augmented intelligence posts statistically significant relationship with corporate adaptability. The thus concludes that corporate adaptability of tertiary institutions in Rivers State largely depends on augmented intelligence or that augmented intelligence predicts corporate adaptability of tertiary institutions in Rivers State. The study therefore recommends that tertiary institutions in Rivers State that seek corporate adaptability should adopt augmented intelligence by providing trainings and empowerment programmes that gives employees the skills needed to adapt to changing work environment including changes that arise as a result of natural causes such COVID pandemic. This is important because institutions that thrive are those that are very

quick to read and act on signs of change. The study also recommends that while artificial intelligence is good and critical for survival of institutions, caution must be asserted while depending on it because artificial intelligence cannot replace human intelligence. It should instead be used to complement human.

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# Rail Transport Operation and Organizational Performance of Manufacturing Firms in Nigeria

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**Abstract:** *This study investigated the relationship between rail transport operations and organizational performance of manufacturing firms in Rivers State. The study was conceptualized with rail transport operation as the independent variable to predict organizational performance with decent measures such as effectiveness, efficiency and productivity. The study adopted the cross-sectional survey research design to study a population of five (5) selected manufacturing companies in Rivers State. However, 20 copies of questionnaires were produced and administered to each of the 5 manufacturing firms making it a total of 100 respondents for the study. Data generated were analyzed and presented using both descriptive and inferential statistical techniques. The hypotheses were tested using the Spearman's Rank Order Correlation Statistics and the tests carried out at a 95% confidence interval and a 0.05 level of significance. The study findings revealed that there is a significant and positive correlation between rail transport operations and organizational performance of manufacturing firms in Rivers State. The study therefore, recommended that the government of the country should invest in railway transport as this will go a very long way in changing the economic fortunes of the country.*

**Keywords:** *Rail Transport Operations, Organizational Performance, Manufacturing Firms.*

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## INTRODUCTION

Transportation is essential to economic growth and development of nations world over. Its importance is evidenced in the fact that no nation can claim to be developed without effective and efficient transportation system (Nwanze, 2002). In Nigeria, different transportation modes play pivot role in the movement of people and coordination of business activities. (Muogbo, 2013), identifies railway transport as one of the key transportation modes with significant impact on Nigerian economy through the movement of people and industrial and non-perishable commodities from one destination to the other safely.

An efficient transport system, especially railway transport, plays a significant role in any economy through the movement of people and goods from one destination to the other safely. In essence, an effective and efficient transport system aids commerce and helps economic activities of any country. Rail transport therefore plays a significant role in commerce and economic activities of the Nigerian economy due to its ability to haul large volumes of cargo and carry large numbers of passengers at a very low cost. Nigeria is endowed with a total land mass of 351,649 sq. miles (910,771 sq. km) with a total population of about 170 million (Sanusi, 2014).

According to Nworji and Oluwalaiye (2012) the total collapse of the roadway infrastructure, due to the lack of infrastructure investment, poor maintenance and over use of the existing roads, will further restrain the transportation boost required for speedy economic growth. In order for Nigeria to join the league of world developed economies by 2020, as per its projected national plan, it requires a mode of transport, like rail, which not only has a capacity advantage over other land modes, but also enjoys the advantages of energy efficiency as cost-effectiveness. Therefore, a rejuvenation of the existing railway structure and construction of a new rail network, will act as a spring board for sustainable economic development and growth in the country (Oni, 2010).



Railway system plays a significant role in the development and overall growth of any economy. It is often regarded as the wheels of economic activity because of the crucial role it plays in providing the bulwark upon which production and distribution stand. It opens up regions, hinterlands and rural by facilitating agricultural development as well as the growth of cottage and large-scale industries. It also attracts residential, commercial, educational and recreational settlements and developments around its corridor. Due to the role it plays in growth and development process, rail transport is seen as the mainframe around which an integrated national transport system is built. Its capacity, which is further accentuated by its safety and security factors, coupled with its ability to travel longer distance with ease and lower unit costs, places it in good stead to serve as the hub of a transport system of a nation (Nwanze, 2002).

The movement of people and goods is currently done inefficiently through road transportation, but in contrast, efficient rail transport could provide an efficient distribution that is both cost effective and assists in achieving Nigeria's economic development initiatives. Jaekel (1997b) argues that "an efficient NRC will act as an aid to the development of other sectors such as agriculture, mineral resources, tourism and manufacturing, through the effective transportation of people and goods throughout the country to and from the seaports, linking companies with the outside world. Odeleye (2010), in concluding a research paper, noted that, "today, Nigeria's economy ultimately relies on road mode for sustenance of its economic activities." Ironically, the road mode is largely constrained due to its limited carrying capacity relative to rail transport.

Efficient railway transport enhances the economic development of any country, in terms of the movement of people and goods from one destination to another. Nigeria is an oil producing country, yet the supply chain of the petroleum product distribution is poor, inefficient, and abysmal let alone effective. The distribution of petroleum products is done through the road haulage system which equally drives up the distribution cost as well as an increase in the pump price. Inefficient product distribution results in delays in the petroleum products reaching the filling stations quicker which sometimes lead to product shortages and results in fuel scarcity and fuel queues at filling stations. Nigerian Railway Corporation (NRC) was therefore established by the Act of 1955 (amended by 1990 Act) for the sole aim of moving of passengers and haulage of freight and given the monopoly power and exclusive right for this purpose. Although development and construction of the railway track started as far back as 1898 and over years, numerous amounts of money invested on the rail system in Nigeria have also seen little impact. NRC is currently saddled with the problem of dwindling revenue; operational costs are increasing, as is the mounting debt. There is demand for the services that is currently not satisfied, but due to limited operational capacity, the yearnings of the teeming population for efficient transport system are still not fulfilled let alone effective.

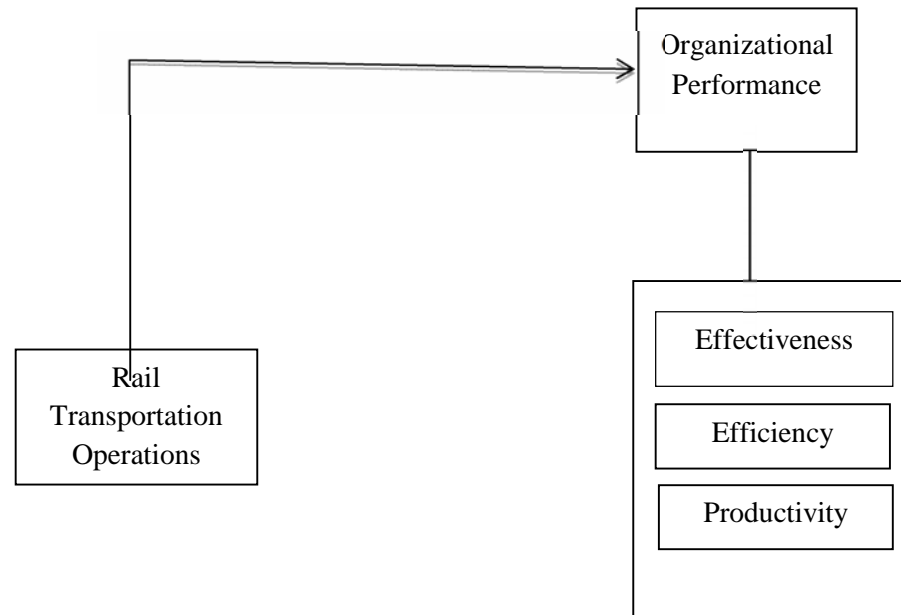
Achieving entrepreneurship especially in emerging economies cannot be attained if transportation which is an important component of globalization and economic growth and development is not properly overhauled especially the railway system which encourages long distance travel and haulage of bulk goods at a very low cost. Therefore, the purpose of this study is to examine the relationship between rail transport operations and organizational performance of manufacturing firms in Nigeria.

The specific objectives of the study therefore are:

- i. To examine the relationship between rail transport operations and efficiency of manufacturing firms in Nigeria.
- ii. To examine the relationship between rail transport operations and effectiveness of manufacturing firms in Nigeria.
- iii. To examine the relationship between rail transport operations and productivity of manufacturing firms in Nigeria.

This study also seeks to provide answers to the following questions:

- i. To what extent does a rail transport operations influence efficiency of manufacturing firms in Nigeria?
- ii. To what extent does a rail transport operations influence effectiveness of manufacturing firms in Nigeria?
- iii. To what extent does a rail transport operations influence productivity of manufacturing firms in Nigeria?



*Fig 1.1: Conceptual framework of the relationship between rail operations and organizational performance*

*Source: Desk Research, 2019.*

## **LITERATURE REVIEW**

### **Theoretical Foundations of the Study**

#### **Resource-Based View**

This theory takes a strong view of procuring and sustaining a state-of-the-art infrastructure, which gives the enterprise a competitive advantage. The firm's infrastructure will enhance the achievement of competitive advantage, performance indicator improvements and simultaneous advancement will be achieved. Whereas, if left in the public sector, this objective of a sustained and effective infrastructure will not be considered as of importance and, hence, the enterprise will become less competitive, as presently observed in the case of Nigerian Railways (Omoleke, et al., 2011).

Wade and Hulland(2004), cited in Carter (2013) argued that resources that are valuable and rare can lead to the creation of competitive advantage, and the competitive advantage can be sustained over longer time periods to the extent that the entity is able to protect against resources being imitated, transferred or substituted. Whereas, in most SOE, because of the monopoly power advantage and lack of competition or substitutes for a similar service provide little or no motivation for efficient service

compared with the private sector's competitive environment, which enhances competition, efficiency and profitability. For example, Fatemi&Behmanesh (2012) noted that new public management does not emphasize on processes (input) but on efficiency (output). A view shared by Adeyemo (2008) who also suggested that this theory would reap the advantages of the market system and competition, namely effectiveness, productivity, and efficient service.

### **Concept of Rail Transport Operation in Nigeria**

The impact of rail transport is evaluated by how its operational measures (rail distribution network, number of rail passengers and value of rail freights) enhance other economic activities. An assessment and discussion of the Nigerian Railway Corporation (NRC) and its relations with other ancillary sectors on the performance of the railway service is also included. Generally, an efficient transport system, especially railway transport, play significant role in any economy through the safe movement of people and goods from one destination to the other (Jaekel, 1997). In essence, an efficient and effective transport system aids commerce and helps economic activities of any country. Rail transport therefore is imperative in the actualization of commercial and economic goals of Nigeria given its ability to haul large volumes of cargo and carry large number of passengers at a very low cost (Oni, 2010).

Nigeria is endowed with a total land mass of 351,649 sq. miles (910,771 sq. km) with a total population of about 186 million (Fatemi 2012). The main source of external revenue for Nigeria is predominantly from crude oil exploration and crude export. The movement of people and goods is currently done inefficiently through road transportation, but in contrast, an efficient rail transport could have provided an efficient distribution that is both cost effective as well as assists in achieving Nigeria's economic development initiatives. Jaekel(1997) argues that an efficient NRC will act as an aid to the development of other sectors such as agriculture, mineral resources, tourism and manufacturing, through the effective transportation of people and goods throughout the country to and from the seaports, linking companies with the outside world.

The railway in Nigeria was originally a government department in 1898 which later metamorphosed to NRC as created by the act of 1955 (amended by 1990 Act). NRC was therefore established to carry on its activities among others including the movement of passengers and haulage of freight in a way that offers full scale transportation services, ensure value for money, adhere to the corporate goals, meet the expectations of passengers, ensure safety of operation with maximum efficiency, meeting the social responsibility of the corporation in the manner that meets and satisfy the needs of the rail users, industry, the general public and other stakeholders (Adesanya, 2010).

Construction of the railway lines started in 1892 and went until 1965. The establishment of the corporation took place in October 1955, by an act of Parliament which also granted the corporation a monopoly power. In total, at the official inauguration, Nigeria had a 3505-kilometer narrow gauge single-track railway network system (Abubakar, 2006; Odeleye, 2010). As discussed earlier, the perceived benefits of efficiency and a cheaper cost of transportation of farm produce to the European market acted as the motivator for early construction of the rail lines in Nigeria by the colonial administration. This early construction was without foresight and consideration of the full potential social benefits of railway system to the community. Hence, the pursuit of cheaper and modest investments in rail transport meant that geographical terrain that was deemed too costly for construction was avoided. As such deep cuttings, high embankments, long bridge spans, tunnels and viaducts which would have potentially increased the cost of construction were avoided. Even though foresight would have dictated that the increased cost of construction would be off-set by the benefits of service efficiency, effectiveness and the connection of major towns and villages across.

The short-sighted view of the colonial administration in the establishment of a rail transport led to the construction of a rail system with a narrow-gauge rail network that was not favourable for the movement of people and goods on the north-south and north-east corridors while leaving out east-west corridor as well as vast areas of the country unconnected (Odeleye, 2010). These areas remained

comparatively under-developed until the construction of roads and national highways was started after the country became independent in 1960. In addition, travel times were also elongated and travel speed was slowed to a maximum of 65km/h due to the steep curves, poor track equipment, sharp bends and the narrow gauge of the rail lines (Dina, 2011). Although there is over 100,000km of national highways, there is a dire need for an extension of the present railway system, construction of new lines serving specific industrial project areas and better integration of the country by providing a cheaper means of transportation (Jaekel, 1997; Balogun, 2005; Oni, 2010; Ademiluy i &Dina, 2011).

### **History of Nigerian Railway Corporation**

The first rail line in Africa was stated in 1852 by the famous railway engineer Robert Stephenson to connect Cairo with Alexandria in Egypt, and then in the Cape Colony of South Africa in 1859. In Tropical Africa, Railway construction started towards the end of the 19th century especially after the Berlin Conference of 1834-5 when tropical Africa was partitioned among various European Powers. It may indeed be said that the period between the late 19th Century and the first world war were the boom years of railway construction in Tropical Africa it was during this period that most of the present railways were constructed.

The railways were the outcome of various economic and political motives and rivalries. For one thing, they enable the colonial powers to administer a territory and convince the rivals that they were in effective control of the area claimed. The second motive for the construction of the railways was the anticipation that they would stimulate increased production in the regions, which pass through. Having secured political control, the economic motive became more important, and the railway line, were constructed or extended to link areas of mineral and agricultural potentials. When these trans Atlantic trade became very lucrative as the agricultural product of the sub Saharan region were in great demand in the European market, it was discovered by the colonial administration in Nigeria that the major transportation mode in the hinterland, the inland waterways, could no longer meet its needs. More over the seasonability of navigation on the river and creeks posed serious problems. The colonial government in Nigeria made application for the construction of rail lines to the secretary of state for the colonial prior to 1892.

As a result of the selfish colonial government interest, the colonial office in 1892 commissioned a survey to estimate the cost of railway construction in Nigeria. This was headed by William Shelfords. Although, Sir William Shelfords came up with favourable result, approval for construction did not come until 1895 when the secretary of state sanctioned the 32km, "1067 mm" gauge railway from Iddo to Otta. Consequently, by 1896 construction of the first railway line began from Iddo (Lagos). It got to Otta and Abeokuta in 1898 and in 1901, it got to Ibadan. That year Lagos – Ibadan line was opened by 1909 the line got to Jebba and linked to Baro- Kano line (already completed in 1911) at Minna by 1915. The Eastern line connecting Port-Harcourt to Enugu was opened in 1916, this line got to Port Harcourt in 1924 from where it was extended to Kaduna through Jos in 1927; this linking the Western and Eastern lines. Jos was linked with Zaria in 1912 by a narrow gauge line designed for the evaluation of tin from the Jos Plateau. This narrow gauge line called the Bauchi light Railway was closed in 1957.

The Nigerian Railway was therefore constituted in 1912 by the amalgamation of the Lagos Government Railway and the Baro- Kano Railway. The 38 Maiduguri line was later opened in 1964. Apart from the two main lines branch lines were also built from Zaria to KauraMamoda, Kano to Nguru and Ifo to Idogo. With the addition in 1966 of a 9.6 Kilometre branch line from Alesa Eleme Oil refinery to Elelenwa in the Port-Harcourt to Enugu line, Nigerian railway has a total of 3505 kilometres of single-track, metre gauge Railway connecting the two principal seaports, Lagos and Port-Harcourt, with the major urban centres in the interior.

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major urban centres in the interior. At the onset, the railway was known as the Nigerian government railway and run as a department of the Federal Government.

However, in 1952, the Government announced its intention to establish the Nigerian Railway Corporation (NRC) as an autonomous body to take over the duties and functions of the railway department. This did not come through until 1955 when the Nigerian Railway Act was passed. The Act set up the NRC, as a statutory Corporation entirely owned by the Federal Government. The act assigned the following function to NRC.

- i. To manage and operate the Railway and provide reasonable facilities for the carriage of passengers and goods
  - ii. To control railway Expenditure
  - iii. To ensure that as far as it is possible, annual revenue are sufficient to meet all expenditure properly chargeable to revenue and
  - iv. To direct and control expansion and extension of the railway system
- The NRC Act empower the minister of transport and Aviation to give to the corporation, directive of a general character as to the discharge of its functions in relation to matters appearing to him (minister) to be of great importance. The minister may also establish the upper limit of rates and fares within which the NRC is free to fix its rates/. Fares as well as appoint an inspector of railways. The NRC is required to furnish any information register by the minister \relating to its operations, property and finances, including annual account and reports.

The idea to establish the NRC was to free the Railway management from the rigidity and formality of government procedure and to establish the corporation as a public utility to run on quasi- commercial lines and in a sound financial basic. The NRC Act advised that uneconomic service could be undertaken at the expense of the government should the later insist on such services. Again, the government while paper on statutory corporations and the state owned companies 1978, emphasized that the corporation was largely of a commercial and industrial nature. However, from its creation, the NRC was saddled with conflicting objectives. The government did not seem to make up it mind whether it should be run as a business or social service. That conflict reflects heavily on the operations of the NRC development of Nigeria.

### **Development of Nigerian Railways after independence**

Throughout the colonial era, rail transport was the most important mode of transport in terms of its infrastructural facilities, traffics, hauled and reliability as an all the year round transport system. For example, while the first motorable road in Nigeria was opened in 1906 (Onakomaya, 1981) train services had begun as early as 1901 on the Lagos- Ibadan route. This foremost position of the Nigerian Railways during the colonial era was overturned shortly after independence. Shortly after independence a five years National Development plan was introduced, beginning from 1962-1968 in which priority attention was given to the critical sector of the economy. The transport sector was given a top priority, because of its potential to open up the country through internal movement of goods, services and people.

However, a new policy for transport development also evolved. Transport development was conceived as an integral part of National development. A multi-model approach was also adopted in which all the major transport modes were given some attention based on the government perceived need, for them. As a result of this thinking, road transport was not only given the most important attention more than half of the resources available for the transport sector was invested into road transport development. Thus for the period from 1960-1978, the railway system did not only lose its importance and relevance to the post independence socio-economic and geopolitical activities, but its role as a major transport system in the scheme of National development. Therefore, for the entire period of 1960 –1970, there was very

little attempt at the development of the Nigerian Railway system. Given the post colonial experiences, the Nigerian Railway Corporation was faced with the problem of how to regain its lost glory and make itself relevant to the socio-economic and Political development of Nigeria.

The first attempt at re-organising the NRC system in 1971, when a new organisational structure was adopted, the reform brought about the cancellation of the post of deputy general manager, Location of secretary to the NRC outside line management making the secretary responsible solely to the Board the abolition of the position of DGM is to cartel the constant right between the General manager and his deputy arising purely from land of specific functions assigned to the post of Deputy General Manager . The re-structuring also see the placement of District managers below the Heads of Department, this was designed to remove the misconception that the District managers were higher in the organisational hierarchy of the NRC. The restructure experiences more decentralization and clearer liens of reporting compared to the former structure. More units, department and districts were also established. Despite this re-structuring; NRC fortunes continue to decline even rapidly especially in the mid-to late 1970s until the Rail India technical and economic services limited (RITES) was invited in the late 1970s to resuscitate it. The RITES was contracted for three years, from 1979 – 1982 in order to turn the declining fortunes of the NRC around.

The need to inject into the management of the NRC, an external management train was first mounted in 1975 by a Canadian consultant appointed by the federal Government to carry out a management audit of the corporation between 1970-1975. Both the World Bank RITES also made a similar recommendation to the Federal Government in 1976 and 1977 respectively as consultants to the Federal Government on the Nigerian Railways. These external consultants were of the view that there was a counselling need to inject into the NRC an external techno-managerial know-how, which they concluded, was lacking and constituted one of the problems militating against the efficiency and effectiveness of the NRC.

The RITES management team made up of 36 top managers and 470 technicians formally took over the management and running of the NRC in January 1979 (World Bank, 1983). The RITES was contracted for three years at the cost of N462 million and this led to serious improvement in the outrage of wagons, coaches and locomotives, serious reduction in operating ratio, good and effective communication system but with little improvement to the track (Omowa,1995 : P 30) . RITES also trained a lot of Nigerians within and outside Nigerian with 600 Nigerians sent to India to acquire more knowledge and experience. The built a great number of staff quarters, training schools, canteens, medical centres in the division. At the end of the contract, NRC recorded a considerable improvement in its operation, but this could not be sustained. From 1983 to 1985, the passengers carried by the Nigerian Railway Corporation rose from 12.98 million to 15.42 million, since then, the number of passengers carried annually continue to decline, By 1989, the total passenger carried had dropped to 6.5 million, and to 580,000 in 1993. However in 1994, the passengers carried rose to 1.43 million, and further to 1.73 million in 1991 to N39.4 million in 1995, despite a continuous reduction in freight tonnes 1 km from about 282,000 tonnes 1km in 1991 to 108,000 tonnes 1km in 1995. It was the upward review of tariff (CBN Annual Report 1995:110 Adesanya, 1997).

In 1986, there were 187 locomotives of eight different makes in NRC's book stock, while daily availability of locomotives has fallen from 75 at the time to about 25 locomotives in January, 1997; thus constraining the provision of all the 148 programmed services per day. The effective, functional stock of wagon is less than 3,000 as against the required 7,00 wagons. The inability of the NRC to sustain the considerable improvement in this operations recorded after the RITES left Nigeria, led to the contractual agreement which was entered into between the Nigerian government and China civil Engineering and construction corporation (CCECC) and it was planned to cover a period of 36 months. This bilateral pact, which was made in order to improve rail operations in Nigerian worth about US\$528.697,000. In 1996, the Federal Government made move to revitalise the company by signing a memorandum of understanding (MOU) with China civil Engineering and construction company (CCECC) a Chinese firm

to modernise its operation. The firm was to repair damaged rail tracks and reconstruct all the bad bridges along the rail lines in the country, train staff and supply 400 wagons, 150 coaches and 50 locomotive engines. As of today, the contract that was supposed to last for three years at an estimated N50 billion has not been completed.

In spite of the non-conclusion of the original contract, the Federal Government in the year 2001 signed another MOU with the Chinese firm for the supply of spare parts for locomotive engines. The corporation is using a South African firm to repair some of such engines eight of the engines have been put in proper shape since the beginning of the exercise. Apart from the on going project of the Chinese Government has also moved to modernise the railways as it has commissioned a foreign consultancy firm to produce a blueprint that will lead to the development of the nation's rail system in the next twenty five years. In the same vein, the Germans are also being contacted to participate in the revitalisation of the Nigerian Railway Corporation. Furthermore, the anti corruption war of government progressed in the company with the Transparency monitoring Unit (TMU) of the ministry of transport which probed cases of looking at the corporations and recommended the pact of about fifty six officials of the company. The ministry approved the memorandum and relieved the affected officers of their appointment. For now, the Federal Government has appointed a Canadian Technomanagerial consultant to take over the management of the Nigeria Railways. They will manage the corporation, train the work force, re-orient them towards being real railway men and then add value in terms of restructuring to fall in line with the general standard of well managed railways in the world like the one in Canada and in due course prepare the railway for privatisation.

### **Distribution of the Railway Network Between States of the Federation in Nigeria**

The administration of Nigeria at the time of independence from British rule was regional: The Northern, Eastern, and Western regions, all of which were autonomous. The unification took place after independence in 1960. In 1963, just before the declaration of the civil war in 1966, Nigeria became a Federal Republic and has remained so to date. In order to facilitate the reconstruction, reconciliation and development of the destruction that had taken place during the civil war, in 1970, the regional administrative system of the former colonial administrator was abolished with the introduction of the twelve States of the Federation, all in line with the provision of the first national development plan in Nigeria (Odeleye, 2010; Ademiluyi & Dina, 2011). In 1976, at the beginning of the transition programme to the Second Republic, seven more states were created to reflect the stages of development and to enhance the phases of change in Nigeria. This was also in line with the objective of bringing the phase of development to the grassroots level, gaining closeness to the rural dwellers in order to discourage rural urban migration, where the necessary amenities are lacking or inadequate (Okanlawon, 2006).

In 1986, just at the start of another transition programme to the Third Republic which was terminated without materialising in June 1993 by the then military head of state, six more states were created with the same objectives as set in the national development plans. And in 1995, prior to the start of another transition programme, five more states were created, also in accordance with the changes and diversity of the economic and political environment in Nigeria. To date the total number of states of the Federation in Nigeria stands at thirty-six plus the Federal Capital Territory, Abuja, the present seat of government. Despite all the divisions and the creation of more states, the railway network still did not reflect the federal government agenda, neither is the railway network equitably distributed nor is there a strategic transport policy to ensure effective intermodal and railway connectivity with all the States of the Federation, airports and seaports (Odeleye, 2010, News Agency of Nigeria, 2016).

### **Organizational Performance**

Performance is the competency of an organization to transform the resources within the firm in an efficient and effective manner to achieve organizational goals (Daft, 1997). Organizational goals vary depending on the purpose for which they are established. Business organizations, like manufacturing



firms, have profit, growth and survival as the main goals. The popular ratios that measure corporate performance can be summarized as profitability and growth: return on assets (ROA), return on investment (ROI), return on equity (ROE), return on sale (ROS), revenue growth, market shares, stock price, sales growth, liquidity and operational efficiency (Dent, 2005).

Dess and Robinson (1984) proposed two measures of return on assets and sales growth for measuring firm performance: objective (actual amount) and subjective (perception). If objective performance measures are available, they should be utilized (Dess & Robinson, 1984). Otherwise, subjective performance measures will be the alternative due to the absence of accurate objective performance measures (Dess & Robinson, 1984).

Organizational Performance will be measured using financial measures. Financial performance is any mathematical indicator used to assess how efficiently a firm utilizes its resources to generate income over a specified period (Wang & Huynh, 2013). Financial performance is often evaluated on various indicators such as the growth in returns on asset (ROA), returns on equity (ROE) and profit (Zack et al., 2009). Financial performance has also been measured using a five point scale from no growth, a little growth, average growth, fast growth to very fast growth using a comparison of industry average during the last three years for the following three items, namely returns on asset, returns on equity and profit (Wang & Huynh, 2013)

## **Measures of Organizational Performance**

### **Effectiveness Measure**

Effectiveness is a broad concept that is difficult to measure in organisations. According to (Amah, 2014) the concept of organizational effectiveness is an elusive one that there is no single way of defining it. This may be due to the too many criteria used and the many definitions available for the concept. Veldsman(1982) defined organizational effectiveness as a qualification attached to an organisation resulting from the comparison from the actual state of the entity against its ideal state. He posits that an organisation can either be effective or ineffective. Georgopoulos & Tannenbaum, (1915) defined effective organisation as one that is productive, flexible, and lacks organizational strain. This view is supported by (Caplow, 1964), who perceived organization as one that has stability, integration, voluntarism and achievement. For him, an effective organisation is not only stable but achieves its goal. The views of these authors are supported by Yuchtman & Seashore (1967); Price (1968); Schien (1970); Bennis (1971); Mot (1972); &Duncan (1973); Being successful, means being more than just effective. It means making an important input to the long term interests of the shareholders by adding value.

Effective organisations are built on effective individuals who work effectively in groupsLawler, (1972). There are different variables for measuring organizational effectiveness. Maheshwari (1980) said this much when he opined that that organizational effectiveness is a multi-dimensional concept, which has no agreement as to which dimensions are significant and should be used as the basis of the analysis. The starting point in measuring board effectiveness should be to consider how it rates on these principal six variables viz: does the board have the ability to choose members with the right balance of qualities and skills, particularly the right chief executive officer, Is it agreed about priorities in its role, Is it agreed about how to achieve the company's strategy, how good are internal board dynamics and culture (handling dissent, the relationship between executives and non-executives etc., how good are the board's key relationships with major stakeholders, and is there respect for what it does?. Likiermann (2007).

### **Efficiency Measure**

Bernard (1938) argued that the primary measure of an efficient board is its capacity to survive. Many authors have used efficiency as a primary measurement of performance Cameron, (1986); Drucker, (1954); Murphy, et al., 1996; and Venkatraman & Ramanujam, 1986). Ogboso and Amah, (2016) opines

that efficiency refers to the accomplishment of goals with minimum resources or waste. It includes measures such as time minimization, cost minimization, and waste minimization. Speed and time are important resources for any board and must be seen to seek to maximize speed and minimize time. The way a board does this indicates how efficient and productive they are. Speed and time were the essence of time and motion studies since the day of scientific management introduced by Taylor that led to management efficiency. They are sources of competitive advantage.

Doing the right thing in corporate governance terms is an important, but not a sufficient, condition for performance. And doing the wrong thing (e.g. an ineffective audit committee, or lack of independence among the executives) will make it more difficult for a board to perform but is not a measure of success or lack of it either. The questions relating to board efficiency are: How effective is the organization in dispatching businesses (including through board committees in and between meetings) and following up on decisions, does the board identify and focus on key (not just a long list of) issues and risks facing the organisation; is the organization able to take initiatives, dealing with crises and identifying emerging issues? The conception of time here is the duration taken to accomplish a task. These honest questions are both a matter of choice. Since it is usually only after an extended period is it possible to know whether the board has dealt with the right issues, how well it has done so, and which issues have not been addressed. Accordingly, failing to ensure succession or invest in new technology is just as much about performance as successful talent management or systems investment.

Organizations can be really helpful in identifying risks that executive director alone, sometimes preoccupied with current challenges, and may not have spotted. There are two questions rather than one here because a history of dealing with key issues as they arise is not enough. The ability to take initiatives, deal with crises and identify issues that are not part of 'normal business' is a crucial differentiator between an efficient and a tolerable board. For the same reason 'meeting organization objectives' isn't included as a performance measure, since it runs the risk of being too inward-looking and passively taking things too much as they are.

### **Productivity Measure**

Productivity measurement indicates areas for possible improvements and shows how well improvement efforts are faring. It helps in the analysis of efficiency and effectiveness. It can stimulate improvement. Productivity is basic to board performance. Productivity is defined by Amah (2006), as the measure of how efficiently and effectively resources are brought together and utilized for the production of goods and services of the quality needed by society in the long term". This implies that productivity is combination of performance and economic use of resources. High productivity indicates that resources are efficiently and effectively utilized and waste is minimized. High productivity promotes the development of the organisation. Organizational evaluations helps, but no organization can, or should, attempt to quantify the return it makes on each cent stakeholders have invested in it. Good governance does not come with neat measurements or scales. Benchmarking board productivity across company size, industry or location is problematic. If there had to be any single question about the performance of the board, it would be: what is the board's contribution to the company's performance, is the board aware of, and interested in, good practice?

Organizations will understandably want to take credit for things that go well. This disposition applies not only to the success of visible initiatives (new ventures, new people etc.) but also to activities resulting in the absence of problems normally indicating board failure (e.g. deciding against an unfortunate acquisition, recording fewer bad debts than competitors). But making either connection is not easy, particularly for contributions such as establishing ethical standards. So while it may be possible for major individual events, such as acquisitions, to be linked to board decisions, the larger the organisation and the longer the lead time between decision and result, the less plausible the connection. Even for events with a short lead time, quality of execution and overall stock market trends often mask the board's particular role. Left to themselves, organizations tend to become narrow-minded or inward looking.

Working methods become “the way we do things around here”. So even if the board comes out well from questions on all other issue, there still is the issue of whether it is committed to sustaining good practice.

The damage from an unproductive board is far greater than wasting shareholder funds on directors’ fee. It reduces board effectiveness and efficiency, exposes the organisation to greater risk, erodes management confidence in directors and gets in management’s way, getting the right number and mix of directors is a critical factor in maximizing productivity. Bridge (1992), says board composition is the key to lifting board productivity. Having too many directors’ risk creating factions and multiple conversations, just as too few means the board cannot adequately handle the workload. Some signs of poor boardroom productivity according to Bridge (1992) are viz: management lacks confidence in the board, directors get in management’s way, compliance overtakes common sense, the focus is more operational and less strategic, the board pack is large and keeps growing, it contains irrelevant or unclear information, directors haven’t had enough time to read it, conversations often fracture and factions emerge, meetings go off track and discussions get bogged down in detail, directors are not engaged and struggle to keep their eyes open, the board keeps covering old ground, directors keep asking for more information, too many decisions are deferred, meetings are full of long management presentations and directors leave feeling exhausted, frustrated and that nothing was achieved.

### **Empirical Studies - Rail Transport Operation and Economic Growth in Nigeria**

Several authors have examined rail transport-growth nexus both in the developed and the developing countries. Herranz-Loncan (2011) examined the contribution of rail transport to economic growth in the Latin America before 1914. The paper used the growth accounting framework to provide estimates of the contribution of railways to the region’s economic growth using four of the main Latin American economies (Argentina, Brazil, Mexico and Uruguay), in order to obtain the impact of the railway on those economies during the period of export-led growth. Results show that the contribution of railways to growth varied substantially across Latin American countries. More precisely, in the case of Uruguay, the growth impact of railways was very low, lower actually than in some European countries, such as Britain and Spain. This unexpected result may be explained by the features of the Uruguayan geography and economic structure, and provides a clear counterexample to the hypothesis that railways had higher benefits in Latin America than in the core industrialized countries.

Furthermore, Herranz-Loncán (2011) examined the role of railways in export-led growth of Uruguayan economy between 1870 and 1913 using OLS estimation. The results showed that Uruguayan railways did produce some positive effects. They helped to integrate the national market while also promoting the political and administrative unification of the country. However, their economic impact was much lower than in other countries of the region that experienced export-led growth. This indeed has affected the growth prospects of the Uruguayan economy. The results, therefore, provide reason for relatively poor performance of the economy during the period under study. The study concluded that Uruguayan case provides a clear-cut example in which geography limited the potential of railway technology to generate significant levels of economic growth.

Atacket. *al.* (2009) investigated whether railroad induced or followed economic growth in the American Midwest for the period 1850-1860. Using a newly developed GIS transportation database, the study examined the subject matter, focusing on two indicators of broader economic change, population density and the fraction of population living in urban areas. The difference in differences estimates (supported by IV robustness checks) strongly suggest that the coming of the railroad had little or no impact upon population densities just as Albert Fishlow concluded some 40 years ago.

However, the results also imply that the railroad was the reason for mid-western urbanization, accounting for more than half of the increase in the fraction of population living in urban areas during the 1850s. Haines and Margo (2006) used panel data set of counties for 1850 and 1860 to examine the economic impact of gaining access to a railroad on local economic development in the US. Difference in Difference approach was adopted to compare outcomes from a treated group (counties that gain rail

access in the 1850s) with a control group (those that gain rail access before and after 1850s). Results showed that rail access appears to have increased the percentage participation in the service sector, decreased agricultural yields, and reduced the share of improved acreage in total land area.

Pienaar (2012), competition is a significant factor in attaining the principal objectives that should be achieved by a transport system and further states, “It will provide the discipline needed to develop and enforce the kinds of rational investment policies that will provide effective transport services in the most efficient manner” (2012). The most recent WEF (2013) report showed that Nigeria is ranked 52 out of 144 countries with regards to economic competitiveness. This is a decrease of two places since the 2011/2012 report. It should be noted that other African economies have showed significant development in their economies as well (2013). Arslan and Tathdi (2012) further explain international competitiveness as the ability to sustain activity in the global economy along with a satisfactory level of growth.

However, Ubogu (2011) states that without efficient transport it is hardly possible for an economic transformation and the development of any country to occur because 17 goods should be transported from the origin to the destination at the minimal cost (2011). Transnet (2012) and General Electric Nigeria Technologies (GESAT) have made a deal for GESAT to supply TFR with 143 heavy haul diesel locomotives (ten manufactured in the USA and 133 assembled in Koedoespoort) to haul freight and coal across Nigeria in order for Transnet to meet the Competitive Supplier Development Programme objectives. These locomotives indicate that there are great opportunities for Transnet, Nigeria and GESAT.

Abdulsalami (2014) on the other hand, stated that rail transport system in Nigeria has facilitated the movement of internal and long-distance trade. Shehu (2011), also pointed out that by far, rail transport transformed the growth of the economy, especially in the export of groundnut and other cash crops in the early stage of the country's development. According to Adenji (1995) quoting from Agbaeze and Onwuka (2014) rail transportation helped to reduce the cost of road maintenance and repairs and at the same increased the lifespan road infrastructure. From this empirical review, it is obvious that rail transport needs to be improved upon in Nigeria and doing this require a comprehensive study of the different aspects of the rail transport system to provide the necessary inputs for policy formulation and implementation in the sub-sector.

Brussels (2014) defines the competitive position of rail transport in the transport system is influenced by the factors such as rail transport costs and quality of rail services. Transport cost affects productivity and efficiency improvements; for example, if passing lowered operating costs to transport users can increase the attractiveness of the transport mode and again be used to enhance the technologies and invest in rolling stock and the quality of rail transport services also affected by various factors such as journey time, reliability, frequency, flexibility and customer information.

According to Stewart (2013) freight railways boosts the economic competitiveness because these are energy efficient; a freight train moves one ton of freight for an average of 484 miles on a single gallon of fuel and that is an estimate of four times as far as the same cargo a freight truck can move. According to the World Economic Forum (WEF) (2013) in their Global Competitiveness Report, infrastructure, innovation and market efficiency are three of the 12 pillars of competitiveness (WEF, 2013). Delgado (2012) indicates that the term “competitiveness” can be defined in different ways.

Some define competitiveness as the ability to achieve outcomes, like a high standard of living and economic growth, while others focus on the ability to achieve economic growth through employment creation and increased exports. Competitiveness may also be seen in the light of government fiscal policies which facilitate the management of short-term fluctuations in economic activity (Delgado, 2012).

**H<sub>01</sub>:** There is no significant relationship between influence efficiency of manufacturing firms in Nigeria.

**H<sub>02</sub>:** There is no significant relationship between influence effectiveness of manufacturing firms in Nigeria.

**H<sub>03</sub>:** There is no significant relationship between influence productivity of manufacturing firms in Nigeria.

## METHODOLOGY

This study adopted a cross-sectional survey research design and studied a total population of 5 selected manufacturing firms operating in Rivers State. Specifically, Delta Steel Company, Dangote Cement Company, Flour Mills Company of Nigeria, Unilever Nigeria PLC and PZ Cussons PLC were the focal firms investigated. The study administered 20 copies of structured questionnaires to employees from each of the selected firms making it a total of 100 respondents. Data generated were analyzed and presented using both descriptive and inferential statistical techniques. The hypotheses were tested using the Spearman's Rank Order Correlation Statistics and the tests carried out at a 95% confidence interval and a 0.05 level of significance.

Data for the study was gathered through primary and secondary data sources.

**Table 1: Reliability Coefficients of variables**

S/No	Dimensions/Measures of the study variable	Number of items	Number of cases	Cronbach's Alpha
1.	Railway Transportation	7	74	0.781
2.	Effectiveness	4	74	0.777
3.	Efficiency	4	74	0.710
4.	Productivity	3	74	0.709

*Source: SPSS Output, 2019.*

## Testing of Research Hypotheses

**Table 1: Correlations Matrix on The Relationship Between Rail Transport Operations and Organizational Performance**

		Rail transport operations	Effectiveness	Efficiency	Productivity
Spearman's rho	Correlation Coefficient	1.000	.733**	.713**	.683**
	Sig. (2-tailed)	.	.000	.000	.000
	N	74	74	74	74

	Correlation Coefficient	.733**	1.000	.533**	.334**
Effectiveness	Sig. (2-tailed)	.000	.	.000	.004
	N	74	74	74	74
Efficiency	Correlation Coefficient	.713**	.533**	1.000	.642**
	Sig. (2-tailed)	.000	.000	.	.000
	N	74	74	74	74
Productivity	Correlation Coefficient	.683**	.334**	.642**	1.000
	Sig. (2-tailed)	.000	.004	.000	.
	N	74	74	74	74

**\*\*.** Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS output version 23.0

**Ho<sub>1</sub>:** *There is no significant relationship between rail transport operations and efficiency of manufacturing firms in Nigeria.*

The correlation coefficient (r) shows that there is a significant and positive relationship between effective rail transport operation and efficiency of manufacturing firms in Nigeria. The *rho* value 0.733 indicates this relationship and it is significant at  $p\ 0.000 < 0.05$ . The correlation coefficient represents a high correlation indicating a strong relationship. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate upheld. Thus, there is a significant relationship between effective rail transport operation and efficiency of manufacturing firms in Nigeria.

**Ho<sub>2</sub>:** *There is no significant relationship between rail transport operations and effectiveness of manufacturing firms in Nigeria.*

The correlation coefficient (r) shows that there is a significant and positive relationship between effective rail transport operations and effectiveness. The *rho* value 0.7123 indicates this relationship and it is significant at  $p\ 0.000 < 0.05$ . The correlation coefficient represents a high correlation indicating a strong relationship. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate upheld. Thus, is a significant relationship between effective rail transport operations and effectiveness of manufacturing firms in Nigeria.

**Ho<sub>3</sub>:** *There is no significant relationship between rail transport operations and productivity of manufacturing firms in Nigeria.*

The correlation coefficient (r) shows that there is a significant and positive relationship between effective rail transport operations and productivity. The *rho* value 0.683 indicates this relationship and it is

significant at  $p = 0.000 < 0.05$ . The correlation coefficient represents a high correlation indicating a strong relationship. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate upheld. Thus, there is a significant relationship between effective rail transport operations and productivity of manufacturing firms in Nigeria.

## **DISCUSSION OF FINDINGS**

Findings of the study revealed that a significant relationship between exists between rail transport operations and organizational performance measures of manufacturing firms in Nigeria. The finding corroborated with the empirical findings Abdulsalami (2014) who found that rail transport system in Nigeria has facilitated the movement of internal and long-distance trade. The study also agrees with Shehu (2011) who found that rail transport significantly impact economy growth and development. The study findings are in tandem with the findings of Agbaeze and Onwuka (2014) as the found that rail transportation helps to reduce the cost of road maintenance and repairs and at the same increased the lifespan road infrastructure. Similarly, the study findings are in consonance with the findings of Stewart (2013) who revealed that freight railways boosts the economic competitiveness because these are energy efficient.

## **CONCLUSION**

From the theoretical and empirical literature, this study concludes that Rail transport operation significantly affects the performance of the organization of manufacturing firms in Nigeria. Furthermore, the study in line with our research objectives found that rail transport operations significantly influences efficiency of manufacturing firms in Nigeria, rail transport operations significantly influences effectiveness of manufacturing firms in Nigeria, rail transport operations significantly influences productivity of manufacturing firms in Nigeria.

## **RECOMMENDATIONS**

Based on the findings of the study, this paper recommends that the government of the country should invest in Railway transport as it will go a very long way to positively affect the economic situation of the country, railway transport has over-time before now proven to affect the economic situation of the country, therefore, non-governmental organizations should invest in it, management of manufacturing firms should make use of railway transport operation so as the save cost and increase cost.

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# Cargo Handling Equipment and Efficient Cargo Delivery in Nigerian Ports

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**Abstract:** This study examined the relationship between cargo handling equipment and efficient cargo delivery in Nigerian Ports. The study adopted the cross-sectional survey in its investigation of the variables. Primary source of data was generated through self-administered questionnaire. The population of the study was 2,416 employees of six ports in Nigeria including Abuja office. The sample size of 344 was determined using the Taro Yamane's formula for sample size determination. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. Data generated were analyzed and presented using both descriptive and inferential statistical techniques. The hypotheses were tested using the Spearman's Rank Order Correlation Statistics. The tests were carried out at a 95% confidence interval and a 0.05 level of significance. The study findings revealed that cargo handling equipment positively and significantly influences efficient cargo delivery in Nigerian Ports. The result of the findings further revealed that tractor-trailer system, and heavy duty forklift system gave rise to efficient cargo delivery in Nigerian Ports. The study recommends that management of ports in Nigeria should devise strategies for successful operation of handling equipment which should involve devising ways to compensate for a number of factors that, individually or in combination, act to reduce the efficiency of their equipment.

**Keywords:** Marine Pollution, Maritime Environment, Oily-Water, Shipping Terminals

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## INTRODUCTION

Cargo handling equipments are used to transport goods and materials from one location to another. Cargo handling equipment vehicle varies according to cargo type. Cargo handling equipment are employed widely in marines and railways for the transportation of heavy goods, containers, and components. Cargo handling equipment Vehicle generally comprises cranes, container handlers, yard tractors and forklifts (Sislian, Jaegler & Cariou, 2016).

The global cargo handling equipment market can be segmented based on propulsion, equipment type, application, and region. Based on propulsion, the cargo handling equipment vehicle market can be classified into diesel, electric, and hybrid. In terms of propulsion, the diesel segment accounts for a prominent share of the market. Based on equipment type the market can be segmented into Conveyer, Forklift, Truck, Aviation Dolly, Automated Guided Vehicles (AGV), Crane and various others.

Also, Sislian, Jaegler and Cariou (2016), highlight the regional outlook and segments the market into four main regions, Americas (Canada, Mexico, USA), Europe, Asia-Pacific and Row (Argentina, Russia, Brazil). Each of the regions is further divided into various countries. Asia-

Pacific is the largest market for cargo handling equipment market. China is the global leader in cargo handling equipment capacity and accounted for nearly 30% of the total cargo handled in 2017. The high cargo handling equipment capacities of the ports in China is driving the growth of the market in Asia Pacific. This trend is likely to continue in the coming years, leading to an increase in the demand for cargo handling equipment as well as automation at ports is expected in the region in coming years.

The assumption of the study on cargo handling equipment is a facilitating apparatus that determines level of port performance. It is common knowledge that ports play a key role in economic growth and development. Similarly, European Union (2013) reported that nearly 75% of the trade worldwide is handled in ports. This implies that effective cargo handling leads to positive outcomes to port performance and countries economic growth and development.

According to Sislian, Jaegler and Cariou (2016) the process of cargo clearance in its international standards should take three to four days. But this is not the case in African port where the processes take 15 days to three weeks. Their assumption is that dwell time and clearance time are major commercial instruments used to attract cargo and revenues. In a similar manner, Alderton and Saieva (2013) notes that cargo handling is the backbone of a port. This is in line with Rigot (2012) who suggest that the port performance indicators that focus on the cargo-handling are very important in evaluating the performance of a port. Based on the analysis provided above no one can deny that cargo handling equipment have effects to port performance. Therefore, more plans and efforts geared towards developing cargo handling equipment at ports should be given a priority. This is due to the fact that Tongzon (2007) recognized that there are factors influencing the decisions to route cargo through a certain port over the other.

As noted by Esmer (2008) ports have become an intersection node in logistic chains, in which goods engage in additional operations taking advantage of proximity or their stay in transit to other places. Hence, port efficiency is an important requirement in order to survive in the competitive world of shipping industry. Different facilities in the port are expensive to run and purchase. Hence, under-utilizations will result in capital loss and higher cost for running the port. Vessel tracker (2012) shows that cargo clearance at port is a serious problem. While UNCTAD (2012) noted that internationally, it should take between two to three days to clear the cargo, but in Nigeria it takes between ten to seventeen days for customers to clear their local imports and transit imports through.

Some of the reviewed literatures suggest that many ports are facing similar problems related to cargo handling equipment. One of the main reasons for this shift as explained by Kiwanuka (2013) resulted from poor cargo handling equipment. It is noted that cargo clearance at the port are surrounded with several problems including the delay in clearance. Therefore, since maritime trade in Africa on domestic economies, accounts for more than 90% of the continent's imports and exports, ports therefore play a fundamental role in facilitating Africa's integration to international trade. However, with reference to the fact explained above it seems that cargo handling equipment in Nigeria port have been given little attention. The assumption is that Nigeria has the opportunity to become a vital International Hub for landlocked countries such as Uganda, Rwanda, Burundi and DRC. The general shift in trade to the East (China and India) is likely to be beneficial to Nigerian sea ports in the form of increasing demand (Sislian, Jaegler & Cariou, 2016).

The various activities within the maritime sector of any nation's economy could be seen

as the life wire for growth and development. Shipping operations being a major aspect of maritime transport remain the most effective means of transportation in the international exchange of goods. The primary function of a seaport is to transfer cargo between maritime and inland transport, quickly, efficiently and at a reasonable cost (Stephens and Ukpere, 2011), with the aid of various equipment designed to handle specific types of cargo for transshipment. Cargo transfer efficiency can be enhanced with the use of adequate cargo handling equipment.

The purpose of the study was to examine the relationship between cargo handling equipment and efficient cargo delivery in Nigerian Ports.

Furthermore, this study was guided by the following research question:

- i. To examine the relationship between tractor-trailer system and efficient cargo delivery in Nigerian Ports.
- ii. To examine the relationship between heavy duty forklift and efficient cargo delivery in Nigerian Ports.
- iii. To examine the relationship between crane system and efficient cargo delivery in Nigerian Ports.

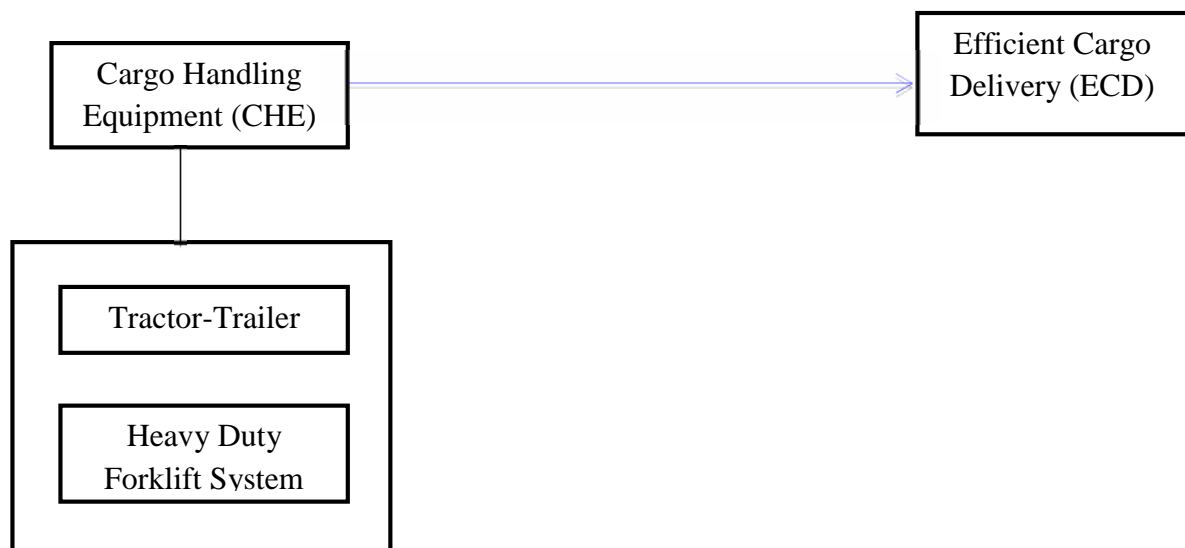


Figure 1.1: Conceptual Framework of Cargo Handling Equipment and Efficient Cargo Delivery Time in Nigerian Ports

Source: Desk Research (2019).

## **LITERATURE REVIEW**

### **Theoretical Foundation**

#### **Queuing Theory**

Large numbers of ports are facing some challenges related to cargo handling equipment especially delay in cargo clearance and delivery. It is assumed that this delay leads to port congestions. In so doing queuing theory can best explain the impact of this delay through its concepts such as waiting line and its impacts to service provision and delivery. Queuing theory is the mathematical study of waiting lines, or queues. In queuing theory, a model is constructed so that queue lengths and waiting time can be predicted. The Theory has its origins in research by Agner Krarup Erlang in 1909 when he created models to describe the Copenhagen telephone exchange. János (2012) explain that Queuing theory deals with one of the most unpleasant experiences of life, waiting and queuing are quite common in many fields. According to him, queuing theory was raised by calls, Erlang was the first who treated congestion problems in the beginning of 20th century by using queuing theory.

The theory also can be used for performance measurements. To characterize a queuing system, we have to identify the probabilistic properties of the incoming flow of requests, service times and service disciplines (János, 2012). The arrival process can be characterized by the distribution of the inter-arrival times of the customers, denoted by  $A(t)$ , that is:

$$A(t) = P(\text{inter-arrival time} < t).$$

In queuing theory these inter-arrival times are usually assumed to be independent and identically distributed random variables. The other random variable is the service time, sometimes it is called service request, work. Its distribution function is denoted by  $B(x)$ , that is:  $B(x) = P(\text{service time} < x)$ .

The theory shows that the service times, and inter-arrival times are commonly supposed to be independent random variables. The theory continues to explain that the structure of service and service discipline tell us the number of servers, the capacity of the system, that is the maximum number of customers staying in the system including the ones being under service (János, 2012). The service discipline determines the rule according to which the next customer is selected. The most commonly used laws are FIFO - First in First Out: who comes earlier leaves earlier; LIFO – Last In First Out: who comes later leaves earlier; RS - Random Service: the customer is selected randomly and priority.

It is important to note here that, the aim of all investigations in queuing theory is to get the main performance measures of the system which are the probabilistic properties that is distribution function, density function, mean, variance of the following random variables: number of customers in the system, number of waiting customers, utilization of the server/s, response time of a customer, waiting time of a customer, idle time of the server, busy time of a server (János, 2012). Of course, the answers heavily depend on the assumptions concerning the distribution of inter arrival times, service times, and number of servers, capacity and service discipline. It is quite rare, except for elementary or Markovian systems, that the distributions can be computed. Usually their mean or transforms can be calculated (János, 2012).

### **Cargo Handling Equipment**

As used in this study cargo refers in particular to goods or produce being conveyed generally for commercial gain either by ship, boat or aircraft (Jean-Francois *et al*, 2015). Nonetheless, the term is now often extended to cover all types of freight including that carried by train, van, track and intermodal container. On the other hand, the term is also used in case of goods in the cold chain, because the perishable inventory is always in transit towards a final end use, even when it is held in cold storage or other similar climate-controlled facility.

On the other hand, Cambridge Dictionaries online defined cargo handling equipment as an activity of moving goods on and off ships, planes, trucks (Cambridge University Press 2015). This implies Multi-modal container units, designed as reusable carriers to facilitate unit load handling of the goods contained. They are also referred to as cargo, especially by shipping lines and logistics operators. Cargo handling equipment includes equipment used to move cargo (containers, general cargo, and bulk cargo) to and from marine vessels, railcars, and on road trucks. The equipment typically operates at marine terminals or at rail yards and not on public roadways or lands. This inventory includes cargo handling equipment of 25 hp or greater using diesel, gasoline, or alternative fuels.

Due to the diversity of cargo, there is a wide range of equipment types. The majority of the equipment can be classified into one of the following equipment types: Forklift, Rubber tired gantry (RTG) crane, Side handler, Sweeper, Top handler, Tractor-Trailer, Heavy Duty Forklift, Straddle-Carrier, Yard Tractor and others.

Sislian, Jaegler and Cariou (2016) posited that Cargo Handling Equipment (CHE) includes all the equipment at ports, rail yards, and warehouse distribution centers used to either handle freight or perform other on-site activities such as maintenance or repair activities. Cargo handling equipment is as diverse a group of equipment as the cargo that it handles and the tasks it performs. Cargo that arrives and/or departs by ship, truck, or train, can include liquid, bulk (break bulk and dry bulk), and containers. Liquid cargo, such as petroleum products and chemicals, are often transported via pipelines, and therefore, do not usually have mobile CHE associated with their operation. Break bulk cargo, such as lumber, steel, machinery, palletized material, and dry bulk cargo, such as cement, scrap metal, salt, sugar, sulfur, and petroleum coke, are handled using loaders, dozers, cranes, forklifts, and sweepers. Container cargo, which is the most common type of cargo at ports and intermodal rail yards, are handled using yard trucks, rubber-tired gantry (RTG) cranes, rail-mounted gantry cranes (RMGs), top picks, side picks, forklifts, and straddle carriers.

The most common type of cargo handling equipment at ports and intermodal rail yards is a yard truck. Yard trucks are also known as yard goats, utility tractor rigs (UTRs), hustlers, yard hostlers, and yard tractors. Yard trucks are very similar to heavy-duty on-road truck tractors, but historically, the majority has been equipped with off-road engines. Yard trucks are designed for moving cargo containers. They are used at container ports and intermodal rail yards as well as distribution centers and other intermodal facilities. Containers are loaded onto the yard trucks by other container handling equipment, such as rubber-tired gantry cranes, top picks, or side picks, and they are unloaded the same way. In addition to loading and unloading operations, yard trucks are used to move containers around a facility (yard) for stacking and storing purposes (Spasovic, 1999).

A number of conventional methods for handling cargo are available and are worth mentioning since they might be capable of providing at least a partial solution to the transfer



problem. These methods include Burton, Housefall, Highline, helicopter, crane, and special purpose container crane. It should be emphasized that all of the above (except the Housefall method) have a common, basic disadvantage that once the cargo is even slightly lifted from the deck, it becomes pendulous and hence potentially dangerous. Thus, any improvement must provide some method of eliminating the unwanted free motion of the cargo - i.e., the same constraints which were originally supplied by the friction between the deck and the cargo must then be supplied by the transfer method once the cargo is free of the deck. Further, any method which does not use the ship as a reference (i.e., not mounted on the ship) must also provide for some type of heave compensation (Sislian, Jaegler & Cariou, 2016).

Burton, Housefall, and highline methods are roughly similar in that a line is passed between ship and platform and suspended from some high point at each end. All have the advantage that the ship may undergo any motion during transfer, but the Burton and Highline methods still have the basic disadvantage discussed above (i.e., a pendulous cargo). One major advantage of the Housefall method is that the Housefall block may be raised and lowered. This permits a mini-mum pendulous length for the suspended cargo, and advanced versions of the Housefall block mechanism are under study at Hunters Point Naval Ship-yard. The Highline method has been adapted by the San Francisco Bay Naval Shipyard in developing a method for transferring cargo from ship to a beach head (Spasovic, 1999). The method was felt to be successful although no attempt was made to test it in heavy seas. A major disadvantage of all three methods is that a large percentage of the load carrying capacity of the line is used to keep the cargo up and out of the water, and the cargo is only a small percentage of the load capacity of the line. Typical maximum load capacities vary from 3,500 lb to 12,000 lb - the latter being of fair amount but still falling short of being able to support a 20 tonne container.

### **The Tractor-Trailer system**

The Tractor-trailer system in which containers are both handled and stored on "over the road" chassis or terminal trailers, and are moved around terminal by heavy duty tractor units. So far as **dry bulk cargoes** are concerned, handling facilities may be in the form of power-propelled conveyor belts, usually fed at the landward end by a hopper (a very large container on legs) or grabs, which may be magnetic for handling ores, fixed to a high capacity travelling crane or travelling gantries (Alderton, 2008). These gantries move not only parallel to the quay, but also run back for considerable distances, and so cover a large stacking area, and are able to plumb the ship's hold. These two types of equipment are suitable for handling coal and ores. In the case of bulk sugar or when the grab is also used, the sugar would be discharged into a hopper, feeding by gravity a railway wagon or road vehicle (Rowbotham, 2008).



Figure 2.1: Trailer-Tractor Equipment

Source: Air Resource Board (2015). Technology assessment: Mobile cargo handling equipment.

*California environmental protection agency publication, 1-*

A **tractor** is an engineering vehicle specifically designed to deliver a high tractive effort (or torque) at slow speeds, for the purposes of hauling a trailer or machinery used in agriculture or construction. Most commonly, the term is used to describe a farm vehicle that provides the power and traction to mechanize agricultural tasks, especially (and

originally) tillage, but nowadays a great variety of tasks. Agricultural implements may be towed behind or mounted on the tractor, and the tractor may also provide a source of power if the implement is mechanized (Rowbotham, 2008).

The word *tractor* was taken from Latin, being the agent noun of *trahere* "to pull (Talley, 1994). The first recorded use of the word meaning "an engine or vehicle for pulling wagons or ploughs" occurred in 1896, from the earlier term "traction engine" (1859) there are many types of tractors. But the main types are crawler and rubber wheeled tractors (Alderton, 2008).

In parallel with the early portable engine development, many engineers attempted to make them self-propelled – the fore-runners of the traction engine. In most cases this was achieved by fitting a sprocket on the end of the crankshaft, and running a chain from this to a larger sprocket on the rear axle. These experiments met with mixed success (Talley, 1994). The first proper traction engine, in the form recognisable today, was developed in 1859 when British engineer Thomas Aveling modified a Clayton & Shuttleworth portable engine, which had to be hauled from job to job by horses, into a self-propelled one. The alteration was made by fitting a long driving chain between the crankshaft and the rear axle (Rowbotham, 2008).

### **Heavy Duty Forklift System**

Heavy duty Forklift or front-end loader system, in which heavy duty forklift trucks are used to perform quay transfer and yard operation, called direct system or in combination with other equipment called relay system.

A forklift (also called lift truck, jitney, fork truck, fork hoist, and forklift truck) is a powered industrial truck used to lift and move materials over short distances. The forklift was developed in the early 20th century by various companies, including Clark, which made transmissions, and Yale & Towne Manufacturing, which made hoists. Since World War II, the use and development of the forklift truck have greatly expanded worldwide. Forklifts have become an indispensable piece of equipment in manufacturing and warehousing. In 2013, the top 20 manufacturers worldwide posted sales of \$30.4 billion, with 944,405 machines sold (Itsuro, 2003).

Forklifts are rated for loads at a specified maximum weight and a specified forward center of gravity. This information is located on a nameplate provided by the manufacturer, and loads must not exceed these specifications. In many jurisdictions, it is illegal to alter or remove the nameplate without the permission of the forklift manufacturer. An important aspect of forklift operation is that it must have rear-wheel steering. While this increases maneuverability in tight cornering situations, it differs from a driver's traditional experience with other wheeled vehicles. While steering, as there is no caster action, it is unnecessary to apply steering force to maintain a constant rate of turn.

Another critical characteristic of the forklift is its instability. The forklift and load must be considered a unit with a continually varying center of gravity with every movement of the load. A forklift must never negotiate a turn at speed with a raised load, where centrifugal and gravitational forces may combine to cause a disastrous tip-over accident. The forklift is designed with a load limit for the forks which is decreased with fork elevation and undercutting of the load (i.e., when a load does not butt against the fork "L"). A loading plate for loading reference is usually located on the forklift. A forklift should not be used as a personnel lift without the fitting of specific safety equipment, such as a "cherry picker" or "cage" (Jose & Tongzon, 2007).



Figure 2.2: Forklift

Source: Air Resource Board (2015). Technology assessment: Mobile cargo handling equipment.

*California environmental protection agency publication, 1-8*

Forklifts are a critical element of warehouses and distribution centers. It's imperative that these structures be designed to accommodate their efficient and safe movement. In the case of Drive-In/Drive-Thru Racking, a forklift needs to travel inside a storage bay that is multiple pallet positions deep to place or retrieve a pallet. Often, forklift drivers are guided into the bay through guide rails on the floor and the pallet is placed on cantilevered arms or rails. These maneuvers require well-trained operators. Since every pallet requires the truck to enter the storage structure, damage is more common than with other types of storage. In designing a drive-in system, dimensions of the fork truck, including overall width and mast width, must be carefully considered (Air Resource Board, 2015).



Figure 2.3: Dedicated container forklift of the HMNZS Canterbury vessel of the New Zealand Navy

Source: Air Resource Board (2015). Technology assessment: Mobile cargo handling equipment.

*California environmental protection agency publication, 1-8*

Forklift hydraulics are controlled either with levers directly manipulating the hydraulic valves or by electrically controlled actuators, using smaller "finger" levers for control. The latter allows forklift designers more freedom in ergonomic design. Forklift trucks are available in many variations and load capacities. In a typical warehouse setting, most forklifts have load capacities between one and five tons. Larger machines, up to 50 tons lift capacity, are used for lifting heavier loads, including loaded shipping containers (Branch, 2007).

In addition to a control to raise and lower the forks (also known as blades or tines), the operator can tilt the mast to compensate for a load's tendency to angle the blades toward the ground and risk slipping off the forks. Tilt also provides a limited ability to operate on non-level ground. Skilled forklift operators annually compete in obstacle and timed challenges at regional forklift rodeos.

The following is a list, in no particular order, of the more common lift truck types (Jose & Tongzon, 2007): Hand pallet truck – no onboard power system of any kind; the operator's muscle power is used to jack-up and move loads. Walkie low lift truck – powered pallet truck, usually electrically powered, Rider low lift truck- usually electrically powered, Towing tractor – may be internal combustion engine or electrically powered, Walkie stacker – usually electrically powered, Rider stacker – usually electrically powered, Reach truck – variant on a Rider Stacker forklift, designed for small aisles, usually Electrically Powered, named because the forks can extend to reach the load. There are two variants, moving carriage, which is common in North America, and moving mast which is common in the rest of the world, and generally regarded as safer (Itsuro, 2003).

A lot of terminal or port cargo handling equipment is provided to facilitate movement of the cargo to and from the ship's side and the transit shed, warehouse, barge, railway wagon or road vehicle. These include two-wheeled hand barrows and four-wheeled trucks either manually or mechanically propelled, and mechanically or electrically propelled tractors for hauling four-wheeled trailers. Ro-ro trailers are moved by tug-masters or ro-ro tractors. There are also belt conveyors mechanically or electrically operated, or rollers, all perhaps extending from the quayside to the transit shed, warehouse, railway wagon or road vehicle. Containers are loaded and unloaded by means of the quayside container cranes, i.e. container gantries also called shiptainers (Air Resource Board, 2015).

### **Empirical Studies**

A search for literature has shown that several attempts had been made by scholars to contribute knowledge to the development of the maritime industry in Nigeria. Several studies had also been undertaken by erudite researchers across different maritime economies of the world. Past studies were extensive in that they covered both port and shipping operations of different maritime nations of the world. Olaogbeikan, Njoku, Faniran and Okoko (2014) carried out an evaluation of the performance of Nigerian ports before and after concession policy of the year 2006. The study found that cargo throughput has continued to increase from 2006 probably as a result of the concession policy.

Ndikom's (2013) evaluation of the challenges and opportunities for shipping lines services in Nigeria concluded that a significant relationship existed between government policies and shipping operations; the activities of pirates and the profitability of shipping lines; and that adequate cargo handling machines led to faster turn-round time of vessels at seaports. The focus of the study of Stephens and Ukpere (2011) was to establish the relationship between land transport systems in the country of destination and the turn-around time, capacity utilisation of port infrastructure, facilities and cargo-handling equipment and general port performance. Using Apapa Port Complex as a case study, Emaghara and Ndikom (2012) linked delays at seaports in Nigeria to inadequate functional cargo handling equipment as the most critical factor causing delays at the port. The researchers concluded as follows: "though the private operators have invested resources in the procurement of cargo handling equipment in both quantity and quality, the result is not yet significant because private terminal operators still rely mostly on the outdated and obsolete equipment inherited from Nigerian ports authority (NPA) during the concession arrangement". It is evident that private terminal operators no longer depend on the outdated and obsolete equipment inherited from NPA as the results of their investment has yielded into equipment with new technologies that requires special technical know-how. The high technical demand of the new equipment is throwing a lot of challenges at efficient operation of cargo handling equipment at the port's terminals (Gidado, 2015).

Alderton (2013) has studied the role of cargo handling equipment to port performance. Their main concern was why cargo spends weeks in Sub-Saharan African ports. Their findings suggest that there is a problem of cargo handling equipment in many of the African ports. In fact, their findings influence the will to undertake the study of this kind as they noted that; the case of cargo dwell times is an illustration of a more general problem in African port developments. Most, if not all, the binding constraints to grow such infrastructure are the result of an equilibrium in which certain actors cause of problem. One of the resulting problems is the delay in cargo clearance and delivery.

According to them, the process of cargo clearance in its international standards should take three to four days. But this is not in case of African port where the processes take 15 days to three week. Their assumption is dwell time and clearance time is a major commercial instrument used to attract cargo and revenues. There has major concern worldwide about the role of cargo handling equipment to port performance. In so doing several researchers, author and organization have attempted to research about this topic. One among them is Rigout (2012), in his study on the effect of container terminal concessions on port performance; analyzed the way cargo handling equipment contributes to port performance. In a similar manner Du, Wang, Tripathi and Lam (2016), explain that the backbone of ports is cargo handling equipment. His study continues to note that the port performance indicators that focus on the cargo-handling

product are very important to analyze. The study provides three possible indicators concerning cargo-handling products. However, it is noted that Port throughput is the most widely used in the port industry since it can be measured uniformly. Also, port throughput, to a large extent, is a determinant for the other port performance indicators. For example, the size of logistics space depends on port throughput volumes. If a port has higher throughput volumes, the logistics capacity has to increase with the throughput volumes.

According to him, this also applies for the value added generated in the ports and the port related employment. Other potential indicators can be found in Chung's division of indicators Denis (2014) states that to evaluate the operational performance, the ship turn-around time is a good indicator. However, the ship turn-around time does, in its basic form, not mean much. The vessels' length of stay depends on the volume of the cargo, the available facilities and the composition of the cargo (Chung, 1993). Tonnage handled per ship day or ship hour is obtained by dividing the port throughput measured in tonnages by the total number of hours that the vessels are in the port. Chung furthermore states that the asset performance is influenced by the total port throughput: generally, this is measured as total throughput divided by the meters of quay or number of berths. To make the financial performances comparable with other ports, they are stated relatively, meaning in ratio to the port throughput. In general, the other port indicators are (indirectly) determined by port throughput.

Likewise, the literature by Talley (2007) provides important information about cargo handling equipment to port performance worldwide. The study assumes that performance indicators are choice variables for optimizing the port's economic objective. As noted by Tongzon (1995) using port throughput as port performance is based on the assumption that ports try to maximize throughput. Traditionally the performance of ports has been evaluated by comparing the actual throughput with its optimum throughput (Talley, 2007). However, "if performance indicator standards are unknown, a port's performance can be evaluated just by knowing the actual values of its performance indicators".

UNCTAD (2012) have also discussed about cargo handling equipment to port performance worldwide. Their assumption is cargo handling equipment plays a key role in the port performance and subsequently in economy and development. The study continues to note worldwide large percent of trade is handled in ports. This implies that cargo handling equipment through port is the most efficient way in logistics and transportation.

In a similar manner Song and Allen (2013) have also studied about the factors influences port performance. The findings of his study suggest that berth utilization, frequency with which shipping lines call at a port, geographical location of a port and economic activities of a port hinterlands influences performance of a port. Though this study agrees with him on the above outlined factors, his analysis has not considered the importance or contribution of cargo handling equipment factors to port performance. The assumption is business environment around ports have changed rapidly competition among port has become intense. In this case, this study aimed at analyzing the contribution of cargo handling equipment to port performance because.

Therefore, the summary derived from above empirical literature review worldwide shows that cargo handling equipment is the backbone of port. Hence, its performance indicators is determined by the following performance indicators such as the size of logistics space on port throughput volumes, the port related employment, the operational performance and the ship turn-around time is a good indicator. Others include vessels' length of stay, the available facilities and the composition of the cargo and the tonnage handled per ship day or ship hour is

obtained.

The study, the study by Kiwanuka (2013) shows that, despite the fact that Dar es Salaam port favored with geographical location and other services relevant to port operation, yet, recently, several countries and customers shifted to Mombasa. However, the study suggests for improving efficiency in cargo handling equipment as a necessary condition in improving the port performance. Therefore, similar to the role of cargo handling equipment to port performance worldwide, it seems also the backbone of port in Africa is cargo handling. Another study by African Development Bank (2010) explained about the contribution of cargo handling equipment to port performance. The study suggests that approximately 80 percent of world merchandise trade carried by ships, maritime transport remains by far the most common mode of international freight transport.

Resulting from the empirical studies, the following hypotheses are hereby stated to be tested:

**H<sub>01</sub>:** There is no significant relationship between tractor-trailer system and efficient cargo delivery in Nigerian Ports.

**H<sub>02</sub>:** There is no significant relationship between heavy duty forklift system and cargo turnaround time in Nigerian Ports.

## METHODOLOGY

The study adopted the cross-sectional survey in its investigation of the variables. Primary source of data was generated through self-administered questionnaire. The population of the study was 2,416 employees of six ports in Nigeria including Abuja office. The sample size of 344 was determined using the Taro Yamane's formula for sample size determination. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. Data generated were analyzed and presented using both descriptive and inferential statistical techniques. The hypotheses were tested using the Spearman's Rank Order Correlation Statistics. The tests were carried out at a 95% confidence interval and a 0.05 level of significance.

## DATA ANALYSIS AND RESULTS

The level of significance 0.05 was adopted as a criterion for the probability of accepting the null hypothesis in ( $p > 0.05$ ) or rejecting the null hypothesis in ( $p < 0.05$ ).

**Table 1 Correlation matrix for Tractor-Trailer System and efficient cargo delivery**

			Tractor-Trailer System	Efficient Cargo Delivery
Spearman's rho	Tractor-Trailer System	Correlation Coefficient	1.000	.740**
		Sig. (2-tailed)	.	.000
		N	325	325
	Efficient Cargo Delivery	Correlation Coefficient	.740**	1.000
		Sig. (2-tailed)	.000	.
		N	325	325

\*\*. Correlation is significant at the 0.01 level (2-tailed).

**Source: Research Data 2019, (SPSS output version 23.0)**



***H<sub>01</sub>: There is no significant relationship between tractor-trailer system and efficient cargo delivery in Nigerian Ports.***

Table 1 shows the result of correlation matrix obtained for tractor-trailer system and efficient cargo delivery. Similarly displayed in the table is the statistical test of significance (p - value), which makes possible the generalization of our findings to the study population. From the result obtained in table 1 above, the correlation coefficient (rho) showed that there is a significant relationship between tractor-trailer system and efficient cargo delivery. The correlation coefficient of 0.740 confirms the extent and strength of this relationship and it is significant at  $p < 0.000 < 0.01$ . The coefficient represents a strong correlation between the variables. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate upheld. Thus, there is a significant relationship between tractor-trailer system and efficient cargo delivery in Nigerian Ports.

***Table 2 Correlation for Heavy Duty Forklift System and measures of efficient cargo delivery***

			Heavy Duty Forklift	Efficient Cargo Delivery
Spearman's rho	Heavy Duty Forklift	Correlation Coefficient	1.000	.818**
		Sig. (2-tailed)	.	.000
		N	325	325
	Efficient Cargo Delivery	Correlation Coefficient	.818**	1.000
		Sig. (2-tailed)	.000	.
		N	325	325

\*\* . Correlation is significant at the 0.01 level (2-tailed).

***Source: Research Data 2019, (SPSS output version 23.0)***

***H<sub>02</sub>: There is no significant relationship between heavy duty forklift and efficient cargo delivery in Nigerian Ports.***

Table 2 shows the result of correlation matrix obtained for tractor-trailer system and efficient cargo delivery. Similarly displayed in the table is the statistical test of significance (p - value), which makes possible the generalization of our findings to the study population. From the result obtained in table 1 above, the correlation coefficient (rho) showed that there is a significant relationship between tractor-trailer system and efficient cargo delivery. The correlation coefficient of 0.818 confirms the extent and strength of this relationship and it is significant at  $p < 0.000 < 0.01$ . The coefficient represents a strong correlation between the variables. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate upheld. Thus, there is a significant relationship between tractor-trailer system and efficient cargo delivery in Nigerian Ports.

## **DISCUSSION OF FINDINGS**

### **Discussion of Findings**

The findings of the study revealed that there is a significant relationship between cargo handling equipment and efficient cargo delivery in Nigerian Ports using the Spearman Rank Order Correlation tool and at a 95% confidence interval. The findings of this study confirmed the views of Olaogbebikan, Njoku, Faniran and Okoko (2014) carried out an evaluation of the performance of Nigerian ports before and after concession policy of the year 2006. The study found that cargo throughput has continued to increase from 2006 probably as a result of the concession policy.

Also, the current finding is in line with Ndikom's (2013) evaluation of the challenges and opportunities for shipping lines services in Nigeria concluded that a significant relationship existed between government policies and shipping operations; the activities of pirates and the profitability of shipping lines; and that adequate cargo handling machines led to faster turn-round time of vessels at seaports. The focus of the study of Stephens and Ukpere (2011) was to establish the relationship between land transport systems in the country of destination and the turn-around time, capacity utilisation of port infrastructure, facilities and cargo-handling equipment and general port performance. Using Apapa Port Complex as a case study, Emaghara and Ndikom (2012) linked delays at seaports in Nigeria to inadequate functional cargo handling equipment as the most critical factor causing delays at the port. The researchers concluded as follows: "though the private operators have invested resources in the procurement of cargo handling equipment in both quantity and quality, the result is not yet significant because private terminal operators still rely mostly on the outdated and obsolete equipment inherited from Nigerian ports authority (NPA) during the concession arrangement". It is evident that private terminal operators no longer depend on the outdated and obsolete equipment inherited from NPA as the results of their investment has yielded into equipment with new technologies that requires special technical know-how. The high technical demand of the new equipment is throwing a lot of challenges at efficient operation of cargo handling equipment at the port's terminals (Usman, 2015).

Kiwanuka (2013) used a case study approach to analyze the effects of cargo handling equipment to port performance. His findings showed that there is a problem in cargo handling equipment especially in the port of Dares Salaam. Among the greatest problem identified are cargo clearances. The study continues to note that in the port of Dar es Salaam it takes between ten to fifteen days for one to clear the cargo. He identified that several countries which were served their cargo to Dares Salaam port were now shifted to Mombasa. This is different from port in Western countries, as noted by UNCTAD (2012) that at international standard cargo clearance should take between two to three days.

## **CONCLUSION**

Cargo handling equipment enhances such as aspects of port operation as schedule of arriving vessels, allocation of wharf space and quay crane resources to service the vessels. They similarly enhance ship operations, especially loading and unloading of cargoes (Somuyiwa and Akindele, 2015). The efficiency of terminal operations is important for cargo transshipment that will ensure Nigeria ports comply with the 48 hours cargo clearance rule of the International Maritime Organisation (IMO). Cargo handling equipment is important at the port because the pieces determine the operations at the quay and moreover in the sheds. In the port, the equipment used

includes mobile cranes, forklifts and betotti. These, though still in use in ports of the world they need to be supplemented in the port with modern equipment to be efficient. Modern ships require modern equipment for operations because of their design. Based on the findings, this study concludes that cargo handling equipment significantly influences efficient cargo delivery in Nigerian Ports.

## RECOMMENDATIONS

- i. Management of ports in Nigeria should devise strategies for successful operation of handling equipment which should involve devising ways to compensate for a number of factors that, individually or in combination, act to reduce the efficiency of their equipment. This should be done with a view to avoiding misuse of equipment, while adequate workshops and spare parts are provided.
- ii. Management of ports in Nigeria should provide the technical know-how for efficient operation of equipment through training and retraining of staff. This should be complemented by the provision of workshop facilities and spare parts capable of bringing about servicing and maintenance of equipment.

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# Achieving Sustainable Development Goals through Financial Inclusion: A Review of the Literature

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**Abstract:** *The study reviewed the role financial inclusion can play to advance the achievement of Sustainable Development Goals (SDGs). The methodology adopted is essentially a historical review of the literature. The Millennium Development Goals (MDGs) programme was launched in 2000 by the United Nations General Assembly. Eight goals were involved to tackle the scourge of poverty and other social ills that beset human life world-wide, especially among very poor nations. The MDGs scheme ended in 2015 and the United Nations wanted to sustain the goals by introducing Sustainable development Goals (SDGs). Seventeen goals were introduced. Researchers argued that financial inclusion should be included as one of the goals. But this suggestion was not adopted. Rather the argument shifted to the role that it could play in the attainment of the SDGs. The conclusion was that financial inclusion has positive contribution to make the attainment of the goals. The paper recommended that government should adopt the policy of financial inclusion to drive the pursuit of the SDGs. Furthermore, ways should be developed to get the private sector involved in the pursuit of the SDGs especially as part of its Corporate Social Responsibility (CSR).*

**Keywords:** *Millennium Development Goals, Sustainable Development Goals, Financial Inclusion, Global Partnership, Climate Change, United Nations.*

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## Section a: Introduction

The Millennium Development Goals (MDGs) programme was introduced into the international scene in 2000 by the United Nations General Assembly. By the goals, 189 countries including Nigeria agreed to seriously pursue objectives to lift their citizens to achieve high standards of living and reduce poverty at the global level. Developing nations which were known to be at the lowest level of development were to be the main targets in pursuit of the goals. Developed countries, that are better off were to serve as helping partners in the achievement of the goals. Eight broad goals were identified to be pursued to encourage development in economic and social conditions especially in the world's poorest nations.

United Nations Development Programme (UNDP, 2000) reported the eight goals as:

**Goal 1:** Eradicate extreme poverty and hunger by pursuing the special goals of reducing half the population of people living below \$1.25 per day; achieve decent employment for women, men and young people and reduce by half the population of people who suffer absolute hunger.

**Goal 2:** Achieve universal primary education. More specifically all children should be able to attain primary education.

**Goal 3:** This is to promote gender equality and empower women. Here the target is to eliminate gender disparity in primary and secondary education.

**Goal 4:** Is to reduce child mortality rate. The target is to reduce mortality under five years.

**Goal 6:** Combat HIV/AIDS, malaria and other diseases. The target is to halve and begin to reverse the spread of HIV/AIDS among the prevalent age group of 15 – 24 years. There is to be free treatment for HIV/AIDS. There also should be move to halve the spread of malaria and other major diseases.

**Goal 7:** Was to ensure environmental sustainability. Specifically, there was a move to integrate the principles of sustainable development into member nations' policies and programmes; reverse the loss of environmental resources and reduce biodiversity loss. By end of 2015 every country (developing countries) should halve the proportion of the population without access to safe drinking water and basic sanitation.

**Goal 8:** Was to develop a global partnership for development. There should be a target of achieving an open, ruler-based, predictable and non-discriminating trading and financial system. There also should be a target of comprehensively dealing with the issues of foreign debts of Highly Indebted Poor Countries (HIPCs).

As the Millennium Development Goals (MDGs) scheme came to a close in 2015, the member nations of the United Nations General Assembly resolved to sustain the goals (however small) of the MDGs scheme. This led to the introduction of Sustainable Development Goals (SDGs). The concept of sustainable development involved the position that the present generation should utilize existing resources in such a way that future generations should also have access to resources for their use. According to Hasna (2007) sustainability implies simultaneous pursuit of economic prosperity, environmental quality and social equity. These are popularly referred to as the "triple bottom line". According Rio +20 Outcome (2013), the 8 goals of MDGs are expanded to seventeen to be pursued from 2016 – 2030. The seventeen SDGs are stated below:

**Goal 1:** End poverty in all forms everywhere.

**Goal 2:** End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

**Goals 3:** Ensure healthy living and promote well being for all including reduction of material mortality and eliminate deaths of children under five years.

**Goal 4:** Ensure inclusive and equitable quality education and promote life-long learning opportunities for all.

**Goal 5:** Achieve gender equality and empower women. That means end all forms of discrimination against females.

**Goal 6:** Ensure availability and sustainable management of safe drinking water and sanitation for all.

**Goal 7:** Ensure access to affordable reliable modern renewal energy and safe environment for all.

**Goal 8:** Promote sustained inclusive and sustainable economic growth rate envisaged at 7% P.a.

**Goal 9:** Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

**Goal10:** Reduce inequality within and among nations.

**Goal 11:** make cities and human settlements safe.

**Goal 12:** Ensure sustainable consumption and production patterns.

**Goal 13:** Combat climate change and its impacts.

**Goal 14:** Conserve and sustain safe use of oceans, seas, lakes and marine resources.

**Goal 15:** Protect and promote sustainable use of terrestrial ecosystems, combat desertification and halt biodiversity loss.

**Goal 16:** Promote peaceful and inclusive societies, provide access to justice for all.

**Goal 17:** Strengthen and revitalize global partnership for all nations.

### **Statement of Problem**

The main responsibility of achieving Sustainable Development Goals (SDGs) lies with the various national governments of members of the United Nations. There are, however, other stake-holders and agents who can play important roles for effective implementation of the SDGs. Nelson and Prescott (2013) argue that apart from the crucial role of governments, there are others who can take part in the implementation of the MDGs and subsequent SDGs. Achieving SDGs involves the application of good governance, upholding of the rule of law, human rights and tackling of corruption and conflicts. Apart from these, it is now seriously argued that financial inclusion should serve to support the achievements of Sustainable Development Goals (SDGs). Were (2015) has argued that although financial inclusion is not included as one of the SDGs, but it is perhaps, crucial and critical to support the realization of the goals. Similarly, UNCDF (2016) has opined that financial inclusion models can support the achievement of overall economic growth and the achievement of wider development goals. It will also create stable financial and economic systems, help to mobilize domestic resources through national savings and help to boost government revenue.

In view this background this study has been undertaken to review the ways and manners that financial inclusion can act towards the achievement of the SDGs. The study involves extensive review of literature to have an overview of how financial inclusion, although not one of the goals, can be critical in the achievement of the goals.

The main objective is to have an overview of how SDGs can be achieved as we are still at the early stage of the fifteen years project that terminates in 2030.

The methodology of the study is essentially theoretical and discursive in approach. That means the study is a review of existing literature, discussion of ideas and comments of goals and targets as set out in the Sustainable Development Goals Objectives.

The plan of the study is in sections:

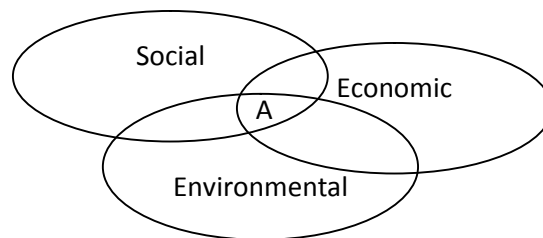
- (a) Introduction dealing with points discussed so far.
- (b) This section deals with a review of related literature on financial inclusion and sustainable Development Goals (SDGs).
- (c) Section (c) deals with discussions on issues of financial inclusion and Sustainable Development Goals.
- (d) This section deals with conclusion and recommendation(s).

### **Section b: Review of Related Literature**

To start with, we review conceptual issues involved. Sustainable Development is a concept that has dominated international political and economic domain for past several decades. It can be said to be extension of economic development which can be said to be sustained, concerted actions of a nation's rulers and policymakers to promote actions and policies to improve living standards of the citizenry. Sustainable economic development can be quantitative and qualitative changes for a nation ranging from Gross Domestic Product (GDP), per capita income, human capital development, critical infrastructure, social inclusion, health and other

initiatives to improve human living standards. According to Myint (2014), economic development can be seen as a process whereby low income countries are transformed into modern economies. Economic development matters assumed unprecedented importance after World War II when colonial nations rose to demand for political independence. These former colonial peoples were trapped in vicious circles of poverty characterized by low income levels, low capital accumulation, low level of productivity, high unemployment and high population growth rate. Economic development is then aimed at breaking out of the vicious circles.

Sustainable development arose from the concept of economic development. It aims at maintaining the ability of nature to provide natural resources and ecosystems on which the human society depends. Bruntland Commission Report (1987) came up with the concept of sustainable development which it defined as development that meets the needs of the present which also provides for the needs of future generations. Hasna (2007) and UN (2006) explained sustainable in terms of “triple bottom line”. This refers to process of resolving conflicts between three competing goals of economic prosperity, environmental equality and social equity. The triple bottom line has been explained as in the diagram below:-



**Source:** <http://en.wikipedia.org/wiki/sustainabledevelopment> accessed 29/9/2017

The diagram shows that each of three factors poses challenges to the society. The meeting point is only in point A.

Financial inclusion is a very important issue among developing countries today. Onaolayo (2015) defines financial inclusion as a process which ensures easy access, availability and use of formal financial system by adults of a country. It can also be seen as a situation where financial services mainly through the financial system are available to all adults of a country. Kama and Adigun (2013) say the financial inclusion is a situation where financial services are delivered by a wide range of providers to reach everyone who has need for them.

In Nigeria, the precursor financial policy and activities by the government can be said to have started in 1977 when the Federal Government introduced Rural Banking Policy. By this, big commercial banks especially, First Bank, Union Bank and United Bank for Africa were mandated to open branches in rural areas. Although the rural branches operated at losses to the banks, the government's intention was to try as much as possible to get banking services available to rural dwellers. Later as part of this intention, People's Bank was set up by the Federal Government. The Banks opened branches in areas ignored by commercial banks. In furtherance of achieving the objectives of financial inclusion (although mention of this was not explicitly stated), Community Banks were organized by various communities with counterpart funding from the government. About 2006, the government transformed community banks to Microfinance Banks. Capital base was raised from ₦1m to ₦20m.



Not until 2012 did the government make a formal launching of the policy of financial inclusion. The National Financial Inclusion Strategy Summary Report (2012) was launched. The Strategy Report stated that financial inclusion is based on some of these criteria:

- a. Financial products must be within easy reach for all groups and should avoid onerous requirement.
- b. It should imply access to a wide range of financial services such as payments, current account, savings account, credits and pension schemes.
- c. It's products and services should be designed according to targeted clients' needs.
- d. Financial services should involve affordable costs especially interest rates.

Umeora (2015) listed some strategies of achieving financial inclusion to include:

- a. Agent Banking which involves the delivery of banking services outside normal traditional bank services through some agents in areas where the banking is not represented. The most current outstanding operator of this system is First Bank operating "First Money Agent" in selected rural areas. The agents link to the principal through Point Of Sale (POS).
- b. Mobile Banking/Mobile Payments through the use of mobile phones with or without the use of tokens.
- c. There is the linkage models which involve arrangements between traditional banks and those not strictly in core banking such as Microfinance Bank.

EFINA (2010) noted some barriers to financial inclusion in Nigeria. Some of these are:

- a. Demand – side barriers which arise from some factors such as loss of employment and irregular income.
- b. Supply – side barriers which can result from long distance between financial services providers and the beneficiaries.
- c. Regulatory barriers come about in forms of cumbersome requirements imposed by regulators such as requirements of Know Your Customers (KYC).

Other empirical works on financial inclusion are reviewed here. Nwankwo and Nwankwo (2014) studied sustainability of financial inclusion on rural dwellers in Nigeria: problems and the way forward. They focused on the services of deposit money banks (commercial banks) and microfinance banks as regards financial intermediation to rural dwellers. They used Pearson Product Moment-correlation method to examine any relationship existing between rural people's use of financial inclusion as their productivity. They found out that most people were aware of the existence of banking services but are not easily persuaded to adopt full scale involvement. They concluded that financial institutions are not enough to ensure full financial inclusion.

Oruo (2013) examined the relationship between financial inclusion and Gross Domestic Product (GDP) in Kenya. Adopting a descriptive survey research design, the study concluded that gross domestic product has a strong positive relationship with financial inclusion in Kenya.

Shabria (2014) studied financial inclusion and vicious circle of poverty and unemployment in India. His study was a review of existing literature. He found out from the literature that people's increasing savings and investment will be a serious way of tackling the endemic poverty and unemployment.

Abiola, Folashade and Onankhanlen (2015) studied financial inclusion and economic growth in Nigeria for the period 1982 – 2012. They discovered that inclusive financial services greatly influenced reduction of poverty.

Okaro (2016) investigated financial inclusion and its effect on the Nigerian economy. He sued financial inclusion to be represented by such financial products as savings, Current

Accounts, banks credit to the private sector insurance and pensions payments. He applied Ordinary Least Squares (OLS) techniques and found out that financial intermediation, financial deepening and financial infrastructure all have positive and significant effect on the economy represented by economic growth.

### **Section c: Discussion**

In this section we take a look the issue of how financial inclusion can help to achieve sustainable development goals which is what this paper has set out to investigate. This is done through examination of the literature.

Were(2015) observes that although the world leaders did not adopt Financial Inclusion as one of the goals of Sustainable Development Goals, it is nevertheless crucial in the attainment of the goals such as abolition of extreme poverty, fight against inequality, justice and climate change. Financial inclusion, he opines, is making available access to affordable, sustainable and qualitative financial services and products to all especially underprivileged segments of the society. He further adds that having availability of financial products and services, such as banking services, insurances and others, enable people to deal with system shocks that adversely affect them and exposing them to untold hardships.

An arm of the United Nations, UNCDF (2016) states that it is leveraging on its innovative models under SDG<sub>17</sub> to contribute to SDG<sub>1</sub> on poverty eradication. It aims at using Financial Inclusion models to support economic growth and achieve wide development goals of the SDG programme. UNCDF adopts approaches such as:

- (i) Financial Inclusion that ensures that individuals, especially the poor and disadvantaged, have access to wide range of financial services and products at reasonable costs.
- (ii) UNCDF, in pursuit of financial inclusion, has supported programmes in 31 least developed countries (LDCs) with 20 in sub-Saharan African countries.
- (iii) Furthermore, UNCDF provides seed capital and technical support by the process of inclusive finance so as to ensure that more households and small businesses get finance to expand business opportunities.

Queen Maxima (2016) speaking at the United Nation's Secretary Generals Special Advocate Report (UNSGSA) says that SDGs imply that financial inclusion is a catalytic agent to advance human development. According to her, data are available to suggest that universal financial inclusion is possible and can help to identify needs of communities and making notable progress in achieving SDGs. UNSGSA is capable of strengthening the links between financial inclusion and development outcomes. The end point is for the UNSGSA to go more deeply into how the agency can deliver real values to the poor people, expand gender equality and other goals of SDGs. In other studies, UNSGSA indentified eleven goals where financial inclusion will very helpful. Let us briefly see them.

**SDG Goal 1** - No poverty. Financial inclusion will help people climb out of poverty hole by accumulating more savings smooth consumption, accumulate assets and invest in human capital development such as health and education.

**SDG Goal 2** – Zero hunger. Farmers will get access to finance to improve farm yields and preservation to survive bad harvest.

**SDG Goal 3** – Good Health and Wellbeing. Financial inclusion will enable people to manage their medical expenses. Some countries such as Nigeria have tried to tackle this goal by introducing Health Insurance schemes.

**SDG Goal 4 – Quality Education.** Financial inclusion will help people to achieve learning which goes to support the belief that human capital development is key to economic growth and development.

**SDG Goal 5 – Gender Equality.** Financial inclusion for women will enable them assert their economic power and improve gender equality.

**SDG Goal 6 – Clean Water and Sanitation and**

**SDG Goal 7 – Affordable and Clean Energy.**

Financial inclusion will help reduce prohibitive cost of providing infrastructure in water, electricity and clean energy that reduce such polluting energy sources such as firewood.

**SDG Goal 8 - Decent Work and Economic Growth.** Financial inclusion will lead to increases in returns on investment and income thereby affecting economic growth.

**SDG Goal 9 - Industry, Innovation and Infrastructure** Access to financial services such as credits will get more businesses to start and existing ones to expand. Overall effect is that there will be expansion in the number of small and medium scale businesses that create more jobs.

**SDG Goal 10 – Reduced Inequalities and SDG Goal 16 – Peace, Justice and strong institutions.** The world, both developed and developing are bedeviled by striking inequalities and instability. Financial inclusion will help reduce inequality (SDG 10) and promote peace and stability (SDG 16). UNSGSA in conclusion encourages governments to push for more financial inclusion.

Global Impact Investing Network (GIIN) (2016) as a network of impact strategic investors encourage capital investment in areas which deal with SDGs. The main areas are climate change, reduction of poverty and financial inclusion, which although is not mentioned as a specific goal of SDGs, but nevertheless has a pivotal role to play in the achievement of many of the goals. GIIN (2016) opines that financial inclusion empowers people, firms and countries to achieve their full economic potentials and achieve areas of SDGs. It further says that if the impact objective (financial inclusion) are pursued, they will result in achieving eleven out of seventeen objectives of SDGs. The goals identified are goals 1, 2, 3, 4, 5, 8, 9, 10, 11, 16 and 17.

Dafe and Volz (2015) investigating the role of central banks in global development state that central banks can help enhance the achievement of SDGs. Central banks can and should look beyond well known macroeconomic targets and make policies directed at financial development, financial inclusion and aligning the financial system with achieving SDGs. They observe that an increasing number of central banks and financial regulators have become more involved to promote financial inclusion. At home in Nigeria, the government is trying to achieve the SDGs but seeks to build on and possibly complete the unfinished business of the predecessor Millennium Development Goals (MDGs), (Nigeria Roads to the SDGs, 2015). The road map states that it is not enough to jump from MDGs to SDGs but that if the experience is properly harnessed, it should provide the foundation for achieving the SDGs. To show its commitment to financial inclusion as a strong pillar of achieving the SDGs, the federal government under the Goodluck Jonathan Administration launched the Nigerian Financial Inclusion Policy in 2015. This was at the end of the period of MDGs and the inception of the SDGs. That was also the year when his administration was replaced by the present administration of Muhammadu Buhari.

### **Problems Hindering Financial Inclusion and SDGs**

It is largely agreed that financial inclusion is a very strong pillar for achieving SDGs. However, UNSGSA (2016) points at some issues that remain unresolved especially gender

inequality which it refers to as gender gap in financial inclusion. This sort of gender financial exclusion is most prevalent in developing countries.

Another problem facing financial inclusion is what some banks call “de-risking” which is financial discrimination against lines of business including women that the banks consider high risks relative to their profitability. Since banks are crucial in financial inclusion, such attitude will hamper the full achievement of the goals of financial inclusion and SDGs.

There is also the problem of ensuring stakeholders monitor social goals including setting social and financial goals that focus on goal areas. In other words, achieving financial inclusion is to be pursued not as an end but as a means to an end. According to Social Performance Task Force (2015) (SPTF) performances including adoption of financial inclusion should not be mere intent but affective achievement of stated goals.

#### **Section d: Conclusion and Recommendation**

We conclude by emphasizing that financial inclusion can play vital roles in the attainment of the Sustainable Development Goals (SDGs). The United Nation General Assembly in 2000 launched eight goals to be achieved under Millennium Development Goals (MDGs) over a period of fifteen years to terminate in 2015. At the end of the MDGs, the United Nation wanted to extend the spirit of development achieved. A new phase called Sustainable Development Goals (SDGs) was introduced to encompass seventeen goals to last for another 30 years, (2016–2030).

At early stage of the discussion on SDGs, it was argued that financial inclusion should be included as one of the goals to be pursued. However, financial inclusion did not make it as a goal, but it has been generally agreed that it has positive correlation between it and lowering inequalities and promote pro-poor growth (UNCDF 2016,1). UNSGA (2016:5) also emphasize the importance of financial inclusion which it said although it is not a goal ‘per se’ but a powerful engine of progress. Generally then, there was agreement that financial inclusion can in various ways assist substantially in the achievement of Sustainable Development Goals.

In the face of overwhelming arguments and agreements on the importance of financial inclusion on the achievement of Sustainable Development Goals, this paper recommends that all governments, should seriously adopt the policy of financial inclusion. In Nigeria, the government has introduced the Financial Inclusion Policy. As Nigeria’s road to the SDGs (2015) states, it will leverage on the achievements of MDGs and pursue the SDGs. It should vigorously pursue the SDGs which its policy states that the SDGs should provide more impetus that may not necessitate a wholesale adopting of new skills. It goes without saying the issues of SDGs should not be politicized even with the change of government at the centre.

In addition, the paper recommends a very important role for participation by the private sector. From the look of things the SDGs appear to be sole government business. Private businesses can adopt some goals as part of their Corporate Social Responsibility (CSR). This is in agreement with the views of Nelson and Prescott (2003) who during the MDGs stated that although the government has crucial role to play, there are other stakeholders who should play some roles.

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# Cargo Insurance Services and Sea Port Operational Efficiency in Nigeria

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**Abstract:** *The study examined the relationship between cargo insurance services and sea-port operational efficiency in Nigeria. The study adopted a cross-sectional survey in its investigation of the variables. Primary data was generated through self-administered questionnaire. The study population was made up of all the six major ports in Nigeria. Thirty copies of the research instrument were distributed to 30 senior managers/supervisors of the six major ports in Nigeria. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. The study stated and tested six hypotheses. The hypotheses were tested using Pearson Product Moment correlation analysis with the aid of Statistical Package for Social Sciences version 23.0. The tests were carried out at a 95% confidence interval and a 0.05 level of significance. The result of the tested hypotheses shows a positive relationship between cargo insurance services and sea-port operational efficiency in Nigeria. Therefore, the study concludes that there is a moderate positive relationship between cargo insurance services and sea-port operational efficiency in Nigeria. Deriving from the findings and conclusion, the study recommends that companies operating at the sea port should ensure that they take comprehensive insurance policy to cover all the goods that are been handle by the ship, the crane and the land transport for efficient sea-port operations and that the insurance services should also cover the container dwell time in such a manner that if the goods stayed beyond the expected time at the sea-port such goods should be covered under comprehensive insurance.*

**Keywords:** *Cargo Insurance Services, Sea-Port Operational Efficiency, Quay Crane, Container Dwell Time, Infrastructure.*

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## INTRODUCTION

Risk and uncertainty are two most fundamental facts of life. We all know that the one event which is certain about our lives on this planet is that one day we will die, but the actual date, time and circumstances of our deaths remain in the realms of uncertainty. Despite, the certainty of ultimate death which most of us prefer not to contemplate, everything else about our lives and future remain uncertain (Irukwu, 1996). Irukwu further opined that having recognised this element of risk and uncertainty as inevitable features of our lives coupled with the fact that we do not know what the future will bring then as intelligent, rational and creative beings, we have had to devise methods of combating and responding to the possible adverse effects of this permanent feature of risk and uncertainty. The most important responses to risk and uncertainty is insurance.

Marine cargo insurance is a contract whereby the insurer undertakes to indemnify the assured, in manner and to the extent thereby agreed against marine losses, that is to say, the

losses incident to marine adventure (Marine Insurance Act 1906, S.1). Indemnity is provided against the majority of losses which can occur during transit. The marine insurance market comprises insurance companies, Lloyds underwriters and private underwriters and in practice, each insurer pools the premiums received from the insured in order to pay claims and expenses, to build reserve fund against future losses and to secure a small margin of profit, hence insurance is said to be based on the principles of contribution (Harrington et al., 2004 cited in Nwokoro & Ndikom, 2012).

One of the oldest forms of insurance is marine insurance. The development of marine insurance is as old the beginning of international travel. Marine insurance is provided to ships, boats and most importantly, the cargo that is carried in them (Kokumo, 1998). It is the agreement between a ship owner and an insurer in which the latter agrees to indemnify the former in the event of loss. The Nigerian Marine Insurance Act, 1961, defines marine insurance as a contract whereby the insurer undertakes to indemnify the assured, in manner and to the extent thereby agreed, against marine losses, that is to say, the losses incident to marine adventure. Marine insurance has resonated so well in some countries that it contributes significantly to their GDP. The International Union of Marine Insurance (IUMI) puts the global marine insurance premium in 2014 at USD32.6 billion.

According to a study conducted by Oxford Economics, 37% of maritime business services in EU are in marine insurance. Marine insurance services alone contributed £2 billion to the UK's economy in 2013. In developed countries the growth of maritime sector automatically translates to the growth of other ancillary services. The sad news is that the state of marine insurance in Nigeria is abysmally poor, which is a reflection of the overall insurance sector and the underdeveloped nature of our maritime industry.

Apart from the scant awareness and patronage of marine insurance in Nigeria, the sector is also affected by a myriad of challenges. In the basket of challenges are weak government legislation and policy, lack of human capital and expertise, high level of ignorance and poor port operational efficiency (Oladejo, 2008).

Port Operational efficiency is often associated with productivity and operational efficiency; also additional factors that are associated with the more organizational side of production such as how efficiently ports use inputs to produce current output levels and whether the technologies adopted by container terminal operators are most efficient, that are critical to determining container terminals efficiency (Chin & Tongzon, 1998). Efficiency often means speed and reliability of container terminal services. In a survey conducted by UNCTAD (2011), 'on-time delivery' was cited to be a major concern by most shippers (UNCTAD, 2006). In fast-paced industries where products must be moved to the markets on time, terminal operators are vital nodes in logistics chain and as such must be in a position to guarantee shipping lines with reliable service levels. These include on-time berthing of vessels, guarantee turnaround time for vessels and guaranteed connection of containers. That is the total turnaround time it takes to wait for pilot to berth, terminal time, un-berthing and final departure from port area (Tongzon and Ganesalingam, 2009). Terminal efficiency can be reflected in the freight rates charged by shipping companies, turnaround time of ships and cargo dwelling time. The larger a ship stays at berth, the higher is the cost that a ship will have to pay. This can be passed on to shippers in terms of higher freight charges and longer cargo dwelling time, thus reducing the attractiveness for them to hub at a port. Tongeon and Ganesalingam (2009) identified several indicators of terminal efficiency and categorized them into two broad groups, namely: operational efficiency

measures and customer-oriented measures. The first set of measure deals with capital and labor productivity as well as asset utilization rates. The second set includes direct charges, ship's waiting time, minimization of delays in inland transport and reliability (Tongzon and Ganesalingam, 1994).

Sea-port operation is defined as cargo handling (or moving) activity, performed by a designed company (gang or team), consisting of labor and machines. It is also defined as the operation of a wharf and other port facilities, operation of port passenger transport service, operation of cargo loading/unloading, haulage and warehousing services within a port area and so on (Acciero & Seira, 2013). Presently, there is difficulty in defining port efficiency due to non-universal definition of what indicates an efficient port or what port efficiency entails (Bailey, 1985). An efficient sea-port should be one that is competent in operations, (Bakshi & Gans 2011). Based on this definition, efficiency of sea-port operations is determined by duration (time) of ship's stay in a port, quality of cargo handling and quality of service to inland transport vehicle during passage through the port. Quality of cargo handling is in the form of berth throughput (Bakshi & Gan, 2011) and quality of service to inland vehicle is dependent on port infrastructure. Productivity has been identified as a measure of sea-port operational efficiency (Alreck & Settle, 1985).

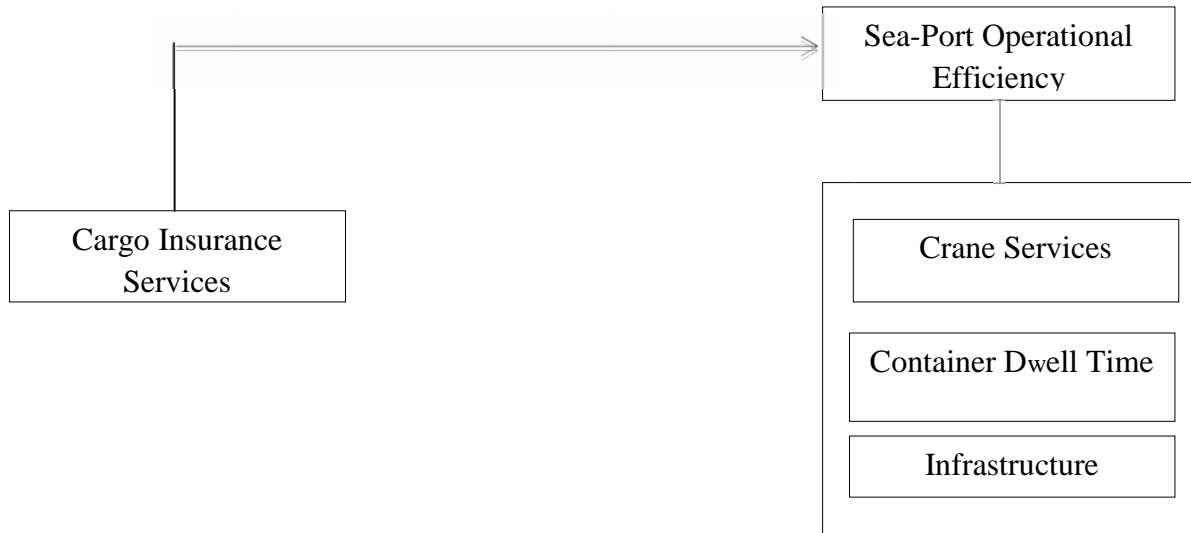
It is important to establish that Customs regulations require every importer to locally insure a cargo coming into Nigeria. However many shippers ignore this Customs requirement. This deliberate disregard for a legal importation requirement introduces other issues that should be probed further. According to Customs regulations, any individual without insurance certificate for a cargo is expected to immediately pay a fine. In order to quickly get cleared by the Customs, shippers usually opt to pay fine. And for those who are not interested in paying huge fine, they resort to patronizing fake insurance agents who arrange fake insurance certificates. Sometimes shippers also patronize fake insurance agents in order to avoid paying exorbitant rate for a policy. This is symptomatic of the ignorance in the industry because in actual fact the premium for a policy is sometimes cheaper than the fine that will be paid to Customs in the absence of an insurance certificate or when the fake certificate is discovered.

As an import dependent country, marine insurance is a major maritime support service with enormous capacity for wealth. Just as many other aspects of the maritime industry, all that is required is a collective commitment to take advantage of the many opportunities waiting for our attention. The purpose of this study is to examine the relationship between cargo insurance and sea-port operational efficiency in Nigeria.

Furthermore, this study was guided by the following research question:

- i. What is the relationship between cargo insurance services and quay crane services in Nigeria Sea ports in Nigeria?
- ii. What is the relationship between cargo insurance services and dwell time in Nigeria sea Ports?
- iii. What is the relationship between cargo insurance services and Infrastructure in Nigeria Sea Ports?





**Figure 1.1:** Conceptual framework of the relationship between cargo insurance services and sea-port operational efficiency

**Source:** Desk Research (2019).

## LITERATURE REVIEW

### Theoretical Framework

#### Data Envelopment Analysis (DEA)

The application of Data Envelopment Analysis (DEA) in seaport industry to measure port efficiency and operational efficiency was first proposed by Roll and Hayuth (1993). They think that seaports are complex service organizations and there is a long list of outputs and inputs characterizing the operations of seaports. Due to this complexity of factors affecting seaport efficiency, it is difficult to determine the efficiency and the extent to which a seaport's resources are fully exploited in achieving the goals. According to Roll and Hayuth (1993), DEA is considered as one of the most suitable tools for measuring seaport efficiency. They mentioned that DEA has some advantages compared with traditional approaches. For instance, it enables coinstantaneous analysis of multiple output and multiple inputs and enables the inclusion of environmental and other qualitative factors, which are highly important to evaluate operational efficiency; it can recognize the possibility of different but equally efficient combinations of outputs and inputs (in different propositions); and it does not require an explicit priori determination of relationships between outputs and inputs, or the setting of rigid importance weights for the various factors. However, they demonstrated the applicability of the DEA technique in seaport industry by constructing a hypothetical numerical example data with four outputs and three inputs where the operational efficiency of 20 ports are compared. They showed that DEA is a promising and easily adaptable method for obtaining the relative efficiency ratings of seaport and it is possible for a series of secondary research to provide a deeper insight into seaport operational efficiency and point out potentials for improvement (Roll and Hayuth, 1993).

Valentine and Gray (2002) compare the efficiency of 31 North America and European ports for the year 1998 forming outputs such as container a total throughput and the number of containers and inputs, such as the total length of berth and container berth length. According to these Authors the DEA method is useful to test the container seaport efficiency. Also, Barros (2003) analyzed technical and allocative efficiency of five Portuguese ports from 1999 to 2000 using cross-section data. The main objective was to investigate how port regulatory procedures affect the productivity of the port. He concluded that the incentive regulation for increasing productive efficiency was not achieving its aims and proposed a policy revision to enforce efficiency.

For inputs he took the number of employees and the book value of assets and for outputs he

took ships, movement of freight, gross tonnage, market share, break-bulk, containers, etc. The same author with Athenassiou (2004) studied the relative efficiency of Portugues and Greek ports using the DEA method. The results of the analysis indicated that there were inefficiency in ports which could improve their operational efficiency. Kaiser, Pathomsiri and Haghani (2006) analyzed the port productivity using the DEA method. They determined an efficient frontier or a set of the best practice seaports, which inefficient seaports may want to emulate and then concentrated on the sources and the extent of inefficiency of ports which could improve their operations. Assuming that the container port depends on the equipment and information marine insurance and by the competition among ports, the main objective of their study was to minimize the use of inputs (the total quay length and the quay gantry cranes) and to maximize the output (container throughput).

### **Cargo Insurance**

Cargo insurance provides insurance cover in respect of loss of or damage to goods during transit by rail, road, sea or air. Thus cargo insurance concerns the following :(i) export and import shipments by ocean-going vessels of all types, (ii) coastal shipments by steamers, sailing vessels, mechanized boats, etc., (iii) shipments by inland vessels or country craft, and (iv) Consignments by rail, road or air and articles sent by post.

Cargo insurance or marine cargo insurance covers and protects the cargo when the ship is actually sailing in the oceanic waters. This type of insurance is mainly beneficial for oil tankers and other heavy cargo-carrying ships. In technical terms, cargo insurance covers losses that occur while the ship is *in transit*.

There are many companies across the world which provide for marine insurance and cargo marine insurance policies. Depending on the client's convenience and necessity the right marine insurance policy can be recommended by the insurance company and then chosen by the client.

Some of the companies that offer marine insurance policies (including cargo insurance) include the Saucon Mutual Insurance Company established in the year 1832 and Insurance Network of America established in the year 1949. However, there are a lot of minor points that a client needs to consider while going for a marine insurance policy. If these points are ignored, then the client could lose money as compensation even after paying proper premium amounts.

If the goods are not packed properly or if the goods that are shipped are second hand then the cargo insurance policy will not be applicable. Similarly, if the loss to the cargo is due to the negligence of the ship workers or if the workers on the ship are dishonest, then the marine cargo policy will not be applicable. Even weather conditions influence whether a marine insurance policy will be covered or not.

### **Sea Port Operational Efficiency**

Sea-port operation is defined as cargo handling (or moving) activity, performed by a designed company (gang or team), consisting of labor and machines. It is also defined as the operation of a wharf and other port facilities, operation of port passenger transport service, operation of cargo loading/unloading, haulage and warehousing services within a port area and so on. Presently, there is difficulty in defining port efficiency due to non-universal definition of what indicates an efficient port or what port efficiency entails. An efficient sea-port should be one that is competent in operations. Based on this definition, efficiency of sea-port operations is determined by duration (time) of ship's stay in a port, quality of cargo handling and quality of service to inland transport vehicle during passage through the port. Quality of cargo handling is in the form of berth throughput and quality of service to inland vehicle is dependent on port infrastructure. Productivity has been identified as a measure of sea-port operational efficiency.

Many researchers have used various approaches to evaluate sea-port efficiency. Annual firm level surveys have been employed as indicators of sea-port operational efficiency, but there was almost no information on how port efficiencies evolve over time from these studies. A number of studies have used data on inputs, out-puts and production function theory, by means of data envelopment analysis, to estimate the most efficient production frontier across a set of sea-ports. The approaches using this method have the advantage of economies of scale derived from econometric evidence but the drawback is that they typically assume constant return to scale. Some research has been done on the contribution of port ownership to efficiency. Transformation from public to private ownership is believed to improve sea-port operational efficiency even without change in level of competition. Some researchers contended this position and have opinion that principal agent problems may also arise in the private sector as a result of capital market imperfections. On the contrary, a number of studies have shown relationship between port ownership and sea-port operational efficiency.

Relative efficiency of a number of Asian ports was assessed by Goss (1990) using a combination of cross-sectional and panel data versions of stochastic frontier model and the finding was that there seems to be some support that privatization should have some relationship with improvement in efficiency. These efforts by the researchers show that port ownership is a likely determinant of operational efficiency. It has been found that size of sea-port has positive effects on its efficiency. Also, it has been shown that ports with larger throughput seem to have certain operational efficiency advantage over those with smaller throughput. In research on 15 sea-ports Goss, (1990) showed that port efficiency has no clear relationship with its size.

### **Measures of Sea Port Operational Efficiency**

#### **Quay crane operation**

The quay crane operation is one of the important operations for the container terminal logistics, which carries out loading a container from a truck to a vessel or unloading a container from a vessel to a truck. Several major container terminal operations influence the efficiency of container terminal, which include the vessel berthing operation, the crane unloading/loading operation, the container delivery operation by trucks, the inspection operation, and the container storage operation. Of those operations, the crane operation is the key factor that determines the efficiency and effectiveness of a container terminal (Lee, Wang & Miao, 2000; Kim & Park, 2004). When a container vessel is moored at berth, several cranes are arranged to load or unload containers for that vessel. Unloaded containers are transported by trucks and then go through

other terminal operations. After finishing all unloading jobs, cranes will start load containers from land side on to the container vessel (Lee, Wang and Miao, 2000; Kim and Park, 2004).

These interfaces are the quayside with loading and unloading of vessels, and the landside where containers are loaded and unloaded on and off trucks and trains. A container yard connects the quayside and landside, and provides space for container storage. Containers are stored either in stacks on the yard deck, or on truck chassis. Under a chassis storage system, each container is individually accessible providing fast transfer to landside movements. Yard cranes are utilized to access containers and reposition them within the stack. Because of increased demand and limited storage space in most modern seaports, nowadays stacking on the ground is the most commonly used storage approach (Steenken, Voß & Stahlbock, 2004).

When a vessel arrives in a seaport, it first has to moor for container loading and unloading. For this purpose, a number of berths are available at container terminals. Berths have very large construction costs, and therefore the number and length of berths at a container terminal is one of the most important strategic decisions that must be made at the strategic level. Berthing decisions initiate the work within a terminal by pushing and pulling containers into and from the yard storage areas. Obviously, the utilization of berths directly affects the overall utilization of the terminal, and therefore the operational level decision of allocating berth space to vessels is crucial. Most container berths in the large ports of the United States and Japan are leased by ship operators. Under such arrangements, ocean carriers are directly responsible for the containers. Such berthing systems are called dedicated berth systems, and terminals operating with dedicated berths are called dedicated terminals Vis & de Koster, 2003).

An alternative system, known as public berths, is used by many major hub ports like Hong Kong, Singapore, Rotterdam, and Hamburg. Public berth systems are used in multi-user terminals that process the vessels of different carriers, and generally have longer berths and higher berth utilization rates than dedicated terminals. When a vessel is moored at a berth, the unloading and loading of containers begins. Quay cranes are the standard equipment designed for this task. A quay crane is a special type of gantry crane having a large steel framework, which is positioned along the wharf (or quay) alongside a berthed vessel. Quay cranes are generally classified by their lifting capacity, and the size of the container ships they can load and unload. A Panamax crane can fully load and unload containers from a container vessel capable of passing through the Panama Canal (vessels 12-13 container rows wide). A Post-Panamax crane can fully load and unload containers from larger container vessels up to about 18 container rows wide. The largest modern container cranes are classified as Super-Post Panamax, and are used for vessels up to 22 container rows wide (Steenken et al. 2004) A modern container crane capable of lifting two 20-ft containers at one time generally has a lifting capacity of at least 40 tonnes. Some new cranes have now been built with 120 tonne load capacity enabling them to lift up to four twenty foot or two forty foot long containers. The speed of quay cranes during unloading and loading movements is also important. Modern quay cranes have hoisting speeds of 60-80 m/min when carrying a load. Trolley speeds can exceed 140 m/min. Given these parameters, it takes about 90 seconds to load or unload a single 40-ft container with an experienced crane operator. Post-Panamax cranes weigh approximately 800- 900 tonnes while the newer generation Super-Post Panamax cranes can weigh 1600-2000 tonnes (Vis & de Koster, 2003; Stahlbock, and Voss, 2008).

### **Dwell Time**

Container dwell time is one of the many operational efficiency indicators to assess the efficiency of terminal operation. As compared to standard indicators such as ship turnaround time or productivity indicators it is however not yet widely used for global benchmarking purposes. It is therefore challenging to define standard limits above which dwell time would be considered too long in any given seaport. Maritime industry sector experts tend to agree however on a 3 to 4 days representative mean value (Goardon, 2003). From a national perspective, the issue of dwell time has been specifically identified as a major hindrance to country economic development for a long time (KPA, 2009).

The average current dwell time is 5 days depending on where the goods are destined – it does not compare favorably with international standards which are typically 1 – 3 days. On the other hand, gateways seaports are not only gateways, they are also a place of integration a number of players within the supply chain: port operators, public administration and authorities, brokers or intermediaries and shippers. Each of these players has a specific use of the seaport that conditions its perception of the long dwell time issue. For the terminal operations at the Mombasa Entry Port – there is a direct relationship between distribution of dwell times and terminal occupancy. It therefore needs to precisely evaluate a standard dwell time beyond which the efficiency of the terminal is negatively affected. This standard is the free time period defined “as the period during which a container can reside in the container yard without being assessed a demurrage fee” (Huynh, 2006).

According to UNCTAD (1995) it should correspond from a user perspective to the “sufficient time to allow efficient importers to clear their cargo” (UNCTAD, 1995), but in practice, the seaport authority and terminal operators define this free time according to capacity constraints, profit maximization, container traffic patterns or other consideration (for instance differentiation between transit and domestic goods), and they tend to reduce it for example when facing high congestion patterns. As for shippers (importers or exporters) dwell time in seaports can be assimilated to a temporary storage period which is justified either by the time necessary to complete cargo clearance formalities (transactional dwell time) or by a decision to leave cargo in the port for a definite number of days superior to that clearance delay (discretionary dwell time). For containerized imports, cargo dwell time is defined as the time between vessel arrival and container exist from the port facilities – exceeds 20 days in average for most seaports in developing countries which makes them the most time-inefficient seaport in the world (UNCTAD, 2003).

From a transport service perspective, container terminals are nothing more than intermodal nodes in global transport chains. Their basic function is then to transfer efficiently utilized cargo from a maritime transport mode (container ship) to a land transport mode (rail and truck) and vice-versa. The efficiency of this transfer operation is then assessed against operational efficiency objectives which are in general berth, yard and quay productivity objectives. If we focus specifically of time operational efficiency of entry ports for containerized imports we can however simply look at the agility at which containers are physically transferred from the containership to the land transport mode via the container yard. This total time for the physical transfers only plus the necessary idle time between operations is defined as operational dwell time (UNCTAD, 2003).

## **Infrastructure**

The critical role that container infrastructure plays in favoring the economic development of a Country or region is well established. Infrastructure is the necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development as well as securing deep-sea container connectivity for economies heavily dependent on international trade. Container infrastructure, however, needs to be complemented by efficient hinterland transport connections if the port is to fully exploit its potential as growth catalyst and supply chain node (Suykens and van de Voorde 1998). Unfortunately, it is not uncommon for development projects to focus exclusively on enhancing the infrastructural capabilities of the port, without adequate consideration of the hinterland connections. The urgency of looking at port and terminal development in conjunction to their hinterland connectivity is exacerbated by the pressure on container terminals to increase their efficiency levels resulting from the rapid growth of containerized cargo traffic flows and their increased variability (Haralambides, Cariou & Benacchio, 2002).

As port capacity cannot be developed as rapidly as increases in demand (Haralambides, Cariou & Benacchio, 2002), any overcapacity is eventually exhausted and episodes of congestion ensue even in the most efficient terminals. This calls for a phased but continuous and well-coordinated effort in expanding container capacity at terminals. Terminal operations are affected not only by the larger number of vessel calls but also by the increased variability of all sizes. As Vessels of over 12700 TEU are becoming increasingly common, despite the fact that they may only be able to access a few large hubs (Cullinane & Khanna, 1999). This will concentrate container flows on a few megaports, in turn impacting berth and crane productivity of the terminal and adding pressure on hinterland links, often with adverse effects on congestion and the environment (Yap & Lam 2013).

The expected increase in transshipment associated with larger vessel size, is likely to influence the terminals not only forcing them to handle higher volumes in the same period of time, but also to reduce the variability of their operations (i.e. increase reliability) in order to guarantee seamless flows of cargo among transshipment ports and/or transshipment port and feeder ports (Gilman 1999). The increases in productivity and reliability at terminals will require more tracking, greater container visibility and more emphasis on environmental and regulatory compliance particularly as terminals now occupy critical positions the supply chain (Notteboom 2008).

Generally, infrastructure is divided into physical and soft elements. Physical infrastructure includes not only the operational facilities such as the number of berths, the number of cranes, yards and tugs and the area of storage space, but also the intermodal transport such as roads and railways (Tongzon and Heng, 2005). Whereas, the soft infrastructure refers to the manpower employed. Maximum deployment of both types will assist in reducing vessel turnaround, thereby increasing the terminal capacity to accommodate more containers. Ships are continually increasing their carrying capacity and container made for large transport units in overseas container transport are under consideration. This scale enlargement requires new and capital-intensive transshipment facilities in gateway ports. Particularly, inter-modality is essential for the speedy transport of cargoes into and out of a gateway port. Without proper linkages, the efficiency of container terminal operation may decline due to congestion and delays (Tongzon and Heng, 2005).

## **Empirical Review**

Some scholars (Tongzon, 1995; de Langen, 2003) have researched factors influencing cargo flow. Other studies (Wiegman *et al*, 2007) have focused factors influencing the choice of ports. These studies are interdependent since the cargo flow depends on the port choice of port users. Using these findings is particularly interesting in order to understand which variables can be included in the model. Additionally, advantages such as the location of the port and the distance to the consumer markets play an important role in the volume of port throughput. However, more factors of ports determine the terminal throughput volumes. Also, Tongzon (1995) determines that cargo flow is dependent on the following factors: the first factor is the geographical location of a port. If the port is located on an easily accessible location by different modalities, more cargo is likely to flow to that specific port. The second factor is the frequency of ship calls. The higher the frequency of ship calls, the higher the port throughput. The third factor is the terminal efficiency. This indicator can be measured by looking at the container mix, the crane efficiency, the size of the vessels and cargo exchange (economies of scale), average number of container handled per hour. Again, Tongzon states that port charges could also be included as variable in the model. However their contribution to the total costs is relatively small (Tongzon, 1995).

Conversely, some scholars (Tongzon & Heng, 2005) have identified factors influencing the choice of port users. The studies determine choice factors of different port users. These studies are relevant for this research since the choice of the port users determine the cargo flows to the ports. The most discussed factors from these studies are, besides the location, the physical and technical infrastructure, the port efficiency, the hinterland connections, the port charges and the available (logistic) services. The physical and technical infrastructure includes port physical characteristics such as the depth of the water, the type of cranes in the port and the meters of quay. These variables indicate the limits of the capacity of the port and so the possible port throughput (Tongzon & Heng, 2005; Wiegman *et al*, 2007; Chang *et al*, 2008; Tongzon, 2002; Tongzon, Chang & Lee, 2009). On the other hand, port competition has had an impact on the port choice factors. Containerization has led to standardization in the maritime industry, implying that ports cannot rely on specialization to maintain their market share and to generate revenues as much as they used to do (OECD, 2008). By containerization, ports in the same region became closer substitutes for the port users. Furthermore, port competition has moved from competition between ports to between transport chains (de Langen, Nijdam & Van der Horst, 2010). Hinterland connections are of vital importance for a port, because container ports are nowadays a link in a logistics chain (de Langen *et al*, 2010).

Nevertheless, this implies that the quality of the hinterland connections and the diversity of the modalities available determine the level of container terminal throughput. Additionally, the costs of hinterland have become relatively important. However, OECD (2008) states that the cost per kilogram per km on the hinterland is 5 to 30 times as high (this depends on the hinterland transport mode) as the shipping cost by sea. Also port charges have an influence on the competitive position of the port; they include taxes, administration costs and shipping tariffs. Port users prefer the port with the best price/quality ratio. However port charges are not the most important choice influencer since this indicator is mentioned lower in the list compared to the other factors in several studies. Also, Tongzon (1995) states that port charges form an extremely low proportion of the overall costs of international trade. To make a link between port competition and the physical and technical infrastructure: when these infrastructures are strongly congested, their quality decrease and this weakens the ports competitive position.

The activities of the Nigerian Ports were commercialized in 1992 under the name, “Nigerian Ports Plc”. However, considering the fact that the government still wholly owns the company, it reverted to its former name, Nigerian Ports Authority in October 1996. This reversion is however, not in conflict with commercialization efforts and commitment to improved services. Okorigba (2008) observed that the efficiency improved at the ports after the reforms of 2006, as cargo dwell time and turn round time of vessels reduced to an average of 2.45days as compared to an average of 6.85days and 10.43days before the reforms. He equally found out that infrastructural modernization and equipment enhancement reduced delays of cargo discharge at the ports thus increasing efficiency of the ports.

Ehbenine (2009) opined that port concession is very viable in a national economy because of its significance as a global tool for port development and unquantifiable gains to the economy, eliminating poor quality services and delays at the ports. He concluded that private operators would be more reasonable in their dealings to avoid government revocation of their license and unnecessary public reaction; freeing up of government funds for other priority developmental projects; attracts and uses foreign investment and marine insurance and also port concessioning will expose the private sector concern for a more efficient service than government (NPA) in port service delivery. Josiah (2008) in his study of Lagos port complex (port operational efficiency) noted the following as the contributing factors to low port operational efficiency at Nigerian ports: (a) poor services and poor cargo handling (b) documentation procedures characterized by long procedures (c) poor labour operational efficiency (d) queuing for berths problems and allocation (e) poor customs and port authority relationship (f) corruption and port pilfering and so on. Josiah (2008) concluded by suggesting the following:

- (a) The use of satisfactory port traffic flow arrangement and reviewing them very often for the arrival and departure of vessels.
- (b) Improvement of documentation process in terms of information reliability and spread of efficiency using ship arrival message (SAM), which is a linkage of port networks that allows port computers to interact with each other so that as soon as a ship departs a port, the next ports of call are notified automatically through this network. The ships travel, arrival times, at these ports of call, the type, volume of cargo to be delivered at each port of call, as well as the names of the consignees, the shipping agents, ships and nationality of the ship. This makes preparation for ships arrival fast and easier. This works on the principle of Electronic Data Interchange (EDI).
- (c) Efficient berth allocation policy that considers ships length, size, draught, volume and type of cargo etc hence reduction in waiting time, idle time and improved turn round time of the vessel.

Emeghara (1992) noted that from 1975-76, ship congestions at the Nigerian seaports was not due to lack of berthing facilities, but due to the fact that the cargoes stacking areas were not relieved of traffic as early as they should be. He further argued that lack of adequate, efficient and cost effective transport linkages with the hinterlands of the ports poses operational problems which mitigate against capacity utilization. He concluded that the Nigerian ports are under-utilized considering berthing and cargo handling capacities available hence the poor operational efficiency of the ports.

Adebayo (2005) equally identified cumber some clearing, system as one of the problems of poor port operational efficiency in Nigeria as the cargo clearing system depends on



manual paper and physical movement of document to and from various processing centers located within and outside the ports. He also identified the non availability of multimodal transport system or rather the utilization of trucks rather than rail transport for the movement of goods to and from the hinterlands to the ports. This is also bad in some ports whereby no provision is made for the parking of the trucks prior to loading and so on. Emeghara (2008) in his study on the various delay causative factors influencing the high turnaround time of ships in Nigerian port, he identified the following:

- (a) Corruption at all levels in the port.
- (b) Lack of cargo handling equipments.
- (c) Lack of skilled manpower among dockworkers.
- (d) The channel depth or drafts of the entry channels.

However, the Onne and Rivers ports has drastically improved on the quantity and quality of cargo handling equipments since after the reforms and also on the other issues raised by the researcher in his study hence the operational efficiency currently. He also alleged low productivity of an average Nigeria dockworker as well as the private terminal operator slow training and retraining of the abundant unskilled dockworkers. These trends have reduced since after the reforms of the ports as they were evident in the ports prior to the port concessioning.

Operational efficiency measurement plays an important role in the development of an organization. As a result, all ports, without exception, use a variety of methods to examine their operational efficiency. Operational efficiency can be defined as the capacity to produce positive results that is, depending on the expectations (Ducruet, 2009). Ports are essentially providers of service activities, in particular for vessel, cargo, and inland transport. As such, it is possible that a port may provide sound service to vessel operators on one hand and an unsatisfactory service to cargo or inland transport operators on the other. Hence, port operational efficiency cannot normally be accessed on the basis of a single value or measure, rather evaluations are made by comparing indicator values for a given port over time as well as across ports for a given time period (De Monie, 1987). Despite the importance of port operational efficiency measurement, however, it is surprising to note that there are almost no standard methods that are accepted as applicable to every port for measurement of its operational efficiency (Cullinane, Song & Gray, 2002). More surprisingly, it is even harder to find standard terminology to describe port production, with different container ports using different terms to describe port production. "Measurement will always have a natural tendency to be terminal-specific" (Robinson, 1999). As reported by De Monie (1987), the measurement of port productivity has been greatly impeded by the following factors:

- (a) The sheer number of parameters involved.
- (b) The lack of up-to-date, factual and reliable data, collected in an accepted manner and available for dissemination.
- (c) The absence of generally agreed and acceptable definition.
- (d) The profound influence of local factors on the data obtained.
- (e) The divergent interpretation given by various interests to identical results.

Port operations are increasingly specialized and processed in dedicated terminals but many flows of goods are still handled at general purpose berth; as in the case of Port Harcourt port and Onne ports. For instance, both ports in reference handles General cargoes, bulk, containers, refined

petroleum products, oil exploration equipments and so on; hence there is no homogeneity of products/terminals for comparison. Depending on the case, port operational efficiency should be assessed for an homogenous set of berths or terminals. It is usually expressed as the average number of calls and the average flow-volume or weight of goods over a standard period of time, number of calls per berth and per year, volume or weight of cargo handled per hour, per call or per day, per gang or per crane or based on the new port operational efficiency indicators (PPI). In addition, other criteria can be used to see how existing capacity and operational efficiency meet the requirements of

(a) the shipper or the ship owner: mainly average waiting time of ship, dwelling time of cargo and data related to quality (value).

(b) Port Authority/concessionaire: basically berth occupancy rate and global traffic and so on.

Data Envelopment Analysis (DEA) which is a non-parametric efficiency evaluation model based on mathematical programming theory which was developed by Charnes et al (1978). It is used in operations research and econometrics for multi-variant frontier estimation and ranking which can be used in calculating efficiency levels within a group of organizations. The concept of DEA is developed around the basic idea that efficiency of a DMU is determined by its ability to transform inputs into desired outputs. This concept of efficiency was adopted from engineering which defines efficiency of a machine/process as  $\text{output} / \text{input} = 1$ . In this approach, efficiency is always less than or equal to unity as some energy loss will always occur during transformation process.

Resulting from the empirical studies, the following hypotheses relating to the purpose and problems of the study have been:

**H<sub>01</sub>:** There is no significant relationship between Cargo insurance services and Quay crane services in Nigeria Sea Ports

**H<sub>02</sub>:** There is no significant relationship between Cargo insurance services and Container dwell time in Nigeria Sea port.

**H<sub>03</sub>:** There is no significant relationship between cargo insurance services and Infrastructure in Nigeria sea Ports.

## **METHODOLOGY**

The study adopted a cross-sectional survey in its investigation of the variables. Primary data was generated through self- administered questionnaire. The study population was made up of all the six major ports in Nigeria. Thirty copies of the research instrument were distributed to 30 senior managers/supervisors of the six major ports in Nigeria. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. The study stated and tested six hypotheses. The hypotheses were tested using Pearson Product Moment correlation analysis with the aid of Statistical Package for Social Sciences version 23.0. The tests were carried out at a 95% confidence interval and a 0.05 level of significance.

## DATA ANALYSIS AND RESULTS

The level of significance 0.05 was adopted as a criterion for the probability of accepting the null hypothesis in ( $p > 0.05$ ) or rejecting the null hypothesis in ( $p < 0.05$ ).

### Hypothesis 1

H<sub>01</sub>: there is no significant relationship between cargo insurance services and service quay crane services of the sea ports in Nigeria.

**Table 1: Cargo insurance and quay crane services**

	Cargo Insurance	Crane Service.
Pearson Correlation	1	.75**
Sig. (2-tailed)		0.060
N	27	27
Pearson Correlation	.75**	1
Sig. (2-tailed)	.060	
N	27	27

Source: SPSS Output

The table above present a coefficients of 0.7 which indicate a strong positive relationship between cargo insurance and efficient crane services of the sea ports in Nigeria. The correlation is statistically significant; hence, we reject the null hypothesis which infers that there is no significant relationship between use of cargo insurance services and crane service of the Nigerian sea-ports and accept the alternative which state that there is a significant relationship between use of cargo insurance and crane services of the sea ports in Nigeria

### Hypothesis 2

H<sub>02</sub>: there is no significant relationship between cargo insurance services and container dwell time of Nigerian sea-ports

**Table 2: Cargo insurance and container dwell time**

	Cargo Insurance	Dwell time
Pearson Correlation	1	.72**
Sig. (2-tailed)		.062
N	27	27
Pearson Correlation	.72**	1
Sig. (2-tailed)	.062	
N	27	27

Source: SPSS Output

The table above presents a coefficient of 0.72. This indicates a strong positive relationship between cargo insurance and container dwell time of the sea-port in Nigeria. The correlation is statistically significant. Hence we reject the null hypothesis which infer that there is no significant relationship between cargo insurance and container dwell time of Nigeria sea-ports and accept the alternative.

### **Hypothesis 3**

H<sub>03</sub>: there is no significant relationship between cargo insurance and infrastructures of the sea ports in Nigeria.

**Table 3: Cargo insurance and infrastructure**

	Cargo Insurance.	Infrastructure.
Pearson Correlation	1	.56**
Sig. (2-tailed)		.070
N	27	27
Pearson Correlation	.56**	1
Sig. (2-tailed)	.070	
N	27	27

Source: SPSS Output

The table above presents a correlation  $r$  of 0.56. By interpretation, this is a moderately positive relationship between cargo insurance and the infrastructure of the sea ports in Nigeria, and it is statistically significant. Hence, we reject the null hypothesis which infer that there is no significant relationship between cargo insurance and infrastructure of the sea-ports in Nigeria and accept the alternative which infer that there is significant relationship between cargo insurance and infrastructure quality of the sea-ports in Nigeria. .

## **DISCUSSION OF FINDINGS**

### **Discussion of Findings**

The study examined the relationship between cargo insurance and operational efficiency of sea-ports in Nigeria. The study observed that to a very large extent, respondents agreed that companies provide insurance for loss of goods in transit and that operating companies in the Nigerian ports provide adequate insurance for damages of goods in transit. This is actually one of the major requirement for operators at all the Nigerian sea-ports and which must be complied with completely. This finding is in line with that of Goss (1990). Furthermore, respondents agreed to a very large extent that companies provide insurance to cover cargo when the ship is actually sailing but moderately agree to a small extent that companies provide insurance for second hand goods on vessels.

On the issue of operators obtaining hull insurance, respondents agreed to a very large extent that companies provide insurance cover for the torso and hull of vessel. They also agreed to a large extent that owners of vessels provide insurance for piece of furniture on the ship. This

observation is also in line with the outcome of the study by Goss (1990). Cargo handling corporation and its allies are much more interested in the risk protection of the vessels carrying the cargo as they are in protecting the cargo from theft, or/and damages. Respondents also agreed that vessels owners provide insurance cover for machinery and equipment on vessels. Lastly, respondents agreed to a very large extent that all vessel operators provide insurance for vessels as a measure of safety.

On the issues of quay crane services, respondents agreed to a very large extent that cranes are used for ship loading and unloading on a consistent manner. This finding is in alliance with that statement in the literature review that the quay crane operation is one of the important operations for the container terminal logistics, which carries out loading a container from a truck to a vessel or unloading a container from a vessel to a truck. Several major container terminal operations influence the efficiency of container terminal, which include the vessel berthing operation, the crane unloading/loading operation, the container delivery operation by trucks, the inspection operation, and the container storage operation. Of those operations, the crane operation is the key factor that determines the efficiency and effectiveness of a container terminal (Lee, Wang and Miao, 2000; Kim and Park, 2004). Respondents agreed to a very large extent that Cranes are used for stacking of containers and that the cranes are used to move containers between stacking areas and the landside operation they agreed to a very moderate extent that operators provide different types of cranes for port operational efficiency.

Furthermore, respondents agreed to a very large extent that Port provides minimum time period for ship to berth at the quays. Container dwell time is one of the many operational efficiency indicators to assess the efficiency of terminal operation. As compared to standard indicators such as ship turnaround time or productivity indicators it is however not yet widely used for global benchmarking purposes. It is therefore challenging to define standard limits above which dwell time would be considered too long in any given seaport. Maritime industry sector experts tend to agree however on a 3 to 4 days representative mean value (Goardon, 2003). From a national perspective, the issue of dwell time has been specifically identified as a major hindrance to country economic development for a long time (KPA, 2009). Respondents further agreed to a moderate extent that Port provide a specify period for containers to reside in the court yard before being assessed for demurrage. This is a practice that administered in order to reduce port congestion. Respondents further agreed that Port authorities provide efficient time for importers to clear their cargos and that Port authorities provides minimum days and complies with the day between vessel arrival and container exit from the port facilities.

On the issue of port infrastructure, respondents agreed to a very large extent that Port authority provide efficient hinterland roads to access the ports. As observed in the literature review, the critical role that container infrastructure plays in favoring the economic development of a country or region is well established. Infrastructure is the necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development as well as securing deep-sea container connectivity for economies heavily dependent on international trade. Container infrastructure, however, needs to be complemented by efficient hinterland transport connections if the port is to fully exploit its potential as growth catalyst and supply chain node (Suykens and van de Voorde 1998). Unfortunately, it is not uncommon for development projects to focus exclusively on enhancing the infrastructural capabilities of the port, without adequate consideration of the hinterland connections.

Furthermore, respondents agreed to a moderate extent that Port terminal development and port capacity are ongoing to avoid port congestion and that port authorities Provide increase number of crane yards and area of storage space, provide inter modal transport such as roads and rails. Finally, respondent agreed moderately that Port authority provide adequate manpower for port activities.

### **CONCLUSION**

Carrying the world's trade by sea comes with its challenges and risks. The increase in maritime activities, and shipping in particular, has also given rise to criminal activities on the sea thereby increasing the attendant risks of maritime business. Apart from the scant awareness and patronage of marine insurance in Nigeria, the sector is also affected by a myriad of challenges. In the basket of challenges are weak government legislation and policy, lack of human capital and expertise, high level of ignorance and poor port operational efficiency. In the light of the above the study evaluates the relationship between the cargo insurance services and operational efficiency of Nigerian ports. The study finds reasonable evidences and concludes that there exist a moderately positive relation between cargo insurance services and the operational efficiency of sea-ports in Nigeria.

### **RECOMMENDATIONS**

Deriving from the findings of the research work, the research recommends as follows:

- i. Companies operating at the sea port should ensure that they take comprehensive insurance policy to cover all the goods that are been handle by the ship, the crane and the land transport for efficient sea-port operations.
- ii. That the insurance services should also cover the container dwell time in such a manner that if the goods stayed beyond the expected time at the sea-port such goods should be covered under comprehensive insurance.
- iii. That the insurance services should cover all the infrastructure at the sea-ports in Nigeria.

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# Product Innovation and Competitive Advantage of Aluminium Manufacturing Firms in Rivers State, Nigeria

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**Abstract:** *This study examined the relationship between relationship between product innovation and competitive advantage of aluminium manufacturing firms in Rivers State, Nigeria. The study adopted the cross-sectional survey in its investigation of the variables. Primary source of data was generated through structured questionnaire. The population of the study was (84) managers and supervisors of ten (10) aluminium manufacturing firms in Rivers State. Census sampling was adopted since the population was not large. Hence, the entire accessible population (census) of 84 managers and supervisors of ten aluminium companies in Rivers State was used. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. The hypotheses were tested using the Spearman's Rank Order Correlation Statistics at the 0.05 significance level. The findings revealed that there is a significant relationship between product innovation and competitive advantage of aluminium manufacturing firms in Rivers State, Nigeria. The study therefore recommends that management of aluminium manufacturing companies should put mechanisms in place to enhance more internal innovations. This should include giving employees enough space to innovate new products and services. In addition, there is need for aluminium manufacturing to set aside a budget that will be used exclusively for product innovation.*

**Keywords:** *Product Innovation, Competitive Advantage, Cost Advantage, Differentiation, Market Focus.*

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## INTRODUCTION

At the advent of the twenty-first century, it becomes imperative for organizations to come up with precise strategies. Except the organizations come up with a precise vision as to how to be clearly peculiar, providing products/services that are dissimilar to their rivals to some dissimilar set of clients, they are going to be eaten raw by the height of rivalry (Porter, 2011). The world is indeed too dynamic for any organization that is succeeding today to do nothing and expect the continuity of the success. To attain and sustain a competitive advantage, organizations should innovate (Hyde, 2013; Porter, 2011). It has been advocated that a culture of positive crisis should be so established in such a way that what is good now is not being adequately good (Markides, 1998; Wood, 2007). The reason is to ensure that we have innovation take place in the face of adequate financial resources to take care of the said innovation (Wood, 2007).

In order to beat competition, organizations are charged to embark on innovation so as not to only compete for the same finite customers but equally create and expand the market space for all players (Hyde, 2013). Innovation strategies are asserted to produce more profits than competitive strategies (Kim & Mauborgne, 2005). In addition, they are viewed to be more

sustainable in offering competitive advantage; it might take well over 15 years for competition to erode profits earned from innovation (Burke, Stel & Thurik, 2010).

Furthermore, innovation strategies have the potential to do away with the need for a trade-off, meaning companies are no longer bound to make decisions about whether they will be low cost or highly differentiated (Kim & Mauborgen, 2005).

Organization embarking on innovation should make two strategic decisions; innovation emphasis and innovation timing. Innovation emphasis comprises scientific research, product development and process improvement. The first two lead to differentiation and the last option leads to cost advantage. Another strategic decision is the timing – is the organization prepared to be the first mover or it wants to be a follower in the industry to avoid some of the risks associated with being the first mover. Robbin and Coulter (2013) opined that for an organization to be successful in hypercompetitive world of business, it should be innovative but differs in that innovation should not be in part but must be whole. To him, innovation is all about providing offerings in a manner that is entirely different, embarking on novel combinations. Innovation is not just small, incremental improvements – these are just part of being a dynamic organization. Innovation is essentially finding new ways of combining things generally.

Davila, Marc and Robert (2006) defined innovation as the art of acting on the inventive thoughts with a view of making some specific and tangible distinction in the domain in which the innovation occurs. It can take the form of a new service or product, a new structure, a new production process, or a new administrative system (Bilgihan, Okumus & Kwun, 2011). Innovation is influenced by several environmental and firms dimensions and brings about results. Hence, the research about innovations encompasses not only the study of their sources, determinants, mechanisms or processes, but also their consequences (Van, Polley, Garud & Venkataraman, 2001). According to Chen, Ming-Ji and Ching-Hsun (2009), the ability of a firm to absorb new changes is one of the most important determinants of the firm's innovation performance through the development of ability to acquire, assimilate, and profitably utilize new knowledge. To this end, when firms have a greater absorptive capacity, it would increase their performance in innovation.

Innovation constitutes part of the system that produces it which leads to a shift in the focus of innovation towards providing individuals with unique and customized experiences when they purchase products and services. For this experience to be meaningful, companies will have to understand their user's behavior and include them early on in the innovation process to provide them with solutions that satisfy their needs. As consumers and users become more informed, and are able to exchange and utilize globally-available knowledge, they are placing higher demands on products and services delivered by companies as well as the public sector. At the same time, the world is becoming flat, offering all individuals the possibility of participating in the economy and value creation. The ability of an organization to innovate is a pre-condition for the successful utilization of inventive resources and new technologies. Conversely, the introduction of new technology often presents complex opportunities and challenges for organizations, leading to changes in managerial practices and the emergence of new organizational forms (Macrouse, Hodder & Stoughton, 2003).

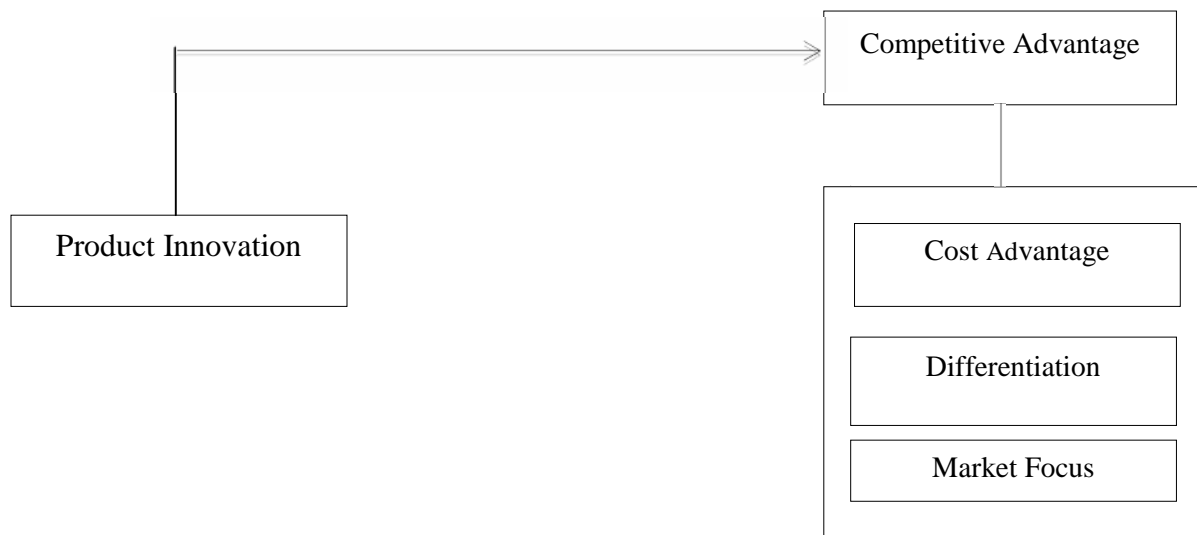
Hyde (2013) argued that innovation strategy is superior to the traditional competitive strategy and is key to attaining competitive advantage, and further divided innovation into three categories which are blue ocean innovation, disruptive innovation, and strategic innovation.

Nielson (2014) towing the similar line had divided innovation into four categories which are as follow: breakthrough innovation, sustaining innovation, new market innovation, and disruptive innovation. When a firm can sustain profits that supersede the average for its industry, the firm is rightly considered to have a competitive advantage over its competitors. The essence of business strategy is to attain a sustainable competitive advantage. Porter (1998) came up with two main types of competitive advantages which are; differentiation advantage, and cost advantage.

A firm is said to possess a competitive advantage if it can come up with the same benefits as rivals but at a lower cost (cost advantage), or come up with benefits that supersede those of competing products (differentiation advantage. Thus, a competitive advantage allows the organization to deliver superior value for its customers and superior profits for itself. Even though research on innovations and sustainable competitive advantage has been done in a variety of industries, hardly any comprehensive research to the best of the researcher's knowledge been done in this respect in the aluminium manufacturing companies in Rivers State. This study therefore examines the relationship between product innovation and competitive advantage of aluminium manufacturing firms in Rivers state, Nigeria.

Furthermore, this study was also guided by the following research questions:

- i. What is the relationship between product innovation and cost advantage of aluminium manufacturing companies in Rivers State?
- ii. What is the relationship between product innovation and differentiation of aluminium manufacturing companies in Rivers State?
- iii. What is the relationship between product innovation and market focus of aluminium manufacturing companies in Rivers State?



**Fig.1:** *Conceptual framework for the relationship between product innovation and competitive advantage*

**Source:** Conceptualized based on desk research (2019) with product innovation sourced from Porter (1996) and measures of competitive advantage sourced from Nolan (2015)

## **LITERATURE REVIEW**

### **Theoretical Foundation**

#### **Resource -Based View Theory**

This theory tries to explain the internal sources of a firm's sustained competitive advantage (Kraaijenbrink, Spender and Groen, 2010). The resource-based strategy paradigm emphasizes distinctive, firm-specific, valuable, imperfectly inimitable and rare resources and capabilities confer competitive advantage on the firm that possesses them (Wernerfelt, 1959). Its innermost proposition is that if a firm is to attain a state of sustainable competitive advantage it must obtain and control valuable, rare, inimitable, and non-substitutable (VRIN) resource and capabilities, plus have the firms in the place that can absorb and apply them. Resources relate to a firms intangible and tangible assets whereas capabilities are the way of accomplishing firm activities, depending on the availability of resources (Wernerfelt, 1959; Barney, 1991).

Simply stated, in order to produce a competitive advantage that is sustainable, firms should base their success in their distinctive competencies which are grounded in their resources and routines. For Menguc and Auh (2006), innovativeness is a rare, valuable and hard-to-copy firm level competence. It is the key driver of innovation in a firm (Damanpour, 1991; Dobni, 2006), and represents a firm's ability to continually develop innovations (Damanpour, 1991; Dobni, 2006; Paleo and Wijnberg, 2008). Fundamentally, innovativeness increases a firm's capacity to innovate (Damanpour, 1991) by encouraging innovative behaviours through strategic practices (Siguaw, Simpson & Enz, 2006). The essence of the argument is that innovativeness is constructed by the purposeful orchestration and strategic application of practices that accumulate bundle and leverage resources (Wernerfelt, 1959; Moingeon & Lehmann-Ortega, 1998). In order to create innovativeness a firm must implement strategic practices that enhance their innovativeness competence (that is, strategic practices are the "how to" for creating innovativeness).

According to Resource Based Theory (RBT), human capital is considered to be a source of competitive advantage for entrepreneurial firms. Ownership of firm-specific assets enables a company to develop a competitive advantage. Sustainable competitive advantage results from resources that are inimitable, not substitutable, tacit in nature, and synergistic (Barney, 1991). Therefore, managers need to be able to identify the key resources and drivers of performance and value in their organizations. The RBT also states that a company's competitive advantage is derived from the company's ability to assemble and exploit an appropriate combination of resources. Such resources can be tangible or intangible, and represent the inputs into a firm's production process; such as capital, equipment, the skills of individual employees, patents, financing, and talented managers. As a company's effectiveness and capabilities increase, the set of available resources tends to become larger. Through continued use, these "capabilities", defined as the capacity for a set of resources to interactively perform a stretch task or an activity, become stronger and more difficult for competitors to understand and imitate.

#### **Product Innovation**

A product innovation is the introduction of a good or service that is new or significantly improved regarding its characteristics or intended uses; including significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics (OECD Oslo Manual, 2005). Product innovation is considered an obvious means of generating revenue and thus improving performance. Camison and Lopez

(2010) state that product innovation not only acts as a means of improving and safeguarding quality but also for cost saving. It is further lauded for retaining and growing the competitive position of a firm, as well as retaining a strong market presence. Products that are constantly improved are particularly important for long term business growth and performance (Bayus, Erickson & Jacobson, 2003). Product innovation is prevalent among new entrants in any industry as it has been used to boost their popularity in the market in a surprising short time (Hult et al., 2004).

Product innovation is the introduction of a good or service that is new or has significantly improved characteristics or intended uses. In SMEs, not only the R&D staff but also the owners may play a major role in acquiring and applying the new knowledge for product innovation (Migdadi, 2009, Omerzel & Antoncic, 2008). Product innovation requires appreciation of customer needs, design and production while innovation process is linked to the application of technology to improve efficiency in the development and commercialization of the product, (Alegre et al 2002). Furthermore, theories of organizational innovation argue that information imported from sources outside an organization facilitate the creation of new ideas and enhance product innovation.

Product innovation is however not always successful, with a main inhibitor to its success being regulation (Lado & Olivares, 2001). Regulations are set by governments to protect policyholders from illegal malpractices against them by insurance companies but on some instances these very regulations limit the range of potential products offered by the firms. Consumer distrust is noted in literature too as another inhibitor to product innovation (Bhalla, 2010). This restricts innovation in that, consumers need a lot of convincing whenever a new product is released to the market.

### **Competitive Advantage**

The rapid change in the economic and business environment in recent times has lead organizations to strive harder in other to increase the revenue they generate, their market share, and also the quantum of their customers with quality goods and services that satisfy customers needs. Competition on a global scale has led to changes in technology whereby customers demand for superior products/services at low prices. The escalation in worldwide competition has brought the decline in product life cycle. Emphasis is now being place on the competency of the organization and competitive advantage which is believed to give an edge over other competitors in the industry. Raduanet *al* (2009) relates that “though there are many objectives an organization would want to achieve these days, the two major ones are: (i). to achieve a competitive advantage position and (ii). Enhance their organization’s performance in relation to that of their competitors.

Hence it is necessary that organizations recognize the relationship between its strengths and weaknesses and the potential effects it has on the organizations competitive advantage and performance. Organizations should make a choice of the type of competitive advantage to adopt and the scope to attain it. Porter (1985) developed the generic strategies which when implemented effectively helps an organization to achieve competitive advantage. The strategies are: product differentiation and cost leadership. Porter (1980), explains that a differentiation strategy involves the firm creating a product/service, which is considered unique in some aspect that the customer values because the customer’s needs are satisfied. On the other hand, cost leadership emphasizes low cost relative to that of the competitors. Porter (1985) argued that cost

leadership and differentiation strategies are mutually exclusive.

According to Barney (1991), when a firm is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors, such a firm has competitive advantage. In addition, competitive advantage is an added advantage one organization has over other organizations in the industry. Competitive advantage exist when organizations provide the same value as other competitors to customers at a lower cost( cost advantage ) or provide value that exceed those of competing products (differentiation). According to Prahalad& Hamel (1990) the source of the advantage can be something the business does that is distinctive and difficult to replicate, also known as a core competency.

According to Stalk, Evans & Shulman (1992) “sustained competitive advantage has become more of a matter of movement and ability to change than of location or position. Prahalad& Hamel (1990) posit that competitive advantage is ultimately built and maintained by adding value to customers. Value is added by cost leadership. That is, offering equal quality products or services at a lower cost than competitors, or by differentiation, that is, offering products or services that are perceived to be unique relative to some important characteristic (Markides& Williamson, 1994). Understanding how each competitively relevant resource and capability affects costs and uniqueness is an important aspect of understanding how, or if, each adds value to the services provided” (Duncan, Ginter& Swayne, 1998).

Competitive advantage is at the heart of an organizations performance. It is concerned with the interplay between the types of competitive advantage, i.e., cost and the scope of the organizations activities. The value chain plays an important role in order to diagnose and enhance the competitive advantage. A sustainable competitive advantage creates some barriers that make it difficult to replicate.

## **Measures of Competitive Advantage**

### **Cost Advantage**

This is Porter's generic strategies known as cost leadership (Malburg, 2007). This strategy focuses on gaining competitive advantage by having the lowest cost in the industry (Porter, 1987, 1996; Cross, 1999). In order to achieve a low-cost advantage, an organization must have a low-cost leadership strategy, low-cost manufacturing, and a workforce committed to the low-cost strategy (Malburg, 2007). The organization must be willing to discontinue any activities in which they do not have a cost advantage and should consider outsourcing activities to other organizations with a cost advantage (Malburg, 2007). For an effective cost leadership strategy, a firm must have a large market share (Hyatt, 2001). There are many areas to achieve cost leadership such as mass production, mass distribution, economies of scale, technology, product design, input cost, capacity utilization of resources, and access to raw materials (Malburg, 2007).

Lower costs and cost advantages result from process innovations, learning curve benefits, and economics of scale, product designs reducing manufacturing time and costs, and reengineering activities. A low-cost or cost leadership strategy is effectively implemented when the business designs, produces, and markets a comparable product more efficiently than its competitors. The firm may have access to raw materials or superior proprietary technology which helps to lower costs. Cost leadership strategy seeks to achieve above-average returns over competitors through low prices by driving all components of activities towards reducing costs. To attain such a relative cost advantage, firms will put considerable effort in controlling and production costs, increasing their capacity utilization, controlling materials supply or product

distribution, and minimizing other costs, including R&D and advertising.

Firms do not have to sacrifice revenue to be the cost leader since high revenue is achieved through obtaining a large market share (Porter, 1987). Lower prices lead to higher demand and, therefore, to a larger market share (Helms et al., 1997). As a low cost leader, an organization can present barriers against new market entrants who would need large amounts of capital to enter the market (Hyatt, 2001). The leader then is somewhat insulated from industry wide price reductions (Malburg, 2000). The cost leadership strategy does have disadvantages. It creates little customer loyalty and if a firm lowers prices too much, it may lose revenues (Cross, 1999).

### **Market Focus Strategy**

The focuser's basis for competitive advantage is either lower costs than competitors serving that market segment or an ability to offer niche members something different from competitors. Focusing is based on selecting a market niche where buyers have distinctive preferences. The niche is defined by geographical uniqueness, specialized requirements in using the product or by special attributes that appeal to members, (Stone, 1995).

A focus strategy based on low cost depends on there being a buyer segment whose needs are less costly to satisfy than the rest of the market. On the other hand, a focus strategy based on differentiation depends on there being a buyer segment that demands unique product attributes. In the focus strategy, a firm targets a specific segment of the market (Porter, 1996). The firm can choose to focus on a select customer group, product range, geographical area, or service line (Martin, 1999). For example, some service firms focus solely on the service customers (Stone, 1995). Focus also is based on adopting a narrow competitive scope within an industry.

Focus aims at growing market share through operating in a niche market or in markets either not attractive to, or overlooked by, larger competitors. These niches arise from a number of factors including geography, buyer characteristics, and product specifications or requirements. A successful focus strategy (Porter, 1980) depends upon an industry segment large enough to have good growth potential but not of key importance to other major competitors. Market penetration or market development can be an important focus strategy. Midsize and large firms use focus-based strategies but only in conjunction with differentiation or cost leadership generic strategies. But, focus strategies are most effective when consumers have distinct preferences and when the niche has not been pursued by rival firms (David, 2000).

### **Differentiation Strategy**

Differentiation strategies are marketing techniques used by a firm to establish strong identity in a specific market; also called segmentation strategy. Using this strategy, a firm will introduce different varieties of the same basic product under the same name into a particular product category and thus cover the range of products available in that category. Differentiation strategy can also be defined as positioning a brand in such a way as to differentiate it from the competition and establish an image that is unique, (Davidow & Uttal, 1989). Differentiation strategy aims to build up competitive advantage by offering unique products which are characterized by valuable features, such as quality, innovation, and customer service. Differentiation can be based on the product itself, the delivery system, and a broad range of other factors. With these differentiation features, firms provide additional values to customers which will reward them with a premium price.



### **Innovativeness and Competitive Advantage**

Several studies discussed the relationship between innovation and firm performance. Baker and Sinkula (2002); Kim and Mauborgne (2005) found a positive relationship between innovation and firm performance. Baker and Sinkula (2002) found that innovation helps companies deal with the turbulence of the external environment and is therefore one of the key drivers of long term success in business, particularly in dynamic markets. However other studies challenge this view and give conditions under which innovation is successful. According to Danneels (2000) big organizations are more likely to have experience with innovation projects leading to organizational innovation capabilities. Smaller and especially new firms often lack this organizational capability and thus run the risk of engaging in managerial undertakings without experience.

Additionally, empirical studies on the innovation-performance relationship present mixed findings. According to Siguaw, Simpson and Enz (2006), innovation is an expensive and risky activity, with positive outcomes on firm performances but also with negative outcomes, such as increased exposure to market risk, increased costs, employee dissatisfaction or unwarranted changes. Similarly, Wright, Palmer and Perkins (2005), using a sample of small businesses, found that product innovation does not affect performance in benign environment, but has a positive effect on performance in hostile environment.

Evidence on the relationship between innovation and business growth, profitability and exporting has become more common in recent years (Love and Roper, 2013). Four main conceptual perspectives underlie studies of the links between innovation and survival. The first, relates to the efficiency effects of innovation. Here, the line of argument, which either implicitly or explicitly reflects the notion of entrepreneurial learning (Jovanic, 1982), runs that as firms become more mature, innovation may lead to efficiency improvements and higher productivity which then reduces the probability of failure: 'Firms that obtain innovations improve their efficiency, which makes them fitter to survive' (Esteve-Perez and Manez-Castillejo, 2008). Consistent with the liability of newness (Stinchcombe, 1965), there is some evidence to support the efficiency-effect model (Colombo and Delmastro, 2001).

From the foregoing the study stated the following hypotheses to be tested:

- H<sub>01</sub>:** There is no significant relationship between product innovation and cost advantage of aluminium manufacturing companies in Rivers State.
- H<sub>02</sub>** There is no significant relationship between product innovation and differentiation of aluminium manufacturing companies in Rivers State.
- H<sub>03</sub>** There is no significant relationship between product innovation and market focus of aluminium manufacturing companies in Rivers State.

### **METHODOLOGY**

The study adopted the cross-sectional survey in its investigation of the variables. Primary source of data was generated through structured questionnaire. The population of the study was (84) managers and supervisors of ten (10) aluminium manufacturing firms in Rivers State. Census sampling was adopted since the population was not large. Hence, the entire accessible population (census) of 84 managers and supervisors of ten aluminium companies in Rivers State was used.

The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. The hypotheses were tested using the Spearman's Rank Order Correlation Statistics at the 0.05 significance level.

## DATA ANALYSIS AND RESULTS

### Bivariate Analysis

The Spearman Rank Order Correlation coefficient is calculated using the SPSS 23.0 version to establish the relationship among the empirical referents of the predictor variable and the measures of the criterion variable. Correlation coefficient can range from -1.00 to +1.00. The value of -1.00 represents a perfect negative correlation while the value of +1.00 represents a perfect positive correlation. A value of 0.00 represents a lack of correlation. In testing hypotheses one to nine, the following rules were upheld in accepting or rejecting our alternate hypotheses: all the coefficient values that indicate levels of significance (\* or \*\*) as calculated using SPSS were accepted and therefore our alternate hypotheses rejected; when no significance is indicated in the coefficient *r* value, we reject our alternate hypotheses. Our confidence interval was set at the 0.05 (two tailed) level of significance to test the statistical significance of the data in this study.

**Table 1: Correlation for between product innovation and measures of competitive advantage**

			Product Innovation	Cost Advantage	Differentiation	Market Focus
Spearman's rho	Product Innovation	Correlation Coefficient	1.000	.662**	.596**	.748**
		Sig. (2-tailed)	.	.000	.000	.000
		N	59	59	59	59
	Cost Advantage	Correlation Coefficient	.662**	1.000	.898**	.947**
		Sig. (2-tailed)	.000	.	.000	.000
		N	59	59	59	59
	Differentiation	Correlation Coefficient	.596**	.898**	1.000	.932**
		Sig. (2-tailed)	.000	.000	.	.000
		N	59	59	59	59
	Market Focus	Correlation Coefficient	.748**	.947**	.932**	1.000
		Sig. (2-tailed)	.000	.000	.000	.
		N	59	59	59	59

\*\*. Correlation is significant at the 0.01 level (2-tailed).

**Source: Research Data 2019, (SPSS output version 21.0)**

***Ho<sub>1</sub>: There is no significant relationship between product innovation and cost advantage of aluminium manufacturing companies in Rivers State.***

From the result in the table above, the correlation coefficient shows that there is a positive relationship between product innovation and cost advantage. The *correlation coefficient* 0.662 confirms the magnitude and strength of this relationship and it is statistically significant at *p*

$0.000 < 0.05$ . The correlation coefficient represents a strong correlation between the variables. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate accepted. Thus, there is a significant relationship between product innovation and cost advantage of aluminium manufacturing companies in Rivers State.

***Ho<sub>2</sub>: There is no significant relationship between product innovation and differentiation of aluminium manufacturing companies in Rivers State.***

From the result in the table above, the correlation coefficient shows that there is a positive relationship between product innovation and market focus. The *correlation coefficient* 0.596 confirms the magnitude and strength of this relationship and it is statistically significant at  $p < 0.000 < 0.05$ . The correlation coefficient represents a moderate correlation between the variables. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate accepted. Thus, there is a significant relationship between product innovation and market focus of aluminium manufacturing companies in Rivers State.

***Ho<sub>3</sub>: There is no significant relationship between product innovation and differentiation of aluminium manufacturing companies in Rivers State.***

From the result in the table above, the correlation coefficient shows that there is a positive relationship between product innovation and market focus. The *correlation coefficient* 0.748 confirms the magnitude and strength of this relationship and it is statistically significant at  $p < 0.000 < 0.05$ . The correlation coefficient represents a strong correlation between the variables. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate accepted. Thus, there is a significant relationship between product innovation and market focus of aluminium manufacturing companies in Rivers State.

### **Discussion of Findings**

This study using inferential statistical methods examined the relationship between product innovation and competitive advantage of aluminium manufacturing companies in Rivers State. The findings revealed a significant and positive relationship between product innovation and competitive advantage of aluminium manufacturing companies in Rivers State using the Spearman Rank Order Correlation tool and at a 95% confidence interval. The findings of this study confirmed previous studies conducted by Baker and Sinkula (2002); Kim and Mauborgne (2005) who found a positive relationship between innovation and firm performance. Baker and Sinkula (2002) found that innovation helps companies deal with the turbulence of the external environment and is therefore one of the key drivers of long term success in business, particularly in dynamic markets. However other studies challenge this view and give conditions under which innovation is successful. According to Danneels (2000) big organizations are more likely to have experience with innovation projects leading to organizational innovation capabilities. Smaller and especially new firms often lack this organizational capability and thus run the risk of engaging in managerial undertakings without experience.

The test of the first, second and third hypotheses revealed that there is a significant positive relationship between. Product innovation and cost advantage of aluminium manufacturing companies in Rivers State. This finding agrees with the arguments of Camison and Lopez (2010) state that product innovation not only acts as a means of improving and

safeguarding quality but also for cost saving. It is further lauded for retaining and growing the competitive position of a firm, as well as retaining a strong market presence. Products that are constantly improved are particularly important for long term business growth and performance (Bayus, Erickson & Jacobson, 2003). Product innovation is prevalent among new entrants in any industry as it has been used to boost their popularity in the market in a surprising short time (Hult et al., 2004).

Product innovation is the introduction of a good or service that is new or has significantly improved characteristics or intended uses. In SMEs, not only the R&D staff but also the owners may play a major role in acquiring and applying the new knowledge for product innovation (Migdadi, 2009, Omerzel & Antoncic, 2008). Product innovation requires appreciation of customer needs, design and production while innovation process is linked to the application of technology to improve efficiency in the development and commercialization of the product, (Alegre et al 2002). Furthermore, theories of organizational innovation argue that information imported from sources outside an organization facilitate the creation of new ideas and enhance product innovation.

## **CONCLUSION AND RECOMMENDATIONS**

In the globalization, integration and liberalization era, the business environment is becoming fiercer than before, businesses of all types and sizes are facing continually changing situations externally and internally. Furthermore, the question at the heart of every strategist in every business enterprise is how to cope with these ambiguities, leverage competitive edge and expected level of performance (Vazquez, Santos, and Alvarez, 2001). In highly dynamic and uncertain environments, competitiveness must be regarded as a multi-dimensional construct comprising customer values, shareholder values and an organization's ability to act and react.

As a result of the foregoing, the study recommends that management of aluminium manufacturing companies should put mechanisms in place to enhance more internal innovations. This should include giving employees enough space to innovate new products and services. In addition, there is need for aluminium manufacturing to set aside a budget that will be used exclusively for product innovation.

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## Supply Chain Integration and Business Success of Agro-Allied Industries in Port Harcourt

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**Abstract:** This study studied the development of the supply chain and business success of Port Harcourt's agro-allied industries. In today's globalizing market climate convergence is one of the most effective strategic methods. Six (6) research questions were developed and six hypotheses were formulated in null form and p-values were tested. With the aid of the Statistical Package for Social Sciences (SPSS), Spearman's Rank Order Correlation Coefficient analyzed the results. It was discovered that a significant relationship exists in Port Harcourt between Technical Integration, Organizational Integration, Relational Integration and Productivity, and Market Share of agro-allied industries. However, the study concluded with viable recommendations that agro-allied industries will continue to implement IT, collaborative joint activity creation and strategic relations to better manage their supply chains as this has a direct relation to business efficiency. This can be done by outsourcing strategies.

**Keywords:** Supply Chain Integration, Business Success, Agro-Allied Industries.

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### Introduction

Today, business organizations face a world more dynamic and competitive than ever before (Porter & Stern, 2001). As trade barriers collapse and less developed countries enter the global marketplace, companies now face a greater number of rivals capable of delivering quicker and cheaper new goods and services than ever before. Its ever-expanding capabilities with the concomitant reduction in investment costs allow capital and knowledge to flow almost instantly across many parts of the world. In addition, as customers have become more selective and demanding, product life cycles have been reduced, requiring companies to contract time for marketing (Lovelace *et al.*, 2001), and delivering higher levels of customer support and personalized goods. As a result, most businesses and corporations have reached a "hyper-competitive" environment, marked by intensified rivalry, volatility and complexity (Merrifield, 2000). For most sectors, the convergence of supply chain operations and the technology to accomplish it has now become competitive necessities.

Including agribusiness, the global market landscape is in a state of transformation, driven by globalization, strategic alliances, mergers and acquisitions and advanced technologies. Such strategic strategies change the direction of overall business management and affect the ultimate target by moving from mass marketing to personalized marketing and promoting relationship-based marketing in all areas. The rapid development of information technology also has an impact on businesses and their management. Such developments in effect influence the supply chain management of all businesses. Generally speaking, any business' widespread success

depends on the efficient use of its supply chain, which connects all the participants and players in that specific sector. The chain usually starts from collecting raw materials or goods, and ends when the good is delivered to the customers, the ultimate end-users. Effective and efficient supply chain management is challenging, requiring clear understanding of the Supply Chain Integration (SCI) components. SCI is generally concerned with the management of the chain including all actors in the supply of a specific product or service starting at the very heart of a market. Often, rivals are treated as part of the supply chain network and managed under the chain. SCI is generally concerned with the management of the chain including all actors in the supply of a specific product or service starting at the very heart of a market. Often, rivals are treated as part of the supply chain network and managed under the chain.

Agro-allied industries are enterprises established with large-scale farming and livestock production activities. We also purchase related food and beverage manufacturing, packaging, and storage facilities to generate revenue and increase food intake per capita (NgCareers, 2013). We are also involved in agricultural research, manufacturing and selling of fertilizers, fish import and export, animal feed and feed millers, ocean trawling, shrimp and fishing, poultry farms, hatcheries and veterinary clinics (The NigeriaBiz.com, 2009). Despite their large scale, diversified structure and functions, however, there is growing concern about the low performance rates of these industries, especially in the developing world of which Nigeria is a part. Their dismal performance was attributed to poor pricing policies, inappropriate investment decisions, underutilization of capacity, inability to generate adequate working capital and maintain existing investments, and high levels of indebtedness (Olomola, 2001). These also contributed to the folding up of some of the companies that have huge consequences for Nigeria's food security.

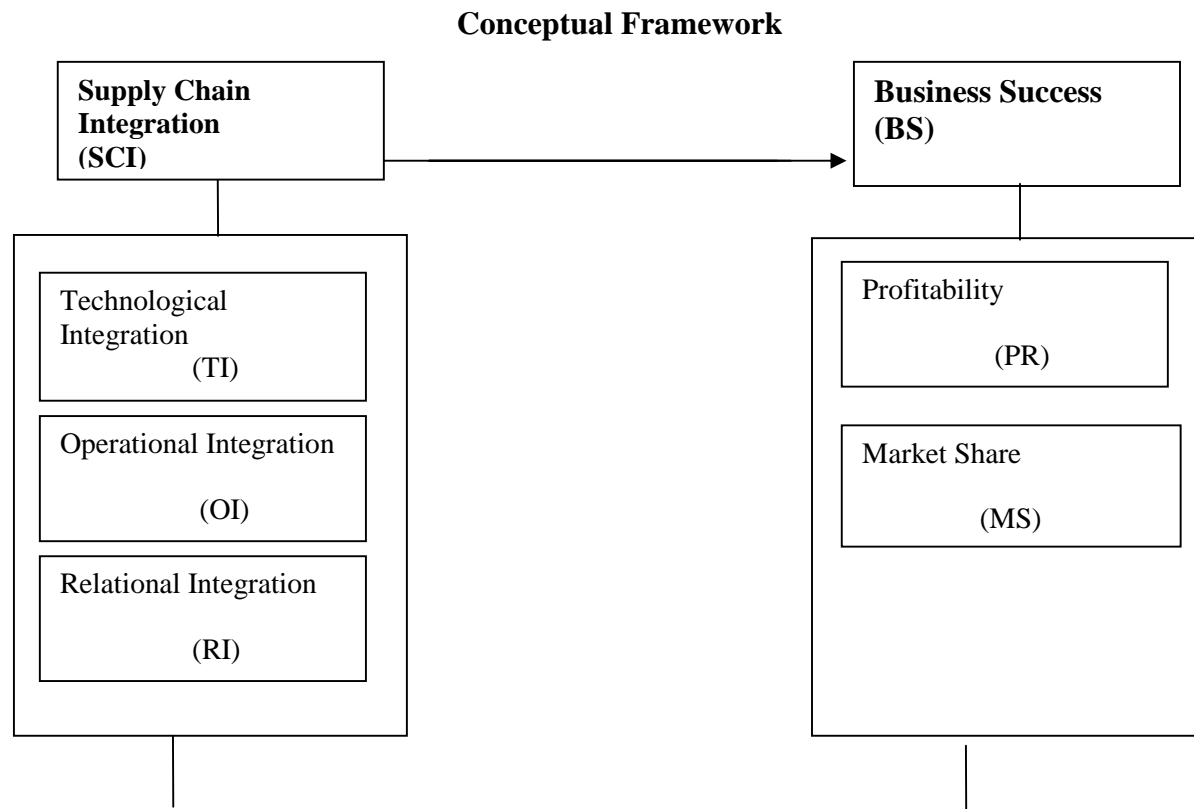
New worlds of technology and globalization have created multiple opportunities to penetrate and master businesses. Efficient supply chains provide incentives to build a competitive advantage that is sustainable (Tracey, Lim and Vonderembese 2005). The principle of supply chain integration is to analyze the processes of organizing the delivery and management of finished goods material through to the end user; the integrated supply chain activities begin with a customer order, and complete when the goods are in the customer's hands. Getting these products for the end user; includes a network of contributions from the involved parties; retailers, wholesalers, distributors, producers, and suppliers of raw materials (Waskita 2007). Chopra and Meindl (2001) argued that the supply chain seeks to increase the chain's total value. It is in line with what Siem (2005) said, supply chain integration (SCI) aims to bring full value to the right places at the right times. SCI's focus seems to be on maximizing profitability for the chains. One presumption states that outcomes are expected to accelerate as interactions between parties improve. Maybe that is true in terms of higher inventory turnover, on-time delivery, responsiveness, consistency, price reduction, reliability and effectiveness in getting the finished product into the hands of the customers.

In regard to empirical works from previous research, due to the market results, fewer works have been carried out on supply chain integration. Abdullah, Hamda, Maryam, and Abu (2011), for example, were studying the effect of supply chain integration on company efficiency and its challenges. Flynn, Huo, Zhao, (2010) looked at the effect of supply chain integration on performance: an approach to contingency and configuration. Grean and Michael, (2000) researched Supply-Chain Integration through Knowledge Sharing: Wal-Mart and Procter & Gamble channel collaborations. From the empirical literature mentioned, no research appears

to be traceable to supply chain integration and business performance in the agro-allied industry. Therefore a literature gap exists and our starting point is to explore empirically how information, operational and relational integration can positively influence a business outcome.

### **Problem Statement**

The global business world of today is rapidly evolving, and highly competitive. Companies need to be coordinated and effective, managing their supply chains, while still innovating and developing new goods. Improving supply chain management by capitalizing on the significant shift in technology, infrastructure and the internet will improve productivity and efficiency in innovation and industry. This is particularly important for agro-allied industries and growing economies like Nigeria, which is why this study is needed. With the emergence of new business innovations like twitter, and digital technology inputs, self-sufficiency in agriculture is nearly being achieved (John, Oral, Parr & Richard, 2010). All is required now is an effective distribution and promotion of the goods to the places that need them for consumption and other uses that in return would translate into good business results. Therefore, the aim of this study is to investigate how efficient integration of the supply chain can be accomplished to optimize the performance of companies in the agro-allied industry.



**Figure 1:** Conceptual Framework of the Relationship between Supply Chain Integration and Business Success of Agro-allied Industries in Port Harcourt

### **Aim and Objectives of the study**

The aim of this study is to evaluate the relationship between supply chain integration in Port Harcourt and business performance of agro-allied industries. Specifically, it sets out the following objectives:

1. To ascertain the relationship between technological integration and business success of agro-allied industries in Port Harcourt.
2. To identify the relationship between operational integration and business success of agro-allied industries in Port Harcourt.
3. To determine the relationship between relational integration and business success of agro-allied industries in Port Harcourt.

### **Research Questions**

In this study, the following research questions were stated:

1. What is the relationship between technological integration and business success of agro-allied industries in Port Harcourt?
2. What is the relationship between operational integration and business success of agro-allied industries in Port Harcourt?
3. What is the relationship between relational integration and business success of agro-allied industries in Port Harcourt?

### **Research Hypotheses**

Based on our research framework, the below hypotheses are formulated:

- Ho1: There is no significant relationship between technological integration and profitability of agro-allied industries in Port Harcourt.
- Ho2: There is no significant relationship between technological integration and market share of agro-allied industries in Port Harcourt.
- Ho3: There is no significant relationship between operational integration and profitability of agro-allied industries in Port Harcourt.
- Ho4: There is no significant relationship between operational integration and market share of agro-allied industries in Port Harcourt.
- Ho5: There is no significant relationship between relational integration and profitability of agro-allied industries in Port Harcourt.
- Ho6: There is no significant relationship between relational integration and market share of agro-allied industries in Port Harcourt.

### **Theoretical Framework**

#### **The Technology Acceptance Model (TAM)**

In this portion, as suggested by Davis, we'll explore the technology acceptance model. Fred Davis was first proposed as a doctoral thesis at the Massachusetts Institute of Technology in 1985 and current literature suggests that TAM is a widely cited pattern. Chuttur (2009 ) argues

that TAM 's wide acceptance is based on the fact that the model holds a sound theoretical premise and functional efficacy. The model has been modified from the time it was proposed in 1985 to integrate variables and relationships obtained from the 1975 Fishbein Theory of Reasoned Action (TRA) and Ajzen. The performance from the modifications was a more streamlined model that was important for anyone willing to challenge the theory about acceptance of the technology and its use in learning.

The model was developed to demonstrate how users come to embrace a technology and to use it. The theoretical basis is based on the assumption that, when a new technology is introduced to consumers, three major factors affect their decision on how and when they will use it. The first determinant is the Perceived Usefulness (PU), the second is the Perceived Ease-Of-Use (PEOU), while the third determinant is User Attitude To Use (ATU). According to Shroff (2011), Perceived Usefulness (PU) is the degree to which a user feels that using a specific program will increase the efficiency of his / her work.

On the other hand, Perceived Ease-Of-Use (PEOU) is the degree to which a consumer assumes the use of a particular technology will be effortless. This is the extent to which customers consider a technology as better than its alternatives (Jahangir, & Noorjahan, 2008). Commenting on the model, Chen, Li, & Li ( 2011) expands the claim that Perceived Usefulness (PU ) and Perceived Ease-of-Use (PEOU) have a beneficial impact on a technology 's Attitude toward Use (ATU).

The authors have stated that a positive attitude towards technology is likely to inspire consumers in a supply chain to use the technology. In addition, along similar lines with other studies, it was found that beliefs about e-learning are important in determining the use of a technology. The study noted that the use of technology may be predicted by degree of competency, indicating that having the expertise and experience to use a program would influence its use in industry for supply chain.

### **Diffusion of Innovations Theory**

The diffusion of Rogers' innovation theory is the most relevant to analyze technology acceptance in supply chain market environments (Medlin, 2001; Parisot, 1995). However, much work about diffusion includes technical advances. Rogers (2003) used the terms "technology" and "innovation" as synonyms for this. For Rogers, "a technology is a design for instrumental action which reduces the uncertainty in the relationships between cause and effect involved in achieving a desired outcome." It consists of two components: hardware, and software. While hardware is "the tool embodying the technology as a material or physical object," software is "the tool 's information base" (Rogers , 2003). Since software has a low level of observability (as a technical innovation) its adoption rate is very slow. For Rogers (2003), adoption is a "complete use of an innovation as the best possible course of action" decision and rejection is a "not adopting an innovation." Rogers describes diffusion as "the process of transmitting innovation over time among the members of a social network through certain channels." Innovation, communication networks, time, and social structure are the four main components of innovation spreading, as illustrated in this definition.

Rogers gave the following definition of an innovation: "Innovation is an concept, a method or a project regarded by an person or other adoption unit as being fresh" (Rogers, 2003). The invention may have been invented a long time ago but if it is viewed by individuals as new, it may still be the invention for them. Additionally, Rogers believed that work on technology

clusters lacks diffusion. For Rogers (2003), "a cluster of technology consists of one or more distinguishable technical elements which are considered to be strongly interrelated."

### **Concept of Supply Chain Integration**

Keebler and Durstche (2000) who described integration as "the merger, combination or incorporation of two or more functions within a company or two or more processes between two or more companies into an operationally compatible or unified process." This definition emphasizes that integration requires the convergence of various systems, which can be inside and beyond the borders of the company. Bagchi and Skjoett-Larsen (2002) have described integration as "the quality of the state of cooperation that exists between departments needed to achieve unity of effort on the basis of environmental demands." At the heart of this thesis examination of the concept of integration lies the cohesion of efforts mentioned in this description. An opportunity for convergence is argued for the accumulation of capital from the various participating units (Cousins and Menguec, 2006; Yeung et al. , 2009; Fernie et al., 2010; Schoenherr and Swink, 2012). This later description, however, focuses on the activities of the internal firm (Bagchi and Skjoett-Larsen, 2002), and neglects the activity beyond the limits of the firm. If the integration emphasis is internal to the organization or spreads beyond its borders, integration is represented as different entities working together as one entity.

In supply chain literature the idea of supply chain integration has recently gained widespread attention (Schoenherr and Swink, 2012; Zhang and Huo, 2013). It is especially relevant since the nature of the business environment needs companies to work more cooperatively to ease the flow of information and resources among supply chain partners (Lee, 2000; Mishra *et al.*, 2013; Caridi *et al.*, 2014). Companies are now under heightened pressure to merge their supply chains and become more profitable and meet existing market demands (Danese and Romano, 2011). A variety of definitions for supply chain integration exist in the literature. Flynn et al., (2010) described supply chain integration as "the degree to which a supplier collaborates strategically with its supply chain partners and manages intra- and inter-organization processes in a collaborative way. The objective is to achieve an effective and efficient flow of goods and services, information, money and decisions, to provide consumers with full value at low cost and high speed.

Kwon and Suh (2005) referred to supply chain integration as 'a strategic strategy that seeks to reduce operational costs and thereby enhance stakeholder values (customers and shareholders) by connecting all stakeholders across the network, from suppliers to customers.' Both concepts emphasize that the integration of the supply chain has to do with near coordination and operating as a single group with the various parties. However, several researchers accept that the principle of integration of the supply chain is still not well established in the literature, and there is a strong lack of consensus on its mechanisms.

### **Dimensions of Supply Chain Integration**

For compare and contrast the different impacts of SCI on firm results, three dimensions were established. This classification covers a broad range of prior conceptualizations provided in a detailed literature review. If management first participates in SCI at two companies, data and knowledge are shared (Lee, 2000; Olorunniwo, & Li, 2011; Saeed, Malhotra, & Grover, 2005). Thus (1) Integration of technology is defined as the use of technology to enhance and maintain the business environment. The next level in the progression is when management implements

activities in addition to information sharing (2) Operational integration refers to the creation of collective joint activities, work processes and organized decision-making among supply chain companies. The last aspect builds on the previous two and goes beyond attitudes-focused practices (Ireland & Webb, 2007; Lee, 2000; Saeed et al., 2005; Vander Vaart & van Donk, 2008): (3) Relational integration refers to the adoption of a strategic link between companies in the supply chain characterized by trust, dedication and long-term orientation.

### **Technological Integration**

In the following areas technology plays a key role in the management of the supply chain. Secondly, technology allows businesses to increase the amount and scope of information that needs to be transmitted to their trading partners. Second, technology enables firms to provide information on the real-time supply chain, including inventory level, delivery status, and production planning and scheduling that helps firms to monitor and track their supply chain activities. Second, technology also promotes cooperation between companies and suppliers in the planning and scheduling of activities, allowing for greater inter-company communication. As such, it may reduce the problems of coordinating supply chain activities that are often hindered by time and spatial distance (Paulraj et al 2017). The use of technology in the supply chain has gained substantial attention with the introduction of numerous Business-To - Business (B2B) networking technologies, including the internet, B2B private (Ethernet), and EPOS (Electronic Point of Sale). Studies have shown that successful communication of the technology enhances the integration of material flows between supply chain partners.

Work on the use and benefits of technology in SCM, however, is smaller in number without concentrating on particular technologies. Research on the benefits of using IT in SCM includes a variety of studies that examine the effect of technology on supply chain integration, consumer integration and service (Closs & Savitskie, 2003), supply chain time efficiency, financial performance, or a variation of that (Vickery *et al.*, 2003).

### **Operational Integration**

Managing the agricultural supply chain faces various administrative and organizational problems. Some of the issues discussed in earlier agricultural operation and management related research include inventory management of perishable products (Nahmias (2011), farm planning (Lowe and Preckel, 2004), management of food distribution (Akkerman *et al.*, 2010). Agricultural activity and risk management are closely related to human decision and reaction such as errors in action and inaction, commission and omission and directly impact a single person in the chain, but may also be spread through the entire supply chain (Jaffee *et al.*, 2010). Management and organizational related uncertainties are part and parcel of farm-to-business decision taking. Such risks are often related to declines in efficiency and poor product quality, and inconsistent distribution. One company may have organizational deficiencies that spillover into losses (or lost market access) to many others and (Jaffee *et al.*, 2010).

The agro-allied supply chain is fraught with market-related risk just like any supply chain. Such risks basically exist in fluctuations in demand and supply. Risks associated with demand result from disruptions that arise from downstream supply chain operations (Juttner, 2005). This involves, on the one hand, problems in the physical delivery of goods to end-customers, with transportation operations (McKinnon, 2006) and the distribution network being common concerns. Demand side risks may come from the confusion surrounding the clients'

random demands (Nagurney et al., 2005). Literature indicates that uncertainties related to demand such as price fluctuations are still the main concern discussed.

As a result of a variety of factors, demand-related risks / uncertainty arise in the agro-allied supply chain. These include (1) variations in demand affecting domestic or foreign input and/or output rates, (2) adjustments in consumer demand for quantities and/or quality attributes, (3) changes in food safety standards, (4) changes in consumer demand for the timing of product delivery, and (5) changes in quality and efficiency of the supply chain (Jaffee *et al.*, 2010).

The risks associated with the above demand contribute to disturbances in the supply chain of agro-allied companies. Disruptions emerge here from a discrepancy between the forecasts of a organization and real demand (predicted error) as well as weak coordination of the supply chain. The bullwhip effect, which is defined by an acceleration of market uncertainty in the upstream direction of the supply chain, is an significant problem in this context, impacting forecast consistency and thus demand-side disruptions. Lee et al . ( 1997) studied this adverse impact and described information that was delayed and skewed, promotional promotions, order batching, demand volatility and rationing, or shortage gaming as major triggers. Other factors which intensify the effect of bullwhip are over-reactions, unnecessary interventions, second guessing and mistrust (Christopher and Lee, 2004).

Supply related threats are numerous occurrences that impact the supplier's stability and result in the buyer – supplier partnership being temporarily or permanently terminated. For example, the threat of supplier financial instability could lead to default, insolvency, or bankruptcy of suppliers (Wagner and Johnson, 2004). Supply-related threats include supply demand limitations on manufacturing efficiency, quality concerns, technical developments and changes in product design.

### **Relational Integration**

Levine (2000) said distribution channel participants usually buy, distribute, and pass titles to products. In addition to physical possession and ownership of products, there are also several other flows between channel participants. They include promotion flows, flows of bargaining, borrowing, risk assessment, ordering and payments. The author also pointed out that a number of support functions also exist which help channel members perform their distribution tasks. Transportation, storage, insurance, funding and advertisement are activities which can be carried out by supporting companies which may or may not be considered part of the marketing process. Levine (2000) concluded that the overall delivery system works better by controlling factors such as channel structure and channel flows.

Distribution channels can be understood by analyzing their members, structure, roles, and contributions as noted by Avittathur and Shah (2005). Channels, in their opinion, consist of networks of different types of independent entities which need to be coordinated to help manufacturers meet and generate customer demand for goods and services. The authors pointed out that three types of organizations consist of channels: officials, traders, and facilitators. Agents advertise products and produce profits but do not purchase and stock goods themselves. Agents may be self-employed or they can be business workers. Companies including retailers, wholesalers and distributors purchase, store and sell products to those in the chain or to absolute disadvantage. Merchants are typically self-employed but certain businesses may have their own distribution units or retail outlets. Facilitators such as logistics service providers, independent warehouses, carrier and forwarding agents, and transporters facilitate the transfer, storage , and



distribution of goods but are not involved in the promotion or trading. Avittathur and Shah (2005) concluded by explaining that distribution networks are designed by assembling representatives, merchants and facilitators in different ways, based on industry, product and competitive background.

McGraw, (2009) referred to the positions of distribution networks by saying a retailer buys wholesaler products and markets them directly to customers. Therefore he acts as a direct connection between the wholesaler and consumers. The author further observed that the role of a retailer in the distribution of products involves a large choice of customers, making goods available in small quantities and at convenient places, home delivery of goods, and daily supply assurance, thus creating place utility, credit facility, and close customer contact. The author concluded by stating that by maintaining close interaction with customers, the retailer anticipates consumers' needs, thus bringing new products to customer notice and educating them in their uses. Thus a retailer acts as a friend to his customers and guides them. Indeed his contact with consumers is of intimate personal character and therefore he can provide wholesalers and manufacturers with input on consumer tastes. Daphne (2003) stressed intermediaries are very relevant market players. All buyers and producers benefit enormously from middlemen's positions, which ensure that by balancing supply and demand there is a smooth flow of products into the market. According to the paper, intermediaries provide input about the demand to the suppliers, thereby influencing the manufacturers' decisions. In comparison, consumers benefit from services rendered by intermediaries, such as promotion and distribution. Buyers will get the right sum they want, because intermediaries will sell in small units. Nonetheless, the author noted that because of the important roles they play, there are certain inconveniences of getting intermediaries in the distribution system, which involves price inflation as the goods are traded from one intermediary to the other. Daphne (2003) clarified that the reason behind these higher prices is to cover goods expenditure such as the expense of warehousing, insurance and transport. Another explanation the author noted behind price inflation was that intermediaries are always out to make profits; therefore they must have some benefit markup in the sales. The author concluded by suggesting that by purchasing the goods, customers would then bear the price of getting intermediaries in the process.

### **Business Success**

The degree to which business produces a certain desired effect or performance can be described as business success (Romaniuk and Sharp, 2003). Given the amount of expenditures necessary for ads, calculating the business impact is very significant. A business cannot dream of being a well-known brand unless it invests in its advertising activities, for which ads have dominated the consumer market (Hussainy *et al.*, 2008). As the advertiser's primary goal is to meet prospective clients and affect their knowledge, perceptions and purchasing behaviour. They spend a lot of money to keep an interest in their product. They need to understand what makes potential customers act the way they want them to. Advertising also seems to have the potential to lead to customer brand preference (Latif *et al.*, 2011).

### **Measures of Business Success**

**i.) Market Share:** Market share defines the percentage that an individual accounts for of a market (defined in terms of either unit or revenue). Market share is a key market competition

metric, that is, how well a company performs over its rivals (Farris *et al.*, 2010). Because of the positive connection between market share and organizational profitability, many businesses are seeking to maximize their market share as a way of achieving corporate profitability (Armstrong & Greene 2007).

Companies are still trying to grow their market share, in addition to attempting to increase the size of the market by recruiting broader audiences, reducing prices or ads (Investopedia, 2015). Some researchers, however, have noted that it does not follow logically that achieving greater market share would increase earnings. Perhaps the connection between market share and productivity is interpreted more logically as showing that companies with better deals appear to gain higher market share (Armstrong & Greene, 2007).

ii.) **Profitability:** Profitability is a company's ability to gain income. In other words, it is an organization's willingness to achieve financial gains that ensures more income than expenses. Profit is what remains of sales income after all the business-related costs are deducted from it (Grimsley, 2015). Business dictionary.com defines profitability as the state or condition that yields a profit or profit. This is the primary goal of all business activities, without which the enterprise would not succeed in the long run. Armstrong & Greene (2007) argues that the achievement of profit, given the positive connection between market share and productivity, is the proper goal of companies rather than market share.

### **Supply Chain Integration and Business Success**

Integration includes cross-functional teams who can collectively and concurrently pull together a carefully chosen variety of experts who exchange knowledge and make product, process and fabrication decisions (Koufteros, Vonderembse & Jayaram, 2005). Integration is characterized as a process of inter-functional cooperation, collaboration, teamwork, communication and collaboration that brings together functional areas into a cohesive organization (Flynn *et al.*, 2010). In addition, supply chain partners who frequently share information are able to function as a cohesive group and can better anticipate the end customer's needs, while responding to business shifts more quickly. External integration is an necessary prerequisite for effective SCI (Lambert, Cooper & Pagh, 1998). Therefore, businesses with a weak internal integration strategy should have low external integration rates and businesses adopting the full internal integration strategy would have the highest external integration rates (Gimenez and Ventura, 2005). In general, businesses are assumed to reach a fairly high level of internal integration before attempting to establish a higher degree of external integration (Otchere *et al.*, 2013). External integration can be achieved under formalized and unified organizational structure by automation and standardization of each external logistics process, implementation of new technology and continuous performance management.

### **Empirical Review**

A research conducted by Abdullah *et al.*, (2011) attempted to examine the effect of convergence of supply chain on business efficiency. This study collected a selection of 21 research papers from 1995 through 2011. Although this research presented empirical proof that integration of the supply chain contributed to improved business results, the use of secondary data rather than primary data exposed the analysis to bias associated with writing. Furthermore, the information was not gathered directly from the respondents as it would undermine the reliability of the results. Only 21 research papers were collected, further research papers could be examined or

reviewed, as well as journal articles. Thus, this paper's results cannot be widely generalized.

Alan *et al.*, (2014) performed a meta-analytic evaluation to determine the relationship between integration of the strategic supply chain and efficiency. The study found a link between Supply Chain Integration and Efficiency. Unlike the Abdullah *et al.*, study (2011), however, this study relied on secondary data which included analyzing the 34 journals released. This method has the disadvantage of not obtaining sufficient or sufficient data to allow the findings to be generalized. The approach is also tedious particularly when the researcher has to look for studies that assess the relationship of supply chain integration – performance.

## Methodology

The design of the survey research was deemed suitable for this report. The survey instrument (questionnaire) was considered the most suitable for collecting the data needed for the study, as the survey centers on people, beliefs, opinion, attitude, motivation and behaviors (Ali 1996). The questionnaire was divided into sections A and B, in which section A deals with the respondents' demographic profile under review and section B deals with the variables under study. The questions were grouped using the Likert scale of five points i.e. Strongly agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD) to draw the respondents' details.

This research has taken a special interest in managing the listed agro-allied services companies. The total number of seven (7) agro-allied service firms represented the total population of this report, which is 95 management personnel from each selected agro-allied service firms obtained from the personnel desk. The population targeted for this study is the management of seven (7) agro-allied services companies in Port Harcourt, Rivers State in their perception or assessment of supply chain integration and business success, namely: Integrity Vision Limited, Vitadamsyl Industries Nigeria Limited, General Agro Processing Ind. Ltd, Pacific Farms Ltd, Business school for farmers, OJOMS FARM COMPANY, Konet Mills Limited. Using Krejcie and Morgan Table (1970), the sample size of the total number of management members of the seven (7) listed agro-allied services companies is 76.

TABLE FOR DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

**Source: Krejcie and Morgan Table (1970).**

Where: N is the Population Size.

S is the Sample Size.

**Table 1. Sample Proportion**

S/No	Agro-Allied Services Firms	Mgt/Union Rep	No. of Questionnaire to be distributed
1.	Integrity Vision Limited	20	15
2.	Vitadamsyl Industries Nigeria Limited	12	10
3.	General Agro Processing Ind. Ltd.	12	10
4.	Pacific Farms Ltd.	10	8
5.	Farmers Business School	14	11
6	OJOMS FARM COMPANY	15	12
7.	Konet Mills Limited	12	10
	<b>Total</b>	<b>95</b>	<b>76</b>

The data collected were analyzed using Spearman's Rank Order Correlation Coefficient from the field. Testing the hypotheses through the use p-value with the aid of statistical package for social sciences (SPSS). The formula for the spearman's Rank-Order Correlation Coefficient is given as:

$$r_s = 1 - \frac{6\sum d^2}{N(N^2 - 1)}$$

Where:  $\sum d^2$  = sum of the squared differences in the ranking of the subject on the two variables.

N = number of subjects being ranked;

## Results and Discussions

**Table 2. Presentation of Data**

S/No	Agro-Allied Services Firms	Mgt/Union Rep	No. of Questionnaire distributed
1.	Integrity Vision Limited	20	15
2.	Vitadamsyl Industries Nigeria Limited	12	10
3.	General Agro Processing Ind. Ltd.	12	10
4.	Pacific Farms Ltd.	10	8
5.	Farmers Business School	14	11
6	OJOMS FARM COMPANY	15	12
7.	Konet Mills Limited	12	10
	<b>Total</b>	<b>95</b>	<b>76</b>

**Source: Field Survey 2018**

Table 2 indicates the number of questionnaires distributed to management employees in each of the seven (7) selected agro-alloy services firms in Port Harcourt , Rivers State. Fifteen copies of

the questionnaire were distributed to Honesty Vision Limited, and ten copies were distributed to Vitadamsyl Industries Nig. Ltd, General Agro Processing Ind was given 10 copies of the questionnaire. Ltd., distributed 8 copies of the questionnaire to Pacific Farms Ltd., administered 11 copies of the questionnaire to Farmers Business School, distributed 12 copies of the questionnaire to OJOMS FARM COMPANY, and distributed 10 copies of the questionnaire to Konet Mills Ltd. It means that out of 76 copies of the questionnaire distributed, 76 copies were correctly completed and returned as the researcher was diligently followed up in the process of circulating, filling, and completing the questionnaire, therefore 76 are taken as the sample size and used for analysis.

### Hypotheses One and Two

**Table 3:** Spearman's correlation of Technological Integration (TI) and measures of Business Success.

			TI	PR	MS
Spearman's rho	TI	Correlation Coefficient	1.000	.721	.882
		Sig. (2-tailed)	.	.000	.000
		N	76	76	76
	PR	Correlation Coefficient	.721	1.000	.527
		Sig. (2-tailed)	.000	.	.000
		N	76	76	76
	MS	Correlation Coefficient	.882**	.527**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	76	76	76

Source: Data output, 2018

The data (table 3) reveals a significant relationship between technological integration, which is a dimension of supply chain integration and the measures of business success. The result is interpreted as follows:

**Technological Integration (TI) and Profitability (PR):** The results of the analysis reveal that there is a significant relationship between technological integration and profitability which is a measure of business success. This is as the rho value = .721 and level of significance where  $P = 0.000$  indicate a substantial level of association between both variables; hence based on the decision rule of  $P < 0.05$  for the tests, the null hypothesis is hereby rejected as the result shows a significant relationship between technological integration and profitability.

**Technological Integration (TI) and Market Share (MS):** The results of the analysis reveal that there is a significant relationship between technological integration and market share which is a measure of business success. This is as the rho value = .882 and level of significance where  $P =$

0.000 indicate a substantial level of association between both variables; hence based on the decision rule of  $P < 0.05$  for the tests, the null hypothesis is hereby rejected as the result shows a significant relationship between technological integration and market share.

This research corroborates the study by Adam, Anders and Christian (2015), finding that the integration of internal information systems has a significant positive association with the integration of external information systems; that both the integration of internal information systems and the integration of external information systems are positively linked to cost and quality performance; The quality performance is significantly related to cost efficiency, and both cost-quality efficiency have major positive associations with firm profitability.

### Hypotheses Three and Four

**Table 4:** Spearman's Correlation of Operational Integration (OI) and measures of Business Success

			OI	PR	MS
Spearman's rho	OI	Correlation Coefficient	1.000	.733	.743
		Sig. (2-tailed)	.	.000	.000
		N	76	76	76
	PR	Correlation Coefficient	.733	1.000	.527
		Sig. (2-tailed)	.000	.	.000
		N	76	76	76
	MS	Correlation Coefficient	.743	.527	1.000
		Sig. (2-tailed)	.000	.000	.
		N	76	76	76

Source: Data output, 2018

The data (table 4) reveals a significant relationship between operational integration, which is a dimension of supply chain integration and the measures of business success. The result is interpreted as follows:

**Operational Integration (OI) and Profitability (PR):** The results of the analysis reveal that there is a significant relationship between operational integration and profitability which is a measure of business success. This is as the rho value = .733 and level of significance where  $P = 0.000$  indicate a high level of association between both variables; hence based on the decision rule of  $P < 0.05$  for the tests, the null hypothesis is hereby rejected as the result shows a significant relationship between operational integration and profitability.

**Operational Integration (OI) and Market Share (MS):** The results of the analysis reveal that there is a significant relationship between operational integration and market share which is a measure of business success. This is as the rho value = .743 and level of significance where  $P =$

0.000 indicate a high level of association between both variables; hence based on the decision rule of  $P < 0.05$  for the tests, the null hypothesis is hereby rejected as the result shows a significant relationship between operational integration and market share.

This result supports the findings of Paiva, Gavronski and D'Avila (2011), in their analysis on the relationship between manufacturing integration and success from an activity-oriented perspective in Brazil, that manufacturing integration with suppliers, marketing and R&D is positively linked to income and sales growth when it occurs simultaneously in key internal activities. They suggested that managers interested in enhancing their plant output should encourage collaboration at all organizational levels between manufacturing and R&D teams.

### Hypotheses Five and Six

**Table 5:** Spearman's Correlation of Relational Integration (RI) and measures of Business Success

			RI	PR	MS
Spearman's rho	RI	Correlation Coefficient	1.000	.642	.852
		Sig. (2-tailed)	.	.000	.000
		N	76	76	76
	PR	Correlation Coefficient	.642	1.000	.611
		Sig. (2-tailed)	.000	.	.000
		N	76	76	76
	MS	Correlation Coefficient	.852	.743	1.000
		Sig. (2-tailed)	.000	.000	.
		N	76	76	76

**Source:** Data output, 2018

The data (table 5) reveals a significant relationship between relational integration, which is a dimension of supply chain integration and the measures of business success. The result is interpreted as follows:

**Relational Integration (RI) and Profitability (PR):** The results of the analysis reveal that there is a significant relationship between relational integration and profitability which is a measure of business success. This is as the rho value = .642 and level of significance where  $P = 0.000$  indicate a high level of association between both variables; hence based on the decision rule of  $P < 0.05$  for the tests, the null hypothesis is hereby rejected as the result shows a significant relationship between relational integration and profitability.

**Relational Integration (RI) and Market Share (MS):** The results of the analysis reveal that there is a significant relationship between relational integration and market share which is a measure of business success. This is as the rho value = .852 and level of significance where  $P = 0.000$

indicate a high level of association between both variables; hence based on the decision rule of  $P < 0.05$  for the tests, the null hypothesis is hereby rejected as the result shows a significant relationship between relational integration and market share.

Such results corroborate the Forbes and Lederman results (2009, 2010). Results show that airlines are more likely to integrate on routes needing more regular adaptation, and that integrated airlines perform better than non-integrated ones when adaptation needs increase. Mullainathan and Scharfstein (2001) also consider that unintegrated waterproof plastic producers respond more strongly to international demand, while integrated producers concentrate on domestic demand. Studies by Antras and Foley (2015), Gill and Marion (2013), Lafontaine and Slade (2012) and Gill et al (2016) all provide evidence of the importance of relative adaptation in the crop, film and airline industries, respectively.

## **Conclusion**

And the researcher concludes on the basis of the aforementioned discussions as follows:

- i. Technological Integration significantly affects the Profitability of agro-allied industries in Port Harcourt.
- ii. Technological Integration significantly affects the Market Share of agro-allied industries in Port Harcourt.
- iii. Operational Integration significantly affects the Profitability of agro-allied industries in Port Harcourt.
- iv. Operational Integration significantly affects the Market Share of agro-allied industries in Port Harcourt.
- v. Relational Integration significantly affects the Profitability of agro-allied industries in Port Harcourt.
- vi. Relational Integration significantly affects the Market Share of agro-allied industries in Port Harcourt.

## **Recommendations**

The study makes a number of recommendations.

- i. The study advises that information technology (IT) should be completely developed and used as a method of technical integration by the agro-allied industries, because this has a significant relationship with business efficiency.
- ii. The study recommends that agro-alliances create collaborative joint activity production as a form of organizational collaboration to better manage their supply chains as this has a direct relation to results. This can be done by outsourcing strategies.
- iii. The study recommends that companies in the agro-allied industry implement strategic relations as a form of relational integration, as they can contribute to better business results.

Therefore, they will be adopted by executives in other sectors to better handle their supply chains and get higher market results.



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