

PERCEPTIONS OF KEY PARTICIPANTS ON THE INFLUENCE OF GREEN SUPPLY CHAIN ON PRODUCTION AND FREIGHTING ACTIVITIES IN A DEVELOPING ECONOMY

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Abstract

The study examined how the global drive for energy reduction and efficient production has contributed to the achievement of Green Supply Chain (GSC) and Good Manufacturing Practices (GMP) in two major production organizations in Nigeria. The methodological approach employed the derivatives of the ontological and epistemological paradigms. For the purpose of data gathering and analysis, the phenomenological school of thought which employed the qualitative methods of in-depth interview sessions and literature were utilized. Production managers in Dangote Sugar Refinery (DSR) and Total Nigeria Plc (TN), two key manufacturing organizations in Nigeria were interviewed on their perceptions of how the adoptions of Environmental Management System (EMS) techniques and staff development activities have positively impacted on the achievement of GSC. Based on findings from this study it is suggested that the two studied firms (and by extension other manufacturing entities in Nigeria) should involve their local Supply Chain partners in the conceptualization and the implementation of their Green Supply Chain protocols, this undoubtedly will enhance the achievement of GMP and sustainable management of their operating environment.

Keywords; Green Supply Chain (GSC), Good Manufacturing Practices (GMPs), Environmental Management System (EMS), Interview, Qualitative Research, Developing Economy

Introduction

Nigeria is home to a fifth of the Africa continent one billion population and it is also the region biggest economy after 2013 rebasing of the country's economy. Statistics from the Post rebasing era showed that the manufacturing sector has become a critical contributor to the national Gross Domestic Product (GDP). Between 2010 (the base or reference year) to 2013, the manufacturing sector contributed nearly 8 % of the total real GDP for each of the four years considered. The data for 2010 revealed that the manufacturing sector solely contributed 6.55% of total real GDP in that year. The contribution of the sector to the country's GDP improved to 7.79% in 2011 and moved closer to the double-digit figure by growing up to 9.03% of real GDP in 2013 (Fig 1). These data underscored the importance of manufacturing activities to the Nigerian economy and its pivotal role in the effort of the government to diversify the economy from the overt dependence on revenue that acquires from crude oil sales solely (Nigeria Bureau of Statistics, 2014). While the contribution of the manufacturing sector to the national economy in Nigeria is not at par with what available statistics showed as being available in many

developing economies of the world (particularly Asian Tigers), the negative externalities on the immediate environment of where most industries are sited are already being experienced in various cities in the country. A 2018 Global Air Report published by the showed that the quality of air in Nigeria is the fourth deadliest in the world (Ogundipe, 2018; Health Effects Institute, 2018).

The Health Effects Institute, 2018 (HEI) reported that there were 150 deaths per 100,000 people in Nigeria which were as a result of poor atmospheric condition in 2017. It was only Afghanistan with 406; Pakistan, 207 and Indian with 195 deaths per 100,000 people that exceeded Nigeria's figure for the considered year (Ogundipe, 2018). Analysts are of the view that air pollution arising from industrial discharge and noxious emissions from the exhausts of poorly tuned engines of Heavy Goods Vehicle (HGV) engaged directly in Supply Chain (SC) activities are the leading causes of air pollution in the country (Ajayi, 2016; Ogundipe, 2018; Ajayi, 2018; Ajayi & Mazinyo, 2020). As it could be deduced from the statistics from the NBS (2014), manufacturing activities are on the upward swing in the country (figure 1). In recent times the Nigerian government has made concerted efforts to wean the country's economic dependency on proceeds from crude oil sales (NBS, 2014; Ajayi, 2016). The government strongly believed that the manufacturing sector is one of the major diversification choices (NBS, 2014). At the global level, there is a near consensus among stakeholders (scientists, researchers, and environmentalists) that industrial activities arguably accounted for the highest level of Green House Gasses (GHG) emission. A 2017 report which assessed the contributions of the global industrial sector to the emission of GHG showed that in 2010 the industry sector accounted for 28% of final energy use and 13 gigatonne carbon dioxide equivalent emissions. The report further warned that unless energy improvements measures are accelerated the volume of emissions are projected to increase by 50-150% by 2050 (Logan et al, 2017).

A critical offshoot from the foregoing has been the drive from global political leaders, diplomats, environmentalists, and business owners to cut down the rate of emission of GHGs. The desire to achieve the delicate balance between the need to grow the global economy through leveraging the manufacturing potentials and the maintenance of environmentally expeditious yearning to cut down on the dangerous discharge of noxious effluents into the environment could therefore be a daunting task. Some of the unavoidable questions that government policymakers and business owners in most developing economies must, therefore, provide answers to in the twenty-first-century environment are; how to maintain the needful balance between Green Supply Chain (GSC) and their potential impacts on the global competitiveness of affected firms (Dechezlepretre, & Sato, 2017). For firms and businesses who engaged different forms of Supply Chain (SC) architectures for the successful achievement of their production targets, the implementation of GSC and the positive impact of such on altering the negative balance of climate change has become a critical determinant of public goodwill (Dechezlepretre, & Sato, 2017; Zheng et al, 2017) This study is an exploratory attempt to examine how two major manufacturing conglomerates (with disparate ownership structures) in Nigeria are grappling with the challenges of achieving sustainably GMPs occasioned by the incorporation of the basic tenets of GSCM at their operational, tactical and strategic levels. This research endeavored to assess how the adoption and implementation of the International Standard Organization (ISO) Environmental Management System (ISO 1400 series) have helped in the achievement of GMPs or eco-friendly manufacturing. There are shreds of evidence which strongly suggested that there is an undeniable connection between the achievement of GMPs, the attainment of an acceptable level of GSCM for manufacturing entities and the usage of ISO engineered EMS as

the vehicle for such exercise (Texeira-Quiros, 2010; Singh et al, 2011; Yaya et al, 2014; Bhattacharjee, 2015; Dombroski, 2018). This appears to be more realistic in the food manufacturing industries, where empirical findings have established the presence of a nexus between the attainment of any EMS standard which naturally promotes GSCM and Safe Quality Food (SQF) (Singh et al, 2011; Yaya et al, 2014; Bhattacharjee, 2015; Dombroski, 2018; Cific & Oliver, 2018; Althor et al, 2018). Detail evidence of such linkages between the attainment of EMS and the achievement of GSCM in the operation of other types of manufacturing concerns also exists in the available literature (Neyestani, 2017; Althor et al, 2018). It is however perceptible that the bulk of these studies employed the positivist paradigm and the use of quantitative techniques. The use of statistical and mathematical analyses to arrive at acceptable inferences for studies in the different aspects of SCM is quite popular (Logan et al, 2018; Ajayi, 2018; Said, 2019; Ajayi & Mazinyo, 2020).

The positivism paradigm while offering a high level of objectivism and scientifically astute explanations of realities often failed in incorporating key elements of subjectivism which is sometimes necessary when the subject of study is human. Human beings quite unlike inanimate physical objects can be irrational and may be difficult to predict precisely (Gammelgaard & Flint, 2012; Golcic et al, 2012; Barbosa et al, 2017). The interpretivist school of thoughts believed that the use of codified mathematical values to represent the emotive and sentimental perceptions of human beings involved in researches could be grossly inadequate. Base on the foregoing the methodological basis for the research was a derivative of the ontological and epistemological paradigms which the researchers believe are most suitable for the achievement of the research objectives. To this end, the phenomenological school of thoughts which utilized the qualitative methods of in-depth interview sessions and literature searches were employed.

Evolvement and Nature of Manufacturing Industries in Nigeria

The major manufacturing firms in the Nigerian economy can be broadly divided into two when the historical accounts of their ownership structure are considered. The first is foreign multinationals with a strong presence in the various aspect of the economy. These firms have their roots in the country's colonial past, although they have become "nationalized" through the 1972 Nigerian Enterprises Promotion Decree and as Amended in 1977 (Genova, 2010). Their operational structure and administrative regimen showed a distinct proclivity for the structures of the 'mother company' which are located mainly in the developed economy of Western Europe/North America. The second categories are multinationals or domestic manufacturing firms established by Nigerians. As should be expected, the philosophy of these organizations on the achievement of Good Manufacturing Practices (GMPs) which incorporates the tenets of Green Supply Chain Management (GSCM) are greatly influenced by the historical antecedents of their ownership structure. One of the effects of the differences in the ownership structures between nationally owned firms and their foreign counterparts in the Nigeria manufacturing milieu is that the foreign-owned multinationals generally, replicate the extant operational philosophies of their international headquarters (which usually located in Europe or the US). It is, therefore, easier for most of such firms to quickly imbibe GMPs that are operational in the different subsidiaries of their parent organizations scattered all over the world (Genova, 2010; Total, 2018; Ajayi, 2018). As observed in the course of conducting this study, they are also more responsive to industry sectorial developmental stimuli than Nigerian owned manufacturing firms due to their strict adherence to global best practices.

Literature Review

In recent times, there is a general awareness of the inevitability of applying GSCM in the achievement of global competitiveness for manufacturing firms in developing economies (Singh et al, 2011; Bhattacharjee, 2015). The contributory factors to this development could be attributed to the unrelenting campaigns by government leaders through different policy instruments like the Kyoto protocol of 1998 and the more recent Paris 2015 agreement. Nearly all the members of the United Nations are now signatories to the different aspects of these treaties.

For the proponents of cutting down on GHGs the achievement of international agreements to limit greenhouse gas emissions, such as 2015 the Paris Agreement or the 1997 Kyoto Protocol, is arguably among the most important issue of our time (Cific & Oliver, 2018). Going forward in a situation like has been quite paradoxical for the policy makers and different stakeholders in the manufacturing and Supply Chain (SC) sectors globally. There is a wide gulf in the perceptions of stakeholders from the different countries on how best to tackle the conflict of interests of GSC and increased manufacturing. Analysts are generally of the opinion that “GHGs are deliberately emitted by countries to drive economic growth and enhance human well-being” (Althor et al, 2018). In the last two decades, there are has been endless debates on who is driving the release of GHGs into the atmosphere between developed and developing regions of the world (Friends of The Earth [FoE], 1992; Ward & Mahowald, 2014). Zheng et al (2008), provided empirical pieces of evidence which showed that between 1850 and 2004, the G8 countries (the U.S., Canada, Japan, Britain, Germany, France, Italy, and Russia) contributed over 61% of the cumulative GHG emissions, while five large developing countries (China, Brazil, India, South Africa, and Mexico) were responsible for 13%. An earlier report by an environmentalist group claimed that between 1931 and 1989, the developed countries of the world were responsible for 95 percent of global chlorofluorocarbon emissions (FoE, 1992).

More recent reports on the discourse are however indicating a rise in the contribution of the developing world on the emission of GHGs-an indication of the upsurge in manufacturing activities in the region (den Elzen et al, 2013; Wei et al, 2015). A 2010 comparative report indicated that the developed countries and developing countries contributed 51.9% and 48.1% to the global GHG emissions respectively. It is an incontrovertible fact there is a causal relationship between the implementations of the various protocols aimed at GHGs reduction and the actual reduction. Some developed countries rightly believed that the successful implementations of the agreements have favored the development of manufacturing and allied activities (like SC) in developing economies while slowing their own economic growth (Wei et al, 2015; Logan et al, 2018; Cific & Oliver, 2018). Empirical evidence from some developed economies (the US inclusive) buttressed this belief. Cific & Oliver, 2018, provided proofs which showed that while the Kyoto Protocol was successful in terms of decreasing greenhouse gas emissions, it has from 2005 (when it implementation commenced) had negative economic outcomes, slowing down per the capita GDP growth in these countries. In absolute terms, from 2005 GHG emission went down by an annual average per country (in the developed economy) of around 1 million metric tons of CO₂ equivalents, while their per capita GDP growth too declined by an average of between 1 and 2 percentage points annually in the years following 2005. It has been observed that over 75 % of a typical manufacturing firm carbon footprint is related to the emission of pollutants occasioned by transportation and logistics activities (Ward & Mahowald, 2014). Amongst other things, this research aims to critically examine the perceptions and knowledge base of key stakeholders in the manufacturing sector

on GSCM and how such knowledge has shaped the achievement of GMPs in their distinctive manufacturing entities.

GSCM is seen in literature as the integration of environmental thinking into supply chain management (SCM). When technically and innovatively implemented, every critical aspect of supply chain feels the impact of the “Greening” paradigm of GSCM. This includes the process of material sourcing, selection of right material to be used in manufacturing, the actual production processes, the delivery of the final products to end-users and the end-of-life product management. As revealed through findings from this research, the need to implement a visible and measurable GSCM has assumed a global dimension. Apparently, it has been on the front burner for SCM and manufacturers in the developed economies in the last two decades (Singh et al, 2011; Logan et al, 2018; Said, 2019; Ajayi & Mazinyo, 2020).

The availability of this methodological gap partly formed the basis for this study. Another important lacuna which this research intends to fill is to provide insights on how manufacturing entities in a developing economy are coping with the pertinent question of achieving sustainable “greening” in their SCM.

The Selected and Studied Corporations

Two corporations are selected for this study. One of them (Dangote Sugar Refinery) is in the Fast Moving Consumer Goods (FMCG) sector. It is presently one of the biggest sugar refineries in the world with a current production capacity of over 2 million MT. The corporation accessed the bulk of its raw materials from various sugar plantations scattered in different locations in the country. The organization employs backward integration by forming alliances with supply chain partners in a manner that encouraged shared philosophies in the areas of quality improvement, environmental management, and GSCM. It presently employs nearly a thousand employees and its part of the larger Dangote Group, a conglomerate which generated revenue in excess of over 4.1 billion U.S. dollars in 2017 (Institute of Developing Economies-Japan External Trade Organization, 2015; Adeboboye, 2019). The second organization studied is Total Nigeria Plc. It is an affiliate of Total S.A, the parent corporation headquartered in France. Total S.A. is one of the global leading energy corporations. The organization described itself as an active player in the whole value chain of the oil and gas industry. It operates in the upstream, midstream and downstream sectors of the oil industry. It has been operating in oil and gas exploration in the Nigerian market for six decades. Its other interests include natural gas liquefaction and the marketing of petroleum products. According to the group, the environmental management systems on Total major sites are ISO 14001 certified. It claimed that 100% of its 67 sites responsible for the emission of more than 10 kt of GHG were all ISO 14001 certified by the end of 2017. The group claimed that the implementation of the ISO 14001 has helped in the achievement of stipulated targets of 50 % reduction of SO₂ emission in all its field station as of 2016, 4 years before the 2020 earlier set deadline. The organization also affirmed that it has achieved the milestone of reducing the hydrocarbon content of water discharge from its offshore and onshore sites by 30mg/l and 15mg/l respectively (Ajayi, 2018; Total, 2018).

These two firms are selected for the study because they provided an opportunity to examine how two different manufacturing entities which are operating in different sectors implemented GSCM in their operational, tactical and strategic plans. The fact that the two organizations have different ownership structures (one is largely indigenously owned while the other is mainly foreign) is another point of divergence that makes the analysis of their guiding philosophies on environmental management interesting. Lastly, this research intended to fill an important gap in the body of existing knowledge by critically investigating how the four main GSCM practices

namely: eco-design, green purchasing, environmental cooperation, and reverse logistics influenced GSC adoption with its implementation in the two selected case studies. Earlier studies (van den Bergh et al, 2000; Gowdy, 2008) have established the existence of a relationship between these four GSCM variables and corporate performances among different manufacturing firms in different climes. This present study, however, differs from these earlier studies because most of the previous studies employed a positivist approach to examine the influences exerted by the GSCM practices on the general performances of SCM firms. The focus of this research revolves around the investigation of how the differences in the ownership holdings (business philosophies) between the two studied cases affected the adoption and implementation of critical GSCM practices. This was done through the use of in-depth interview sessions to critique the existence of a relationship between ownership structures of manufacturing firms and the implementation of GSCM practices of eco-design, green purchasing, and environmental cooperation and reverse logistics in a sub-Saharan developing economy (Gammelgaard & Flint, 2012; Golcic et al, 2012; Barbosa et al, 2017; Ajayi & Mazinyo, 2020).

Theoretical Framework

The theoretical underpinning for this study is a derivative of two major theories; these are the Theory of Change (ToC) and the Prospect Theory (PT). The ToC (Shorgen et al, 2010; Iturbe-Ormaetxe et al, 2011; Osberghaus, 2012) has been described “essentially as an explanation of how a group of stakeholders expects to reach a commonly understood long-term goal” (Anderson, 2005 p 3). According to Osberghaus, (2012), ToC, when applied in Climate Change Adaptation (CCA), studies usually “articulate an ultimate ‘big picture’ the outcome, and then ‘backward mapped’ the steps needed to achieve it” (Bours et al, 2014, p1). It is believed that stakeholders who implemented the framework begin with defining the long-term environmental goal desired and work backward in time up to the present (Osberghaus, 2012). ToC is preferred as a theoretical framework for this study because of its emphasis on contextual analysis which made it a most suitable tool for evaluating CCA programs like the adaption of GSCM designed for local conditions (Shorgen et al, 2010; Osberghaus et al, 2012).

Another critical factor that made ToC appealing for the purpose of this research is the ability of ToC to weave together diverse projects and programs into a coherent and strategic portfolio that enhances linkages across CCA sectors and scales. The two manufacturing entities investigated in the course of this research operate Supply Chain Collaborations (SCC) with different members of their respective value chains who shared the same philosophies regarding GSCM. The shared philosophy on GSCM as it involves their manufacturing and transportation functions revealed an innate predilection towards a sustainable CCA.

The second theoretical perspective employed in this study is the Prospect Theory (Kahneman & Tversky, 1979; Kahneman et al, 1991 Nigussie, 2012; Yohe et al, 2011). PT has been used as a valid descriptive theory for assessing the decision making processes of either an individual or a small community on the appropriateness of their responses to CCA measures (Kahneman & Tversky, 1979; Kahneman et al, 1991 Nigussie, 2012; Yohe et al, 2011). In applying PT to CCA studies, (Yohe et al, 2011) expounded the proclivity of the theoretical construct in the provision of robust descriptive analyses on the causative factors behind decision making processes in CCA measures. PT relies on the observations of the members of the community studied first, in the organization and formulations of the CCA options available which then inform the decision on the eventual CCA measures that will be adopted. This is aptly termed ‘reference points’ (Kahneman et al, 1991 Nigussie, 2012; Yohe et al, 2011). The second stage in the PT construct

when applied in CCA is the editing phase. At this stage, there is an opportunity for feedback or a review of the outcome of the adopted CCA measures. These outcomes are either classified as loses or gain in deference to the earlier adopted CCA measures or reference point (Kahneman et al, 1991 Nigussie, 2012: Yohe et al, 2011). The application of PT, as done in this study, is rather novel, although evidence existed that the theoretical construct has been used extensively in the assessment of CCA in environmental economics (Golicic et al, 2012; Barbosa et al, 2017). It is evinced that the bulk of these earlier studies focused on the assessment of CCA among members of the public who were at the receiving ends of the effects of climatic change on their immediate environment. For example, PT was used in analyzing the environmentally economical effects that decisions on willingness-to-pay and willingness-to-accept-compensation measures had on CCA (Golicic et al, 2012; Barbosa et al, 2017). PT and by extension ToC are both being applied in this present study to critique how private corporations arrived at their decisions on the most ideal GSCM model to apply in their quest to achieve an eco-friendly GMPs. The two theoretical constructs also provided invaluable guidance in the assessment of how efficiently the GSCM models deployed has been in these two corporations, analysis of the respondents' perceptions provided insights on this.

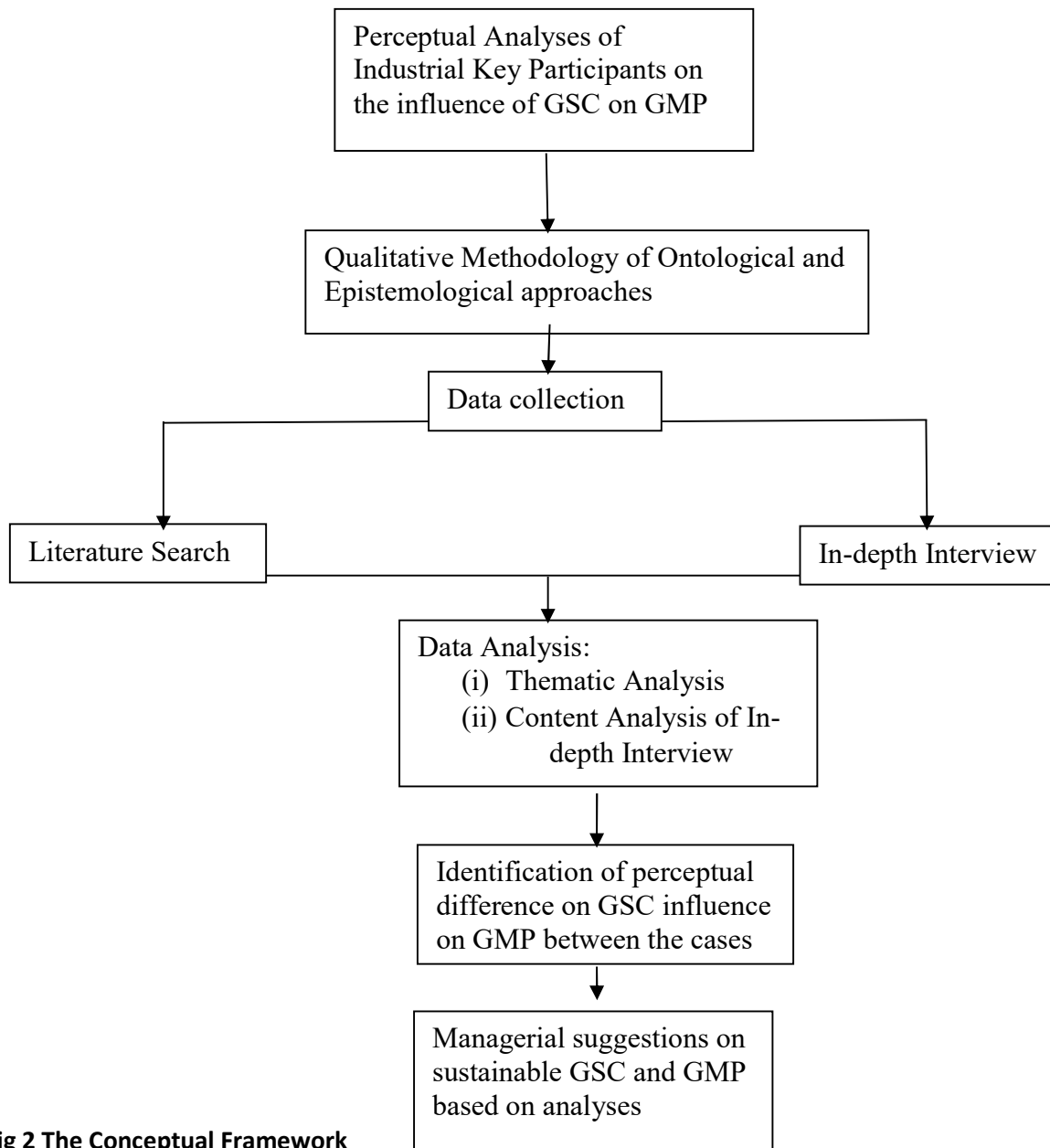


Fig 2 The Conceptual Framework

Methodology

The methodological approach for the study employed the derivatives of the ontological and epistemological paradigms by using the phenomenological school of thoughts. The qualitative methods of in-depth interview sessions and literature search were used in data gathering. The inductive technique of case study was employed to thematically discuss the results from the interview sessions. The perceptions of the Health, Safety, and Environment (HSE) manager and Fleet/Logistics manager of the two organizations on what informed the adoptions of their

organizational philosophy as it relates to GSCM and the effects of such adoption on the achievement of a sustainable GMPs were sought. The results from the interview sessions were discussed thematically as it relates to the implementation of GSCM at the strategic, tactical and operational levels.

In recent time the interpretivism philosophy is becoming popular in SCM studies because of its ability to give a contextual analysis of subject matter without necessarily interfering with the data gathering and interpretational processes (Gammelgaard & Flint, 2012; Golicic et al, 2012; Barbosa et al, 2017). According to Gammelgaard & Flint, 2012, "qualitative research methods should be chosen when questions asked about a phenomenon require them. Thus, having the qualitative approaches in one's toolbox enables far more research questions to be asked and helps to reveal more about the complexity of supply chain networks" (Gammelgaard & Flint, 2012, p1). It is therefore in line with this viewpoint that the interpretive philosophy is applied in the study. It sought to provide valuable insights amongst other things on how the adoption and the implementation of GSC have influenced SCC between the manufacturing entities examined and their various partners. Also, a subjective assessment of the respondents' views on the effectiveness of the adopted GSCM models and their subsequent impacts on the achievement of GMPs in the studied cases was undertaken.

Data Analysis

The thematic analyses of the two interview sessions are transcribed in this section as the findings of this research exercise. Supporting facts from the extant literature are further employed to validate or counter (as the case may be) data sourced from the transcribed interview sessions. Below are the excerpts from these interview sessions;

Determinants of Green Supply Chain (GSC) Adoption and Eco-design model

When questioned about the contributory factors that shaped the adoption of GSC for their organizations, D1 (HSE manager in DSR) posited that their supply chain partners are their greatest pull; "we are desirous of maintaining a wonderful value chain with our partners-our supply chains partners like Coca-Cola and Nestle. These are multinationals manufacturing entities and they insisted that for the continuous business relationship between our organizations and theirs, we must start the implementation of GSC at our operational (daily), tactical (quarterly) and strategic levels". He elaborated further "We have some HSE standard in place right from time, for example, we have the International Standard Organization (ISO) certification for Occupational Health and Safety Management Certification (OHSAS 45000). This is, however, is tailored towards attaining a high level of safety within the manufacturing plant".

T2 (Fleet manager at Total Nigeria), when questioned along the same line, provided a different answer " Total Nigeria is a part of a global energy group-what is reflected here is the decision agreed upon at the global headquarter. We are one of the first organizations to start implementing GSC in our operational schedules in Nigeria. We have been implementing both ISO 45000 (OHSAS) and ISO 14001 (Environmental Management System-EMS) in our all facilities for over 10 years".

Analysis of the Preference of the Climate Change Adoption (CCA) Models Employed for "Greening" SC Activities (Green procurement and allied activities)

Our two respondents posited that their respective organizations both settled for the rigorous processes of obtaining ISO certifications. Of particular interest to them is the ISO 14001 (EMS). D1 opined "we adopted different ISO certification programs in order to achieve a world-class

manufacturing standard. Some of the adopted ISO programs are; ISO 9001 (Quality Management System), ISO 22000 (Food Safety Management System), ISO 22001 (Food Safety System Certification), ISO 45000 (Occupational Health Safety Management Certification), ISO 14001 (Environmental Management System). He clarified further "Most of the ISO certification programs we embarked upon as a manufacturing outfit were tailored toward quality improvement and to help increase our competitiveness in the marketplace. However, the decision to obtain EMS certification was borne out of the desire to have a compatible CCA strategy in line with best global practices (which is practiced by our leading SC partners)". He concluded by revealing that "the adoption of EMS program has helped in our Corporate Social Responsibility (CSR) because we have stopped the discharge of effluents laden water into the environment, our water treatment plant now only discharges treated and clean water". On the effect of GSCM on the organizational purchasing policy, he surmised that "the adoption of EMS has totally influenced our purchasing policy-our main raw material is sugarcane gotten from our farm (Savannah Sugar Farms). He went further "we encouraged the concept of backward integration where we used eco-friendly means to personally handle our sugar cane plantation, in 2017 we expended nearly 400 million US dollars on the eco-friendly backward integrated farm project alone".

T2 replies to similar questions were slightly different. "The decision on the CCA models employed for GSC is beyond the purview of the Nigeria office of the conglomerate. We take directive from the global HQ in France, sometimes before the implementation of such programs invitations would be extended to relevant members of staff to be trained about the nuances of the model. Sometimes such training is conducted locally. Irrespective of where the training holds, the blueprint of the CCA for GSC is always from outside the country". When questioned about the CCA model presently being run he enthused that "ISO 14001, ISO 45000 as certification programs which are driving their achievement of GSC in the management of their operations. He further informed that "the Road to Zero Strategy is being implemented in phases-when fully operational, the strategic plan is to have all the operational Heavy Good Vehicles (HGV) or trucks in the fleet running on gas as against the present practice of diesel-powered HGV". He also added that apart from these ISO certified programs, the organization also employed the model developed by APTH (Formation et Conseil en Securite des Transports) in France in guiding the driving of the trucks in the fleet to increase the safety and eco-friendly consciousness of haulers in the fleet".

Feedbacks on the Impacts of Green Supply Chain (GSC) on the Achievement of Good Manufacturing Practices (GMPs) and Environmental Cooperation

The two theories (ToC and PT) which provided the theoretical perspective for this study emphasized the importance of feedback as an important construct for the determination of the functional CCA model in an organization. Feedbacks are therefore key ingredients which aid the longtime adoption of the GSC model an ideal manufacturing entity should employ. The two respondents substantiated this assertion. For example, T2 confessed that "the feedback that we received from the haulers in our fleet and the general public on the performance of our drivers/vehicles are germane in the determination of the effectiveness of the GSC models we've adopted". He went further "In 2011 our organization liaised with the Federal Road Safety Corps (the Nigerian body in charge of accident prevention on roads) and sent 40 men of the Corps to France to be trained on accident prevention strategies through a program anchored by the APTH. We did this partly as a means to reduce road traffic crashes (RTC) involving HGV and also to safeguard the environment against oil spills resulting from RTC engaged in the carriage of

petroleum products". He concluded that "the feedback we received from the FRSC and members of the public showed that the GSC models we employed have been very effective, also in the last three years none of our HGV involved in the carriage of petroleum products has been involved in RTC".

D1 corroborated this claim by T2 despite the fact that the two manufacturing entities are in different sectors. D1 enthused about the significance of feedbacks to the successful implementation of their various adopted GSC models; "we regularly get feedback from three sources-our staff, our supply chain partners and clients. The evaluation of the feedback from the 3 groups revealed that the adoption of different ISO programs, particularly the EMS (ISO 14001) has positively impacted on the achievement of the management GSC philosophy". He continued "we have installed a gas turbine in our plants as a means of generating power, this was a clear departure from the diesel-powered generator that released heavy doses of GHGs –our staff, clients and partners are all impressed with the cleaner quality of air within our premises". He posited that "such feedbacks are important and generally helpful in guiding management futuristic decisions on GSC adoption". He concluded that "feedback mechanism strengthens our environmental cooperation greatly-our supply chain members and immediate community realizes that our implementation of GSCM involves their inputs as critical SC partners". This finding is in agreement with the result from the studies] on how effective cooperation among stakeholders could aid the achievement of GSC among chain members(Younis *et al*,2016: Zhang *et al*, 2017: Neyestani &Jauanzon, 2017).

Analyses of the Effects of GSCM on the Operational, Tactical and Strategic Plans for Reverse Logistics by Case Studies

The two respondents provided detailed information on how the adoption of GSCM has affected their manufacturing procedures at the three concurrent phases of planning (fig 3 and 4). These are the operational phases (day-to-day activities), tactical phases (3 -12 months planning interval) and strategic phases (3-5 years futuristic plans). The summations of their responses are thus;

D1 agreed that the adoption of GSCM has brought great changes to the manufacturing processes in the organization, he surmised "After the adoption and implementation of EMS 14001, the day-to-day running, short-time and long-time plans of the organization changed. We have a roadmap which all the members of staff, our supply chain partners, clients and even visitors to our manufacturing premises must strictly adhere to. For example, it is part of our operational plans (daily) to stop the discharge of effluents into the water. We now purify the wastewater through our Brine Recovery System (BRS). We retrieve molasses from the Brine solution. The molasses recovered are sold to distillers, this practice encourages reverse logistics we recycle our water and have stopped the dislodgement of brine into the water". He continued "DSR is presently operating a gas powered turbine to generate electricity, a cleaner and more eco-friendlier means than the diesel-powered generating sets we were using before it was commissioned".

He continued "this has cut down the emission of GHGs within our operating plants significantly; we also encourage the use of recyclable materials in the packaging of our finished products". On the effects that GSCM adoption is having on the tactical planning of DSR, D1 inferred that "the adoption of GSCM especially the various ISO certification programs has re-conditioned attitudinal changes in the members of staff, we've gone "green" in the way we handle most operational details- we also organize periodic ISO certified programs in Environmental Management Systems (EMS) quarterly (4 times) in a year". Lastly on how the adoption of GSCM

has impacted on the strategic plans of DSR, D1 explained that “DSR is investing in an integrated Effluent Treatment Plant (ETP) which hopefully is coming fully on-board (fully operational) in the next three years, the ETP will further help in making sure that we have zero discharge of effluents into the water system-it will be a massive improvement on the Brine Recovery System presently operational in our plant”. He also revealed that “the organization also plan to acquire the ISO –GHGs 14064;1-2006”. He explained further that “ISO 14064; 1-2006 is the premium tool that help manufacturing firms the in the attainment of sustainable GSCM.

Discussion

The synopsis on the determinants of GSC adoption earlier done among the two studied cases showed that the ownership structure or holdings are critical factors. Studies done in other climes corroborated this finding (Carbone&Rivers, 2017; Marini & Charis, 2018). It is a truism that some vital issues are considered before a manufacturing outfit will choose any model as being most appropriate in the achievement of sustainable GSC along its entire value chain. One of the major effect of ownership structure on GSC model adoption as demonstrated by the studied cases is speed or agility of the chain to response occasioned by a nascent development in global GSC (Neyistani & Juanzon, 2017; Neyistani, 2017). Based on the excerpts of these interviews, it is obvious that the response of the management of TN Plc to nascent development in the field of GSC is faster. Such responses are purely incidental on the policy thrust from the organizational HQ, which most often are reflective of the best global practices in GSC. On the other hand, DSR adoption of a GSC model is mainly influenced by the directions of its SC partners, their SC agility and response to nascent development in GSCM appeared slower than that of TN Plc. Findings from some studies surmised that most of the manufacturing entities who adopted ISO program as either a quality enhancement tool or as an eco-friendly instrument in areas of purchasing decisions are initially disappointed by the lack of immediate improvement in revenue generated(Logan *et al*, 2018: Yaya *et al*, 2014, Cific & Oliver, 2018) While evidence of causality between the adoption of GSC and the sudden increment in profitability are hard to come by among manufacturing entities globally, there is no doubt that the application of GSCM by any manufacturing entity will generally guarantee public goodwill amongst other non-financial benefits(Singh *et al*, 2011; Bhattacharjee, 2012)..

Apart from the positive public goodwill that the adoption generates, there is no doubt that it impacted on the quality of the operating environment for most manufacturing firms. For example, the decisions of the management of DSR to adopt GSC model of using cleaner means of power generation have an immediate positive impact of the organization working environment. This much was revealed by D1 who enthused that “the adoption of a gas turbine for powering our operation-improved significantly the quality of air in our facility it is a clear departure from the usual fumes from the diesel-powered system we had before”. The study further established that the ownership structures of the two studied entities appeared to have some fundamental influences on the implementation of environmental cooperation and reverse logistics (two out of the four main attributes of GSCM) in the firms. D1 confirmed that the management of DSR “employed backward integration as a form of reverse logistics, by cutting off raw material suppliers we maintained tight reins on our value chain-our reverse logistics inclusive”. For TN Plc the implementation of these two GSCM attributes strictly follows the same pattern replicated everywhere Total S.A. has offices globally. Another finding unearthed by this research is that the application of theoretical lens of Toc as utilized in this study showed that DSR reliance upon the ‘shared philosophies’ of its supply chain partners (particularly Nestle and Coca cola) in the formulation and deployment of its GSCM goals could be a soft underbelly

going forward. There is no doubting about the fact that while such relationship might offer achievements of some immediate business goals (big share of the market and profit) research findings on the discourse has however revealed that overtime, it is always better for distinctive organizations in a chain to evolve their own GSCM model (Chin et al, 2015). While such developed GSCM model could be a reflection of the general thrust among key players in the industry, it is always commonsensical to evolve a 'homegrown' GSCM model as this will reflect the business philosophy of the (business) owner, (Carbone & Rivers, 2017; Marini & Charis, 2018 Logan et al, 2018; Yaya et al, 2014, Cific & Oliver, 2018; Ajayi & Mazinyo, 2020). DSR as one of the global biggest player in the Sugar production industry might compromise on their SC agilities (ability to respond to industrial stimuli) and limit their attractiveness to other partners who might be practicing different GSCM from their two major partners (Reza & Changiz, 2017). TN on the other hand, do not have this problem. One other critical discovery from this study is that TN response to issues revolving around backward integration of their manufacturing activities appeared at best nebulous: the explorative activities among oil corporations in Nigeria have remained a contentious one. Nigerian environmentalists and Civil Society Organizations (CSO) have been up in arms against foreign owned oil corporations in the country, accusing them of degrading the environment due to unsustainable explorative practices (Osaghae, 1995: FoE, 2019). Unlike DSR which provided a visible road map of its backward integration plan, TN appeared to 'have a globalized approach' on this salient issue. Apparently, this negate the reality on the ground, holistic reliance upon 'global best practices' without taking into consideration some important local realities is at variance with the construct of Prospect Theory which clearly advocate the regular editing (or tinkering) of any GSCM an organization will deploy. Perhaps, failure to adhere to such principle could be part of the reason why another foreign oil corporation had the cost of one billion U.S. dollars awarded against for environmental degradation in the recent past in the Nigeria (Osaghae, 1995: FoE, 2019).

Conclusion

This study attempted to provide a critical analysis of the influence which the ownership structures (holdings) of manufacturing firms have on the implementation of sustainable GSCM. In order to achieve this main objective, the researchers employed a derivative of the ontological and epistemological paradigms which the researchers used in the investigation of two manufacturing cases in Nigeria a developing economy in sub-Saharan Africa. The phenomenological school of thought which utilized interpretivist tools of case studies, in-depth interview sessions and literature searches were employed to also analyze how the adoption of GSCM four main attributes (eco-design, green procurement, environmental cooperation and reverse logistics) have affected the 3 levels of SCM decision-making (operational, tactical and strategic) in the studied cases. The results were thematically discussed and it could be inferred that the feedbacks that the firms received from SC partners are critical determinants of their CCA strategies. This situation is truer for DSR which relied upon the feedbacks from SC partners for the achievement of GMPs and environmental cooperation. The study also surmised that a noticeable lacuna exists in the level of SC agility and the rate of response to nascent development in the field of GSCM among the two studied cases. Findings from the study showed that TN Plc leveraged on its global outreach as "one of the largest major integrated oil and gas companies in the world, with activities in more than 150 countries" (Total, 2018) in the development and deployment of swift response to emerging GSC challenges.

Managerial Implications

The findings from this research further confirmed what is already established in the literature on adoption and implementation of GSCM by manufacturing firms in other developing economies, particularly in Asia region (Younis et al, 2017; Marin & Charis, 2018). Findings from this study established the existence of similar financial and non-financial benefits. However, it is observable that while DSR (the indigenously owned firm) demonstrated stronger reliance on local feedbacks from the SC partners in the process of the implementation of its GSC programs, TN Plc adopts a more globalized approach. The implication of this salient fact is that while DSR local SC partners will have a more inclusive environmental cooperation with the management of DSR (and the operating environment), the local SC partners of TN Plc may not enjoy such level of involvement in environmental management system of TN Plc.

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STRATEGIC LEVEL (3 -5 years futuristic plans)

The building of Effluent Treatment Plant (ETP) to remove scum (which are sold to animal food producer) from waste water.

Acquisition of International certification of the international Standard Organization (ISO) to guide against the unmitigated emission of Green House Gases -ISO GHGs 14064 -1; 2006. Which spells out the principles and requirements to achieve this at the organization level. Attaining the certification will mean that DSR have a credible internal system for the accurate reportage and possible removal of GHGs in the operational environment.

TACTICAL LEVEL

(Plans for a Year)

Quarterly Training (3 months interval) modules for all staff members on the prerequisites for the attainments of different ISO programs (QMS, FSMS, EMS, OHSAS)

OPERATIONAL (Daily

LEVEL

Daily implementatin of EMS standards in the production plants.

The use of Brine Recovery System to remove the discharge of poisinous scums into the water system as waste.

The use of gas turbine plan for power generation as against the diesel powerered generator.

Activities)

Fig 3. SCHEMATIC DIAGRAM OF THE STRATEGIC, TACTICAL AND OPERATIONAL PLANNINGS FOR GSCM ADOPTION IN DSR

STRATEGIC LEVEL (3-10 years futuristic plans)

The strategic plan to phase out HGV which runs on diesel with the intention of cutting down emission of GHGs to the bearest minimum through 'The Road to Zero Strategy 2050'. The Strategic plans for the phasing out diesel HGVs and the replacement of them with gas HGV in the next 10 years (2028).

TACTICAL LEVEL

(Plans for a Year)
OPERATIONAL LEVEL (Daily

Quarterly checks of HGV for engine, (for satisfactory emittance standard). training of drivers and assessment of their performances.
Quarterly Issuance of Certificate of Fitness (CoF) for each hauler after the completion of mandatory fitness test (Sense organs cognitive assesment and general assesment of the ability to implement GSCM/EMS-ISO codes in the discharge of duties).

Activities)

Daily implementation of operational GSCM by having perfectly tuned engines in the HGV used in fuel retail distribution. The use of GPS/Rfid in route analysis to guide against unnecessary emittance of carbon 1 oxide through the exhaust pipes of HGV in traffic hold ups. Speed monitoring through On-Board-Computer (OBC) system on each truck.
Feedbacks from the public on the level of compliance from each hauler through phone numbers on the body of each HGV.

Fig 4. SCHEMATIC DIAGRAM OF THE STRATEGIC, TACTICAL AND OPERATIONAL PLANNINGS FOR GSCM ADOPTION IN TN PLC

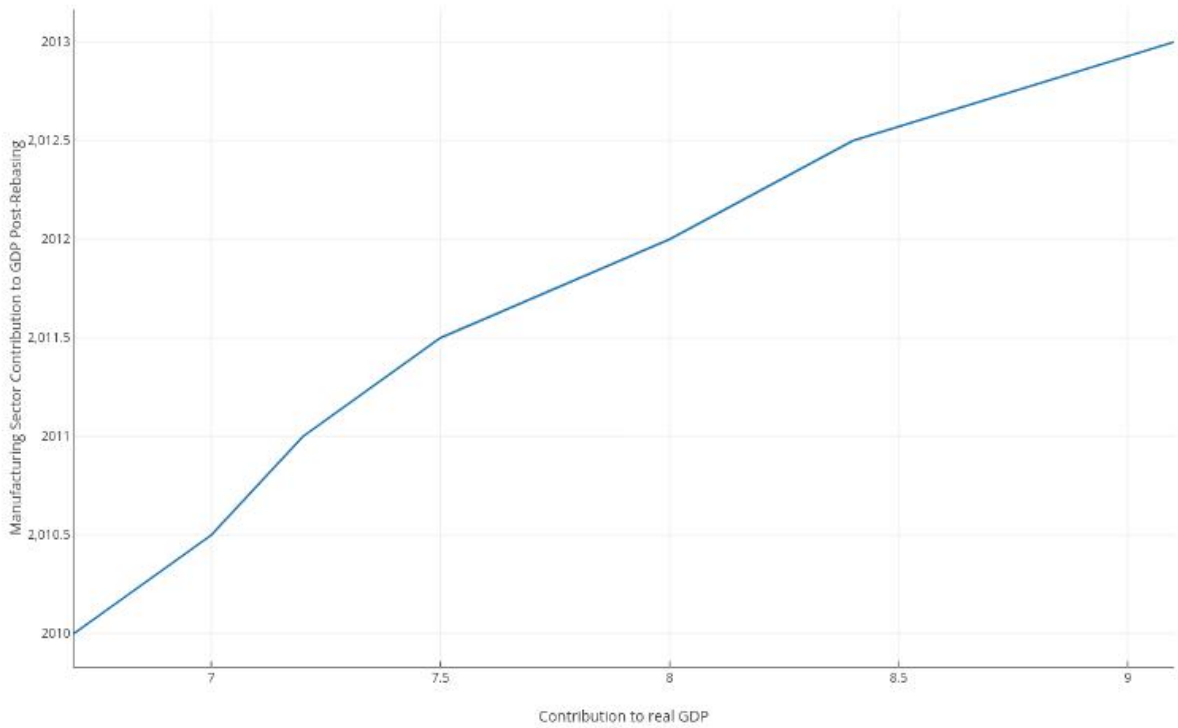


Fig 1. Contribution of the Manufacturing Sector to Nigeria's Gross Domestic Product After Rebasing the Economy (Adapted from Nigeria Bureau of Statistics Annual Abstract of Statistics, 2014).