



## Green Product Development and Environmental Reporting Practices of Listed Manufacturing Firms in Nigeria

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### Abstract

Misalignment between the companies' economic activities and societal expectations with regard to generation of waste and pollution caused by goods offered by manufacturing companies has increase the concern of consumers for development of green product. In view of this notion, the study appraises the influence of green product development on environmental reporting practices of listed manufacturing firms in Nigeria. The population covers all the 67 manufacturing firms on Nigerian Stock Exchange as at 31<sup>st</sup> December 2018. 23 firms were sampled using Simple Random Sampling Technique in order to have optimal representation of various groups of the population. Data were collected from the annual reports of selected firms and factbook published by the Nigerian Stock Exchange for a period of 2008 to 2018. Data collected was analyzed using descriptive statistics and panel regression. The findings of the study revealed that product certification with co-eff. = 0.299; P= 0.001 and pollution control policy with co-eff. = 0.650; P=0.000 as proxies for green product development had significant effect on environmental reporting practices of listed manufacturing firms while research and development with co-eff. = 0.426; P=0.590 was insignificant. With respect to the findings, the study concluded that product certification and pollution control policy have significant effect on environmental reporting practice of listed manufacturing firms as it helps to improve their product quality and earn their product sustainable lifeline. It is therefore recommended that regulators should ensure that manufacturing practices addresses specific environmental problems by enforcing pollution control policy and product certification; also, research and development should be harness as a fulcrum in the realization of green product development.

**Keywords:** Environmental Reporting, Manufacturing Firms, Pollution Control Policy, Product Certification, Research and Development

**JEL Classification:** D12, D18, M49, O35

**Paper Classification:** Research Paper

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### Introduction

Severe ecological problems posed by environmental pollution have awakened the consciousness of product consumers to the need for development of green product in order to abate the negative consequence associated with product manufactured by companies.

Green production started receiving attention due to the need for companies to collaborate the effort of environmental regulators to salvage the environment from total destruction by giving consideration to environmental factors in the process of their product development. Consumers' engagements in green behaviourism suggest that they show great concern toward how environmentally friendly the product they consume is by paying attention to the products' remnants and packages to know if they pose any hazard to the environment (Gbadeyan & Omolekan, 2015)

Teodora, Lonel, Adriana and Lustin (2015) explained that consumers' concern for environmental issues has gone to the extent of influencing their purchasing pattern and in response to this, firms' are inculcating policies that will ensure green sustainability of their product and as well preserve their good reputation. Some firms are now willingly fixing labels to their products to make available environmental information regarding the product risk and opportunities to consumer. This is because companies' reputation for environmental accountability with their customers is usually based on the information about the company's green conduct that customers can obtain (Christmann, 2004).

Despite the awareness of the damage that unhealthy product development and package could do to the environment, access to green product development in the manufacturing industry is still below expectations especially in developing countries like Nigeria (Gbadeyan & Omolekan, 2015). Modern day production has been characterized by environmental irresponsibility as there is a total or partial neglect of effective waste disposal after the use and consumption of certain product. The proliferation of plastic bags in landfills shows that manufacturing firms are guilty of using non-renewable and non-degradable component that retires the effort of environmentalist in ensuring the policy of reduce, reuse and recycle of product component. Considering the awakening of environmental consciousness of consumers, firms need to consider environmental factors as a parameter for product development and packaging to harness the green opportunities.

In order to solve the problems of misalignment between firms' economic activities and societal expectations about product qualities and their environmental consequences, there have been studies investigating the relationship between consumers' behavior; environmentally friendly product and environmental disclosure practice of firms (Liew & Song, 2017; Okoye & Adeniyi, 2017; Kafel & Balon, 2016). It is still unclear whether the engagement of firm in green product development is a factor in determining its environmental disclosure practice. Most studies that consider environmentally friendly products either focus on behavioral intention of a consumer or proxy it for behavioral patterns embraced by firm to earn legitimacy. Therefore, there is need to identify factors that are able to contribute towards green product developments and how they influence manufacturing firms' commitment to environmental disclosure practice.

In view of the aforementioned, there is need to examine how research and development, pollution control policy and product certification have influence the practice of environmental reporting of listed manufacturing firms in Nigeria. The reason for focusing on manufacturing firms was because the largest waste emanate from their production and economic activities. Moreover, it is one of the largest industries in the country. The paper is structured into five headings, and they are; Introduction, Literature Review; Methodology; Data Analysis and Discussion of Findings; and lastly is the Conclusion and Recommendations.

## Literature Review

### Conceptual Clarifications and Hypotheses Development

**Environmental reporting practices.** This is a compartment of environmental accounting practices which involves the transmission of information related to companies' interaction with the natural environment to its stakeholders (Igbodo, Uwagwe, & Aigbadon, 2018; Etale & Otuya, 2018). It is a means by which companies regularly divulge environmental information to their stakeholders to proof and affirm that they took responsibility for the subsequent effect of their activities on the environment (Nazim, Khaled, & Fatema, 2017; Lodhia, 2006). Environmental reporting is a way of relating company's impact on the environment; showing effort in managing those impacts and its input to ecological and sustainable developments. Hence, the study sees environmental reporting as one way of ascertaining the commitment of organizations to their environmental strategy. The study examines the overall mode of environmental reporting practice ranging from separate disclosure to report made in chairman statement and footnote to financial reports.

However, this new development in reporting has not been totally embraced by manufacturing companies in Nigeria. Ndifon, Orok and Sackey (2014); Uwuigbe and Jimoh, (2012) confirmed this in their findings by asserting that environmental disclosure in Nigeria is still improvised and sycophantic in nature. In a study conducted by Mohammed (2018), it is however recorded that there is an increase in the level of environmental reporting of companies listed on the Stock Exchange. Since the economic function of manufacturing firms provide opportunities and as well pose threats to survival of other users of the environment, it is expected of firms to broaden their corporate objective and address the environmental expectation of salient stakeholders like customers by providing environmental information useful to them in the company's annual report. Disclosing information about opportunities attached to green product development in a company will enhance the firm brand value, reputations and enable bench marking against its competitors.

**Green product development.** Development of green product reflects the concerns of a company for maintaining customer satisfaction by giving an environmentally preferable product with green opportunities in product process and packaging (Chowdhury, Sanju, & Asaduzzaman, 2004). It is the underline consciousness of ecological issues through process of production and product designs. Companies are now being encouraged to be proactive in green innovation to enhance creativity and product performance (Chen, Chang, Lin, Lai & Wang, 2016; Yeow & Rashad, 2014). The rationale is that the early record of product design is full up with examples of deficiency over its entire life cycle which in turn do not aid energy conservation and environmentalism when they are prepared or used (Rahman, 2017). In recent years, there have been increasing pressures on business to bear in mind the environmental consequence of the product and services they offer (Kleindorfer, Singhal & Van Wassenhove, 2005). In the context of the study, research and development, pollution control policy and product certification are variables used in explaining the concept of green product development.

Research and development is the application of scientific knowledge to develop a new and better product that meets relevant needs through new discovery about products, processes and services (Akinlo & Iredele, 2014). Investment in research and development will improve company's production process and as well help them contribute to sustainable society. Firm's quest to reduce environmental pollution during product development will make them entrench pollution control policy. To develop green products, firms are expected to reduce atmospheric

pollution by using non-damaging chemical where possible, consider better substitute for their energy source to control emissions of pollutants and focus on recycling where possible (Ofoegbu & Megbuluba, 2016; Beredugo & Mefor, 2012). All these are achievable when a company has a pollution control policy in place.

Product certification is the assessment of product conformity to specifications and requirements by a third party. The initiative of certifying green product became prominent in the 21<sup>st</sup> century due to increasing worry about toxic products and its negative consequence for the environment (Cecconi, Moretti, Mannino & Dejaco, 2019). Hence, product certification is necessary for reasons of safety, health and environmental protection. Firms getting their product certified showcase support for regulatory bodies and voluntary societies that cares for environmental sustainability. Since environmental issues arise at all stages of production, starting from supply chain to final distribution (Yazbehl, 2010), all environmental related information from production to distribution is expected to be disclosed especially to the consumers of the company's product.

**Table 1: Measurement of Variables for Studying Green Product Development and Environmental Reporting Practices**

S/N	Variables	Description	Measurement	Sources
1	Research & Development	It is the invention of new knowledge about products, processes and services to develop new products and improve existing products.	The scores range from 0 to 3, when no information is reported 0, when information is reported in general non-monetary term 1, when information is reported in specific non- monetary term 2, when monetary information is reported 3	(Jyoti, Vanisha, & Teerooven, 2011) (Akinlo & Iredele, 2014)
2	Product Certification	Assurance that a product has passed performance and quality assurance test as stipulated in the regulation.	The scores range from 0 to 3, when no information is reported 0, when information is reported in general non-monetary term 1, when information is reported in specific non- monetary term 2, when monetary information is reported 3	(Ezhilarasi & Kabra, 2015, August)
3	Pollution Control Policy	It is the initiative of the firm to lessen the rate of environmental waste through the use of pollution control equipment	when no information is reported 0, when information is reported in general non-monetary term 1, when information is reported in specific non- monetary term 2, when monetary information is reported 3	(Akinlo & Iredele, 2014)
4	Environmental Reporting Practice	Disclosure of information regarding the relationship that exists between a company economic activities and various aspect of the environment in its annual report	If there is separate disclosure score 3 was allotted, if it is in the chairman/director statement 2, if it is disclosed in the footnote to financial statement 1 and if not disclosed the firm scored 0	(Khaled, Mohammed, & Marwa, 2011)

Source: Author's Compilation 2020

## Green Product Development and Environmental Reporting Practices

**Research & development and environmental reporting.** Research and development is essential for companies operating in a competitive business environment, any company that will survive and as well win must be innovative (Kanter, 1999). It is a known fact that innovation comes from research and development. Research into new ways of product process and development may lead a company becoming a market giant leveraging on social and environmental friendly mechanism. Igbodo et al., (2018) corroborate this fact by asserting that communication of product opportunities that emerge through research and development will

encourage the best practices and well result in competitive advantage for such company. Liew and Song (2017) also emphasize that continuous improvement of products or services to the customers will eliminate uncertain environmental consequence and boost the confidence of the firm in displaying their strides in environmental responsibility. In this respect, the following hypothesis is developed as shown in figure 1.

$H_{01}$ : Research and development do not have a significant effect on environmental reporting practices

**Pollution control policy and environmental reporting.** There are pressures on manufacturers to involve in hygienic production and prevent the greenhouse gasses emissions because these are important in achieving sustainable development and efficient environmental conservatism. In order to curb one of the world greats challenges which environmental depletion as indicated by Ndifon et al., (2014), there is need for active pollution control policy. Pollution control policies help to minimize and avoid creation of pollutant in production process; and as well help in using energy, material and resources efficiently. As of today, the proliferation of environmental regulations and intervention of independent environmental groups shows the level of concern expected to be demonstrated by manufacturing companies on environmental issues in the course of production (Feng & Chen, 2017). Studies are of the opinion that aligning with this will boost their confidence in giving reports of their giant stride in environmental protection. In this respect, the following hypothesis is developed as shown in figure 1.

$H_{02}$ : Pollution control policy does not have a significant effect on environmental reporting practices

**Product certification and environmental reporting.** It is of importance to boost the confidence of stakeholders and affirm the extent of environmental sincerity of the company by allowing an independent party to certify the capability of the product to generate sustainable green opportunities (Knight, Megicks, Agarwal, & Lenders, 2017). Brach, Walsh and Shaw (2018) argue from the perspective of signaling theory that third party certified labels reduce the level of perceived risk and screening effort of consumers on sustainable products. This implies that certification of products is key in implementing design choice that will lessen product impact on the environment (Ceconi et al., 2019)

The National Agency for Food and Drug Commission (NAFDAC) and Standard Organization of Nigeria (SON) are the agencies in control of drugs regulations, consumables and other products in Nigeria. They ensure manufactured products are certified. They make sure efficacious and right quality products are used in Nigeria in order to eradicate fake and substandard product that could harm the users and the environment respectively. However, despite that roughly all the products manufactured in the country have some form of certification, communication tools to show the product adhere to environmental principle are still missing. Studies like Liew and Song (2017); Amran, Ooi, Ydins and Devi (2015) showed that disclosing information regarding product certification could have positive effect on the image of the firm. In lieu of the above, the following hypothesis was formulated as shown in Figure 1.

$H_{03}$ : Product certification does not have a significant effect on environmental reporting practices.

## Theoretical Review

Oliver (1980) developed the Expectancy-Disconfirmation Paradigm (EDP). The model explains that purchase of goods and services by customers always come with pre-purchase prospect and

projected performance. If the outcome equals the expectation, positive confirmation of the product occurs while any difference between the expectations and outcomes will result in disconfirmation. Hence, a customer is either pleased or dissatisfied as a result of positive or disparity between expectations and perceptions of a product. For companies to maintain good relationship with a stakeholder like customers, it is of importance to meet their pre-purchase expectation by giving them product with green opportunities. Also, information through intentional social and environmental disclosures are important to gather support and endorsement of these individuals who possess power to buy from the company or not and legitimize their right of operation.

In consonance with legitimacy theory as propounded by Sethi (1975) the theory explains that firms only have right to existence when they operate in the confines of societal expectations and that other stakeholders apart from financial holders of the firm has legitimate right to the company. Based on these assumptions, stakeholders like customers have legitimate right to product with green opportunities if the company still want acceptance and legitimize their production activities. When there is a disparity between the expected and performance of the concerned firms, there is a threat to its legitimacy. Atila and Fisun (2008) elucidate that the expectation level of consumers in expectancy-disconfirmation paradigm becomes a standard against which the product is evaluated. It means if there is a difference between the expectations and outcomes of a product, disconfirmation occurs.

For companies to avoid disconfirmation of their product, it is necessary for them to get product certification to showcase that their product will bring satisfaction desired by their customers. Also, for manufacturing companies to meet the pre-purchase expectations of consumers with preference for green products, it is of importance they involve in research and development to increase the quality of the product and come up with better ways of production process that will salvage the environment from total destruction. This is achievable by complying with pollution control policy of the company. Hence, the dire need for environmental reporting to customers in order to meet their informational expectations about the recyclable, reusable and biodegradable nature of the company's product.

## Empirical Review

Achieving environmental sustainability is a great task for public authorities and policy-makers. Firms are keying into this by engaging innovation for value creation and doing it in a more convincing way that enables stakeholders to appraise and evaluate their environmental responsibility. Sudawan and Kittisak (2019) confirmed that Thailand organizations involve in green supply chain management practices due to pressures exerted by external forces like environmental protection agencies and customers which are very much interested in environmental responsibility as concerned stakeholders. Ntiamoh, Li and Sarpong (2016) revealed through their findings that innovation practices help to sustain the environment. It was discovered in the study that innovation practices has positive effect on performance of Ghanaian agribusiness companies. After exploring the role of green supply chain integration, Setyadi (2019) submitted that customer integration ( $t$ -value=3.046,  $P$ -Value= 0.003) and technological integration ( $t$ -value= 3.073,  $p$ -value= 0.002) which are elements of green supply chain have positive and significant effect on sustainable performance of firms in the oil and gas sector of Indonesia. This simply indicates the capability of green supply in production to improve environmental sustainable performance.

Companies also use environmental reporting as an indicator and strategy to ease out information asymmetries about their activities (Lars, 2018). This fact upholds the findings of Brach et. al, (2018)

that third party certified label on sustainable products reduce the consumers' risk perception of sustainable product. Examining the open innovation of manufacturing companies in South Korea by taking the perspective of green process and green consumer innovation, Ji and Taewoo (2019) revealed that the effect of open innovation with firms on green process innovation and green consumer innovation was significant. Considering green innovation and environmental performance, Noor (2016) established that green innovation has positive effect on environmental performance of certified Malaysian manufacturing companies. In the study of Rosamartina, Giulia and Angeloantonio (2015), they submitted that green production processes are activities involved in by firm as a response to consumers' attitude and a feedback system to their purchasing signals. Their study results imply that firms' are ready to continue along this path of innovation. Tu and Huang (2015) assert that cleaner production is a necessity that cannot be exempted from environmental protection since production of products can generate pollution. It was therefore submitted that development of green and friendly products can be feasible with the redesigning of production process and packaging, inventive waste management and implementing the green design.

Studying the effects that green innovation could have on environmental and corporate performance of manufacturing companies in Taiwanese, Hua-Hung, Ja-Shen and Pei-Ching (2015) concluded that only pressure from stakeholders like employees, competitors and government can promote green innovation practices while demands from customers and suppliers group on green innovation practices did not significantly influence environmental practices. Bulent and Sibel (2013) findings revealed that green manufacturing applications have a significant impact on environmental performance of Turkish manufacturing industry and eco – innovation product has no effect on sustainability performance of sampled companies. In the same vein, Yazbehl (2010) identified some stakeholder groups' expectations for environmental performance within the apparel industry. Qualitative methodology was used to tackle the problem of collecting empirical data from apparel firms. The result showed that key stakeholder group as customers want apparel companies to tackle the issues of water treatment, chemical use and management, and carbon emission reduction.

## Methodology

Ex-post facto research design was employed and content analysis was used to generate quantitative data from the annual reports of selected firms in order to achieve the stated objectives. The annual reports were obtained from the website of these firms and Nigerian Stock exchange factbook. Firms classified under manufacturing on the Nigerian Stock Exchange cut across seven (7) sectors which are; conglomerates, industrial goods, healthcare, oil and gas, natural resources, agriculture and consumer goods. Twenty three firms (23) out of the 67 firms that form the population were selected randomly.

In order to assess the effect of green product development on environmental reporting practices, the relationship between the variables were analyzed by employing multiple regression model. The proposed model is premised on the idea of legitimacy theory which contends that firm's behaviour is influenced by societal needs expected to be fulfilled by the organizations to maintain their right of existence. The explanatory variables are product certification (PC) Research and development (RD) and Pollution Control Policy (PCP). How the variables are measured is shown in table 1.

$$ERP_{it} = f(GPD_{it}) \dots \dots \dots \text{equ 3.1}$$

$$ERP_{it} = f(PC_{it}, RD_{it}, PCP_{it}) \dots \dots \dots \text{equ 3.2}$$

$$ERP_{it} = a + \beta_1 PC_{it} + \beta_2 RD_{it} + \beta_3 PCP_{it} + e_{it} \dots\dots\dots equ 3.3$$

Where; ERP = Environmental Reporting Practices

GDP = Green Product Development

PC = Product Certification

EP = Research and Development

PCP = Pollution Control Policy

The *a-priori* expectation based on literatures reviewed and theories is that green product development will have positive and significant effect on environmental reporting practice. It is shown statistically as  $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0$ . In order to test for multicollinearity of the data collected, heteroskedasticity test and auto-Correlation were conducted. Hausman Specification, LM test was carried out check the validity and reliability of the data before regression analysis was conducted. Both descriptive and inferential statistics were used in analysing gathered data.

### Data Analysis and Discussion of Findings

**Table 2: Descriptive Statistics of Proxies for Green product Development and Environmental Reporting Practices**

		OBS	Mean	St.Dev	Min	Max	Skewness	Kurtosis
	ERP	253	1.305	1.077	0	3	-.228	1.449
Green Product Development	RD	253	.679	.899	0	3	1.203	3.512
	PC	253	.468	.716	0	3	1.253	3.324
	PCP	253	.44	.763	0	3	1.55	4.246

Source: Author's Computation (2020)

### Descriptive Statistics

The descriptive statistics of variables for this study were shown in Table 2. The table presents summary of the interactions between environmental reporting practices (ERP), research and development (RD), product certification (PC) and pollution control policy (PCP). As obtained from the table, the extent of average for environmental reporting practice (ERP) of the sampled listed manufacturing firms is 1.305 with standard deviation of 1.077 which indicates low variability across the sampled firms. The average of research & development (RD) as shown from table 2 is 0.679, with the standard deviation of 0.899, which indicate wide dispersion across listed manufacturing firms. It implies that there is high variation in the level of research and development on product of sampled firms. The minimum and maximum values are 0 and 3 respectively. The mean of product certification (RD) is 0.468, with the standard deviation of 0.716, which indicate wide dispersion across listed manufacturing firms. The minimum and maximum are 0 and 3 respectively. Average of pollution control policy (PCP) as shown in Table 2 is 0.440, with standard deviation of 0.763 indicating high variation in terms of pollution control policy across the sampled firms. The minimum and maximum values are 0 and 3 correspondingly.

**Table 3: Correlation Matrix of the Study Explanatory Variables**

GPD and ESR	(1)	(2)	(3)	(4)
(1) ERP	1.000			
(2) RD	0.348	1.000		

(3) PC	0.325	0.327	1.000	
(4) PCP	0.529	0.538	0.248	1.000

Source: Author's Computation (2020)

The result from the correlation matrix in table 3 showed that green product development (GPD) been proxy by research & development (RD), product certification (PC) and pollution control policy (PCP) have coefficient of 0.348, 0.325 and 0.529 respectively. According to (Gujarati & Poter, 2009) a correlation coefficient between two independent variables above  $\pm 0.8$  is considered excessive and may indicate the existence of multicollinearity. Thus, all proxies of green product development have positive relationship with environmental reporting practice and can perfectly explain the dependent variable. It further indicates that an increase in research and development will lead to 34.8% increase in environmental reporting practice of listed manufacturing firms. Also, the obtained co.eff (0.325) for product certification implies that an improvement in product certification will lead to 32.5% increase in environmental reporting practices of listed manufacturing firms. As obtained form table 3, the co-eff for pollution control policy (0.529) indicates that an increase in pollution control policy will lead to 52.9% improvement in environmental reporting practices of listed manufacturing Firms in Nigerian.

**Table 4: Assessing Multicollinearity of explanatory variable  
Tolerance and VIF values**

	Variance Inflation Factor	1/VIF
<b>GPD</b>		
RD	1.492	0.670
PCP	1.419	0.705
PC	1.129	0.886
Mean VIF	1.347	.

Advanced measures for assessing multicollinearity among the variables; research & development (RD), product certification (PC) and pollution control policy (PCP) were done to ensure validity and reliability of the statistical inference of the regression model. Data validity and reliability results obtained shows a mean VIF of (1.347) implying that the issue of multicollinearity do not exist as no two independent variables strongly correlate or can serve the same purpose. Based on the evidence presented in Table 4, it can be concluded that there is no multicollinearity problem. This is because the VIF values for all the variables are less than 10 and the tolerance values for all the variables are greater than 0.10 (rule of thumb).

**Table 5 : Hausman Specification, LM Test and Heteroskedasticity Test**

Hausman	Green Product Development	Heteroskedasticity test	
Chi2	23.20	Chi2	2717.66
P-value	0.000	P-value	0.000
<b>LM Test</b>		<b>Auto-correlation</b>	
Chi2	-	F(1, 22)	9.988
P-value	-	P-value	0.005

Source: Author's Computation (2020)

**Table 6: Regression Results for Specified Model to Analyse the Effect of Green Product Development on Environmental Reporting Practices**

	Fixed Effect		Random Effect		Ordinary Least Square	Hausman	
	COEF	P-VALUE	COEF	P-VALUE	COEF	P-VALUE	-
RD	0.058	0.447	0.641	0.389	0.042	0.579	-
PC	0.166	0.070	0.221	0.009	0.299	0.000	-
PCP	0.330	0.000	0.440	0.000	0.650	0.000	-
Constant	1.045	0.000	0.963	0.000	0.850	0.00	-
R <sup>2</sup>	0.6465		0.3191		0.3203		
Adj-R <sup>2</sup>	-		-		0.3121		
Chi	7.57		49.95		38.95		
P-value	0.001		0.0000		0.000		38.95 0.000

Source: Authors' Computation (2020)

The Hausman specification test was conducted to find out which of random effect or fixed effect model is fit for interpretation. The Hausman specification test result obtained from table 5 produced p-value of 0.000, which is significant at 1 per cent. This implies that the variation across entities is assumed to be fixed and correlated with the independent variables included in the model. As a result of this, the result of the fixed effect model was considered suitable for the analysis of the specified model ( $ERP = f(RD, PC \text{ and } PCP)$ ). More so from table 5, the result of auto-correlation test (0.005) showed that there was no constant variance among the independent variables for which indicates that the error across the entities was not homoscedastic for the model. Hence, the regression results were subjected to a further test where panel corrected standard error regression was run in order to take care of the auto-correlation and heteroskedasticity problem, and the results of the regression would be suitable for analysis purpose.

**Table 7: Panel Corrected Standard Error Result Obtained after Analysing the Effect of Green Product Development on Environmental Reporting Practices**

	Panel Corrected Standard Error	
	COEF	P-VALUE
RD	0.426	0.590**
PC	0.299	0.001*
PCP	0.650	0.000*
Constant	0.850	0.000
R-Square	0.320	
Chi C	78.66	
P-value	0.000*	

\*\*\*10%, \*\* 5%, \* 1% Source: Authors' Computation (2020)

The results shown in table 6 was obtained after analysing the overall objective of the study  $ERP = f(GPD)$ . The coefficient and P-Value obtained after analyzing the effect of each independent variable; research & development (RD), product certification (PC) and pollution control policy (PCP) on environmental reporting practices (ERP) was used as basis of judgment. From table 7, the overall result showed R. Square of 0.320, Chi.C (78.660) and P-value (0.000) indicating that green product development has positive and significant effect on environmental reporting practices of listed manufacturing firms in Nigeria. It can be deduced from the result that the development of green products is a vital pathway to achieving environmental sustainability. The results

corroborate the findings of Saengchai, Rodboonsong and Jermsittiparsert (2019) which revealed that innovation of green product influence the environmental performance of firms Thai sports industry. It also aligns with the results of Tu and Huang (2015); Rosamartina et al., (2015) which revealed that green production cannot be exempted from environmental responsibility since it is one way of environmental protection and a form of responses to consumers green behaviourism.

The result further obtained showed that research and development (RD) has a coefficient of 0.426. This imply that research and development have positive relationship with environmental reporting practice but insignificant as indicated with p-value of 0.590, which is greater than 5 per cent level of significance. The positive relationship between RD and ERP explains the benefit that an environmentally responsible firm can derive from research and development directed toward green product development in order to satisfy the expectations of green consumers. However, the insignificant effect implies that engaging in product research and development is not the foremost idea of manufacturing firms' management in relating their commitment to environmental responsibility by reporting on environmental information. The result aligns with the findings of Hua-Hung et al., (2015) which their analysis revealed that demands from customers on green innovation (research and development) practices did not significantly affect environmental practices. The result also supports the findings of Bulent and Sibel (2013) which found out that eco – innovation product has no significant effect on sustainability performance of sampled Turkish manufacturing companies.

Furthermore, the coefficient of product certification (PC) as obtained from table 7 was 0.299 which means that there exist a positive relationship between product certification and environmental reporting practice. With consideration to the P-value (0.001) which is significant at 1%, it means that product certification has a significant effect on environmental reporting practices of listed manufacturing firms in Nigeria. The finding indicates that firms perceive certification of their product as a means of contribution to the environmental sustainability effort of the regulators and as well allow their stakeholders appraise their environmental responsibility while creating quality value for them at the same time. The result aligned with the study of Brach et al., (2018) which submitted that third party certified label is an efficient means to overcome information asymmetries between manufacturers and consumers and as well reduce performance risk associated with sustainable purchasing. The result also confirmed the results of Dunk, (2002) and Ijeoma (2015) which revealed that manufacturing firms are incorporating environmental friendly policies so as to enhance the quality of their product and get them certified in order to earn a sustainable lifeline for their product.

Finally, the result from table 7 shows a positive and significant relationship between pollution control policy (PCP) and environmental reporting practices as indicated by the co-efficient of 0.650 and p-value of 0.000, which was significant at 1 per cent. The result means that entrenching pollution control policies in the production processes of manufacturing firms will enable them to come up with product that have green benefits while preserving the environment at the same time. It also means that pollution control policy is part of the requirements for environmental responsibility. The findings were consistent with the result of the studies conducted by Hussain, Halim and Bhuiyan (2016); Yazbehl (2010) in Malaysia and United States respectively. They found out that carbon footprint reduction which can be classified under pollution control policy is of concern to stakeholders. The result also aligns with the findings of Tu and Huang (2015) which showed that 3R policy (Reduce, Recycle and Reuse) are requirements for improving green accounting. This is because through this, customer will have insight about the industry chemical use and management.

## Conclusion and Recommendation

The study exposed manufacturing companies to the need of employing pollution control policy in production process as it empowers them to control emissions in course of their production and also come up with the product designs that are renewable in order to avoid environmental pollution. Also, the study explains the essence of product certification in the development of green product so as to complement the effort of the environmental regulators and as well encourage consumers' acceptance of the product. The study affirmed that at all stages of production, environmental related information from production to distribution is expected to be disclosed especially to the consumers of the company's product. Based on the findings, the study concludes that product certification and pollution control policy are significant factors in green product development and an important means of improving the environmental reporting practices of listed manufacturing firms.

It is therefore recommended that management of manufacturing firms should get involved in research and development to gather efficiency measure for proper green production and harness the benefit attached to it; entrench pollution control policy by strategizing the integration of renewable component in production and ensure product certification so as to establish a modern environmental practice and reduce the negative consequence associated with their products. Regulators should as well ensure that manufacturing practices addresses specific environmental problems by enforcing pollution control policy and product certification.

## References

- Akinlo, O. O., & Iredele, O. O. (2014). Corporate Environmental Disclosures and Market Value of Quoted Companies in Nigeria. *The Business & Management Review*, 5 (3), 171-174.
- Amran, A., Ooi, S. K., Ydins, R. R., & Devi, S. S. (2015). The Impact of Business Strategies on Online Sustainability Disclosures. *Journal of Business Strategy and the Environment*, 24 (6), 551-564.
- Atila, Y., & Fisun, Y. (2008). Consumer Satisfaction Theories: A Critical Review. In A. et.al, *Tourist satisfaction and Complaining Behavior: Measurement and Management Issues in the Tourism and Hospitality Industry* (pp. 65-88). New York: Nova Science Publisher.
- Beredugo, S. B., & Mefor, I. P. (2012). The Impact of Environmental Accounting and Reporting on Sustainable Development in Nigeria. *Research Journal of Finance and Accounting*, 3 (7), 55 – 63.
- Brach, S., Walsh, G., & Shaw, D. (2018). Sustainable Consumption and Third-Party Certified Labels: Consumers' Perceptions and Reactions. *European Management Journal*, 36 (2), 254-265.
- Bulent, S., & Sibel, Y. C. (2013 ). Effects of Green Manufacturing and Eco-Innovation on Sustainability Performance. *Procedia Social and Behavioural Sciences*, 99, 154-163.
- Cecconi, F. R., Moretti, N., Mannino, A., & Dejaco, M. C. (2019). Sustainability Certification of Construction Products through BIM. *Paper presented in IOP Conf. Series: Earth and Environmental Science*. Milian, Italy. Retrieved from <http://iopscience.iop.org/issue/1755-1315/296/54>.
- Chen, Y., Chang, T., Lin, C., Lai, P., & Wang, K. (2016). The Influence of Proactive Green Innovation and Reactive Green Innovation on Green Product Development Performance: The Mediation Role of Green Creativity. *Journal of Sustainability*, 8 (10), 966-977.
- Chowdhury, S. R., Sanju, N. L., & Asaduzzaman, A. M. (2004). Green HRM Practices as a Means of Promoting CSR: Suggestions For Garments Industry in Bangladesh. *Global Journal of Management and Business Research*, 17 (6), 29-35.

- Christmann, P. (2004). Multinational Companies and the Natural Environment: Determinants of Global Environmental Policy. *Academy of Management Journal* , 47 (5), 747–760.
- Dunk, A. (2002). Product Quality, Environmental Accounting and Quality Performance. *Accounting Auditing and Accountability Journal* , 15(5), 719-732.
- Etale, L. M., & Otuya, S. (2018). Environmental Responsibility Reporting and Financial Performance of Quoted Oil and Gas Companies in Nigeria. *European Journal of Business and Innovation Research* , 6 (6), 23-34.
- Ezhilarasi, G., & Kabra, K. C. (2015, August). Determinants of Environmental Disclosures Practices by Most Polluting Industries in India. *4th International Conference on Emerging Trends in Finance & Accounting*. India. Retrieved from <http://www.researchgate.net/publication/319617877>.
- Feng, Z., & Chen, W. (2017). Environmental Regulation, Green Innovation, and Industrial Green Development: An Empirical Analysis Based on the Spatial Durbin Model. *Journal of Sustainability* , 10(223), 1-22.
- Gbadeyan, R. A., & Omolekan, O. J. (2015). Relevance of Green Marketing on Environmental Degradation: An Empirical Study of Consumers' of Green Products in Benin- City, Nigeria. *University of Mauritius Research Journal* , 21, 1-25.
- Gujarati, D. N., & Poter, D. C. (2009). *Basic Econometrics*. New York,: NY : McGraw- Hill Companies.
- Hua-Hung, W., Ja-Shen, C., & Pei-Ching, C. (2015). Effects of Green Innovation on Environmental and Corporate Performance: A Stakeholder Perspective. *Journal of Sustainability* , 7 (5), 4997 - 5026.
- Hussain, M., Halim, S. M., & Bhuiyan, A. B. (2016). Environmental Accounting and Sustainable Development: An Empirical Review. *International Journal of Business and Technoprenureship*, 6(2), 335 – 350.
- Igbodo, A., Uwague, A., & Aigbadon, B. (2018). Theoretical Framework for Environmental Accounting. *International Journal of Innovative Environmental Studies Research*, 6(4), 27-36.
- Ijeoma, N. B. (2015). Evaluation of Companies Environmental Practices in Nigeria. *Social and Basic Sciences Research Review*, 3(7), 349-364.
- Ji, Y., & Taewoo, R. (2019). Open for Green Innovation: From the Perspective of Green Process and Green Consumer Innovation. *Journal of Sustainability* , 11(12), 3234 - 3251.
- Jyoti, D., Vanisha, O., & Teerooven, S. (2011). Changes in Social and Environmental Reporting Practices in an Emerging Economy (2004–2007): Exploring the Relevance of Stakeholder and Legitimacy Theories. *Accounting Forum Journal* , 35(3), 158– 175.
- Kafel, P., & Balon, U. (2016). *Certification of Products, Processes and Management Systems- Common Feature and Differences*. Paper presented in the 10th international conference for center of quality. Petrovac: universiti of Motenegro.
- Kanter, R. M. (1999, May – June Issue ). From Spare Change to Real Change. The social sector as Beta Site for Business Innovation. *Harvard Business Review (Innovative & Entrepreneurship)* , 77(3), 122-132.
- Khaled, H., Mohammed, E., & Marwa, A. R. (2011). Factors Affecting Corporate Social Responsibility Disclosure in Egypt. *Corporate Ownership and Control* , 8 (4), 432-443.
- Kleindorfer, P. R., Singhal, K., & Van Wassenhove, L. N. (2005). Sustainable Operations Management. *Journal of Production and Operations Management* , 14(4), 482– 492.
- Knight, H., Megicks, P., Agarwal, S., & Lenders, M. (2017). Firm Resources and the Development of Environmental Sustainability among Small Medium-Sized Enterprises: Evidence from Australian Wine Industry. *Journal of Business Strategy and the Environment* , 28, 25-39.

- Lars, M. (2018). Signaling responsibility? Applying Signaling Theory to the ISO 26000 Standard for Social Responsibility. *Journal of Sustainability* , 10(47152), 1-20.
- Liew, C., & Song, B. (2017). Consumers Perception on Organizational Corporate Social Responsibility Practices and Its Implication on Consumers Attitude: Evidence from the Malaysian Telecommunication Industry. *Journal of Management and Sustainability* , 7(4), 112 – 122.
- Lodhia, S. (2006). The World Wide Web and Its Potential for Corporate Environmental Communication: A Study Into Present Practices in the Australian Minerals Industry. *The International Journal of Digital Accounting Research* , 6(11), 65-94.
- Mohammed, S. (2018). Mandatory Social and Environmental Disclosure: A Performance Evaluation of Listed Nigerian Oil and Gas Companies Pre- and Post-Mandatory Disclosure Requirements. *Journal of Finance and Accounting*, 6(2), 56-68.
- Nazim, U., Khaled, H., & Fatema, A. (2017). Environmental Reporting Practices and It's Relationship With Corporate Characteristics: An Evidence From Manufacturing Companies Listed in Dhaka Stock Exchange (DSE). *The Cost and Management Journal* , 45(1), 3-11.
- Ndifon, O., Orok, E., & Sackey, J. (2014). The development of environmental accounting and disclosure practices of manufacturing companies in Nigeria. *Journal of Economics and Sustainable Development* , 5(12), 70-19.
- Noor, A. (2016). The Mediating Effect of Green Innovation on the Relationship Between Green Supply Chain Management and Environmental Performance in Malaysia Manufacturing Industries. Doctorate Degree thesis of Universiti Teknologi, Mara, Malaysia. Retrieved from <http://arkib.uitm.edu.my/ofa/>.
- Ntiamoah, E., Li, D., & Sarpong, B. (2016). The Effect of Innovation Practices on Agribusiness Performance: A Structural Equation Modeling (SEM) Approach. *African Journal of Science, Technology, Innovation and Development* , 11(6), 671-681.
- Ofoegbu, G., & Megbuluba, A. (2016). Corporate Environmental Accounting Information Disclosure in the Nigeria Manufacturing Firms. *International Journal of Management Sciences and Business Research* , 5(12), 208 – 220.
- Okoye, E., & Adeniyi, S. (2017). Effects of Environmental Protection Cost on Product Price in Nigeria: Study of Brewing Industry. *Arabian Journal of Business and Management Review (Nigerian Chapter)* , 4(2), 52 – 58.
- Oliver, R. (1980). A Cognitive Model of the Antecedents and Consequence of Satisfaction Decisions. *Journal of Marketing Research* , 17(4), 460 - 469.
- Rahman, F. (2017). The Influencing Factors of Eco-Friendly Products Towards Customer Satisfaction: A Study in Bangladesh. *The Standard International Journal of Transactions on Industrial, Financial and Business Management* , 5(4), 64 – 67.
- Rosamartina, S., Giulia, N., & Angeloantonio, R. (2015). Consumers' Behavior toward Green Products: A Signaling Theory Approach. *International Journal of Business Administration* , 6 (6), 44 – 54.
- Saengchai, S., Rodboonsong, S., & Jernsittiparsert, K. (2019). Environmental regulation, Green Product Innovation and Performance: Do the Environmental Dynamics Matter in Thai Sports Industry? *Journal of Human Sport and Exercise* , 14 (5), 2276 - 2289.
- Sethi, S. (1975). Dimensions of Corporate Social Performance: An Analytical Framework. *California Management Review* , 17 (3), 58 – 64.
- Setyadi. (2019). Does Green Supply Chain Integration Contribute Towards Sustainable Performance? *Uncertain Supply Chain Management*, 121-132.

- Sudawan, S., & Kittisak, J. (2019). Role of Pressures and Green Supply Chain Management Practices in Enhancing the Operational Efficiency of Firms: Evidence from Thailand. *International Journal of Supply Chain Management* , 8(4), 437 – 445.
- Teodora, R., Lonel, B., Adriana, M., & Lustin, M. (2015). Profile of Green Consumers in Romania in Light of Sustainability Challenges and Opportunities. *Journal of Sustainability* , 7(6), 6394 - 6411.
- Tu, J., & Huang, H. (2015). Analysis on the Relationship Between Green Accounting and Green Design For Enterprises. *Journal of sustainability* , 7(5), 6264-6277.
- Uwuigbe, U., & Jimoh, J. (2012). Corporate Environmental Disclosure in The Nigerian Manufacturing Industry. *An International Multidisciplinary Journal Ethiopia*, 6(3), 71- 83.
- Yazbehl, V. (2010). Stakeholder Expectations For Environmental Performance Within the Apparel Industry. *Master's thesis* . London, London, United Kingdom: University of Delaware. Retrieved from [www.udspace.udel.edu/bitstream/handle/19716/5842/yazbel-waters-thesis.pdf](http://www.udspace.udel.edu/bitstream/handle/19716/5842/yazbel-waters-thesis.pdf).
- Yeow, K., & Rashad, Y. (2014). The Concept of Green Marketing and Green Product Development on Consumer Buying Approach. *Global Journal of Commerce and Management Perspective* , 33-38. Retrieved from <http://www.longdom.org/archive/gjcmp-volume-3-issue-2-year-2014.html/>.

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