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ENVIRONMENTAL SUSTAINABILITY AND THE PERFORMANCE OF PLASTIC MANUFACTURING FIRMS IN ENUGU STATE, NIGERIA.

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Abstract

The earth is the home for human; as such it should be cherished by all. The activities of manufacturing firms by burning of fossil fuels and releasing of energy to the atmosphere should be put to a halt, if we intend to live in a healthy environment. The earth cannot be crying for excess usage of its natural resources, and at same time be confronted with pollutions. The activities of improper and unethical waste management processes have affected the progress of manufacturing firms, and if not addressed immediately, achieving sustainable development will be far reached. This study was carried out to examine the relationship between environmental sustainability and the performance of plastic manufacturing firms in Enugu State, Nigeria. The descriptive survey research design method was adopted. The study was conducted in Enugu state of Nigeria which housed seven (7) plastic manufacturing firms and a population element of 1,043, the Borg & Gall formula: n= [(Zx) 2 (e) (N)] was adopted to obtain the sample size for the study. However, the sample size for the study was 200. A structured likert questionnaire was employed. Similarly, the researcher used information from the literatures that were studied to create the instrument. The hypotheses of the study were tested using the Paired Sample T-test included in SPSS version 23. The findings of the study showed that there is a significant positive relationship between recycling and net profit margin, and also that there is no significant relations between incineration and customer satisfaction. However, the study concluded that plastic manufacturing firms should invest in sustainable operational approaches that yield positive impacts to them, and pay less attention to those approaches that does not impact positively to their operations. Based on the findings, the study recommended amongst others that; by implementing efficient collection techniques and creating markets for recovered plastic waste, plastic companies are being urged to improve their recycling infrastructure and waste management systems. This will save them money, increase their organization's cash flow, and provide employment opportunities for people who land fill empty plastic can.

Keywords: *Sustainability, Environmental, Recycling, Incineration, Performance, Plastic.*

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1.1 Introduction

Plastic manufacturing firm is a significant unit in the industrial goods sector of the economy for various reasons. It provides materials for medical equipment, consumer electronics, and consumer packaging, playing a crucial part in the manufacture of consumer products and medical supplies (Rhema, 2023). The production of plastics also makes a significant contribution to the global economy by creating employment and money. Furthermore, plastic is a versatile material that may be utilized to make a variety of things, including toys, household items, medical equipment, and automobile components. Finally, because plastic is a resilient, lightweight, and recyclable material, producing it has a significant positive influence on lowering the environmental impact of items. The transformation of raw materials into final plastic goods is a step in the plastic manufacturing process. This is accomplished using a variety of techniques, including as injection molding, extrusion, blow molding, and thermoforming. Each method has distinctive qualities of its own that make it suited for producing a certain product.

The adjective "pliable" (meaning "easily shaped") is where the term "plastic" first appeared. According to the intended functionality, plastics may be easily transformed from one shape to another (Asgher, Afzal, Qamar, and Khalid, 2020). In addition to being referred to as polymers or "long chains of monomers," plastics are made up of identical subunits that are joined together to create polymers. As the fundamental building blocks of plant cell walls, polymers like cellulose can have natural beginnings and assist cells in adapting their roles (Qamar, Ashiq, Jahangeer, Riasat and Bilal, 2020). The dispersal of plastic trash is connected to human populations, though. Demand for plastics and plastic goods has increased as a result of the growing human population. The degradation of the environment's natural beauty (Andrady, 2003), the entanglement and death of aquatic organisms (Lithner, Damberg, Dave, and Larsson, 2009; Adane and Muleta, 2011), the clogging of sewage systems in towns and cities, particularly in developing countries (Proshad, Islam, Kormoker, Haque, and Mahfuzur-Rahman, 2018), and other signs of environmental pollution can all be caused by the careless disposal.

According to the UN Global Compact Report from 2020, the industrial sector with the biggest demand for plastic in 2017 produced 146 million metric tons of plastic for packaging globally. With 65 million metric tons of demand that year, the building and construction industry ranked second globally in terms of plastic production (Oware and Awunyo-Vitor, 2021; Sachs, 2021). Due to its aftereffects, the global expansion of the plastic container industry has significantly increased greenhouse gas emissions, making it one of the primary causes of global warming. According to Benjamin (2017), the use of plastic for packaging food and drink, chemicals, electronics, and other goods in Nigeria has been recognized as a real instrument to increase a product's value and represent its identity. Additionally, he claimed that using plastic for packaging promotes social and economic advancement while simultaneously preserving and preserving the environment.

According to Cassie (2022), corporations are forced to choose between addressing and reducing the harm they do to the earth and its inhabitants or risk going out of business altogether due to the combined pressure from consumers, employers, potential employees, and regulators. Nowadays, businesses understand that they must actively participate in maintaining their operations (Gordon, Farnan, Grafton-Clarke, Ahmed, Gurbutt, and Daniel, 2019). Jane, in the year 2022, Starbucks Coffee Company stunned the globe by declaring that they will stop using straws in the sake of sustainability. The amount of plastic trash generated by their use of straws, however, pales in comparison to that produced by their use of single-

use plastic cups (Folqué, Escrig-Olmedo, and Santamara, 2021; Mahmood *et al,* 2021). They also provide paper cups, however they are not recyclable due to a thin coating of liquid-resistant substance on them (Meuer, Koelbel, and Hoffmann, 2018). This corporation, a pioneer in the food and beverage sector, is opposed to environmental sustainability advancement (Wood, 2020; Kim, Bansal, and Haugh, 2019).

Exxon Mobil is another business that routinely ranks highly for its contribution to world emissions, according to Jane (2022). Even though they claim to be setting themselves up for a lower-carbon future, their economic model today only uses fossil fuels. According to Ming-Lang, Tran, Ha, Bui, and Lim (2021), Exxon is devoted to environmental protection since they think that their goods are necessary for contemporary living. According to Elleuch, Bouhamed, Elloussaief, and Madi (2018), enterprises that are not lucrative won't survive, and those that are not up to speed on sustainability will be left behind. Companies that disregard social sustainability, such as their workers' rights and fair compensation, face increasing public criticism and risk losing their market value (Refinitiv, 2020).

According to the concerns that represent the environmental sustainability of plastic companies, it is clear that plastic is a significant cause of pollution and that it has a negative impact on the world's seas. The type of plastic used by Amazon is mistaken for food by sea turtles and other marine creatures, which can be harmful. According to Sasja (2020), it is challenging for the general public to assess Amazon's actions because the company publishes scant information about its environmental impact and doesn't provide any readily available format for a sustainability or environmental impact report. In 2021, the Oceana organization endorsed the claim that Amazon utilized 465 million pounds of plastic packaging on average. Additionally, the organization calculated that up to 22 million pounds of Amazon's plastic packaging waste ended up as garbage in freshwater and marine environments all over the world, inflicting significant harm.

It is a well-known truth that plastic pollution is brought on by the buildup of plastic waste in the environment, which has arisen through plastic manufactured, usage, and careless disposal in the environment, according to the Sustainable Research and Action for Environmental Development (SRADev) in 2019. Due of its simplicity in shape, low cost, diversity, and mechanical resistance, its use has increased dramatically globally since its commercial discovery in the 1950s (Adogame, 2019). Adogame, (2019) added that plastic has been extensively employed in manufacturing domestic goods, food packaging, electronics, childcare items, and the construction sector to create energy-efficient roofs, walls, floors, and insulation. Though it has mostly supplanted metal food packaging in the food business because of its low cost. Ingeniously, a newer form of plastics was created at the micro-size since micro-plastics and micro-beads are a worry, because they are utilized in cosmetics and other personal care goods and end up in the ocean. Therefore, this study was conducted to investigate the relationship between environmental sustainability and the performance of plastic manufacturing firms in Enugu state, Nigeria, and to suggest adequate measures for sustainable plastic production and control measures that are kind to the ecosystem, and the people living in the society, as well as a working environment that is safe and secure for its employees to perform more effectively for the achievement of the organizations' stated goals.

1.2 Statement of problem

Plastic is consumed by us through packaging. "The bisphenol-A (BPAs), which are present in many plastic items that come into contact with food, are metabolized to bisphenol-A in the liver and remain in our bodies through our urine," noted conserve energy future bottled water has tiny plastic particles. Micro-plastics were found in 90% of bottled water, according to a startling research

released by the World Health Organization (WHO) in 2018. The WHO further underlined that just 17 of the 259 samples had plastics-free tests. Our clothes, which are 70% synthetic and constructed of the worst fabric for the skin, allows us to absorb plastic.

Poor waste management has led to us breathing plastic when we burn trash outside, according to Chukwuemezie and Agwuna (2023). The World Health Organization (WHO, 2016) lists dioxin as one of the chemical substances released during the burning of plastic waste. Numerous reproductive and developmental problems, such as cancer, immune system damage, hormonal imbalance, and others, have been linked to dioxin. Nigeria is now predicted to have 233,911 cancer cases, with 124,815 new cases and 78,899 cancer deaths annually (Muanya, 2023). Research has found that pollution adds 80% to the chance of developing cancer in Nigeria. In Nigeria, the ongoing open burning of plastic waste has the potential to considerably increase these figures.

"Plastic is not just a litter problem; it is a pernicious pollution problem that starts as soon as the plastic is made," claims Adogame (2019). Adogame claims further that 1247 (58%) of the 2,166 plastic materials it collected were from 171 well-known companies. Five of the well-known brands accounted for approximately a third of all pollutants produced by those brands. These firms include Coca-Cola, Bigi, Pepsi, Nova Plastics, C-way Table Water, and Pepsi. High percentages of the materials collected (94%) were plastics, with the majority of the items being used for food packaging. Despite this, the SRADev study (2019) also identified more major polluters of the coast, including Action Bitters, 7-Up, Eva water, Pepsi, Viju water, Maltina, Mirinda, Fan milk juice, La Casera, Fanta, Aquafina, Nestle water, Dana Plastics, Orijin bitters, Sabrina bitters, and Adonko bitters. Additionally, practically all of the materials were recyclable in the area.

1.3 Objective of the Study

The general objective of this study was to examine the relationship between environmental sustainability and the performance of plastic manufacturing firms in Enugu State, Nigeria, while the specific objectives were:

i. To evaluate the magnitude of relationship between Recycling and Net Profit Margin of plastic manufacturing firms in Enugu State, Nigeria.
ii. To investigate the extent to which Incineration relates with Customer Satisfaction of plastic manufacturing firms in Enugu State, Nigeria.

1.4 Research Question

i. To what magnitude does Recycling relates with Net Profit Margin of plastic manufacturing firms in Enugu State, Nigeria?
ii. What is the extent of relationship between Incineration and Customer Satisfaction of plastic manufacturing firms in Enugu State, Nigeria?

1.5 Hypotheses

Ho_1: Recycling has no significant positive relationship with Net Profit Margin of plastic manufacturing firms in Enugu State, Nigeria.

Ho_2: Incineration does not improve Customer Satisfaction of plastic manufacturing firms in Enugu State, Nigeria.

Review of Related Literature

2.1 Conceptual Review

2.1.1 Environmental Sustainability

Sustainability has received a lot of attention in the business, academic, and popular press. This phrase is frequently used in conjunction with, or occasionally as a synonym for, phrases

like "Sustainable Development" and "Corporate Social Responsibility." According to Meseguer, Gálvez, López, and Molina (2002), sustainability promotes brand positioning, reputation, and image of the companies, which in turn improves financial performance over time (Pucheta-Martnez and Gallego-Alvarez, 2021; Snyder, 2019). It also increases corporate value and image. According to Meseguer *et al*. (2021), the crises that have connected the issues of climate change, economic recession, and increase in the prices of commodities in the market, all of which have had a more severe impact on the most impoverished communities, have already discussed and ratified Sustainable Development (SD). However, since 1980, civilizations all over the world have transformed in how they approach social and environmental challenges.

Consequently, we have gained a lot of knowledge about the fundamentals of business sustainability over the past forty years, which has led to more sustainable initiatives, methods, and regulations. Wang, Chen, Sulistiawan, Bui, and Tseng in 2021; Mintzberg, 2019, Corporate sustainability, according to Amorelli and Garca-Sánchez (2021), is a brand-new corporate management paradigm that is still developing. Despite the fact that Mahmood, Naveed, Ahmad, Scholz, Khalique, and Adnan (2021) emphasized, the concept of corporate sustainability acknowledges the need for profitability and differs from the conventional growth and profit-maximization model in that it places a much greater emphasis on environmental, social, and economic performance, as well as the public reporting on this performance. Environmental, economic, and social sustainability are the three pillars of business sustainability, and they are intertwined (Purvis et al., 2019). But in order to develop a sustainability strategy, a sustainable business will take into account each pillar.

We must address a number of environmental problems as a planet if we are to save it for coming generations (Delgado-Ceballos, Ortiz-de-Mandojana, Antolin-Lopez and Montiel, 2020). According to Mishra (2021), this can only be accomplished if everyone contributes, and the global efforts of individuals and corporations may lessen dangerous dangers and increase Earth's lifetime. According to Mio, Panfilo, and Blundo (2020), the idea of sustainability recognizes that the Earth's resources are finite and tries to prevent resource misuse. We can protect resources for future generations if we all work together to raise environmental awareness. On the other hand, Future (2021); Garcá Sanchez, Hussain, Martnez Ferrero, and Ruiz-Barbadillo (2019); David Nielsen (2021); Henriksson, Weidman, and Grunewald (2020); Fonseca and Carvalho, (2019) stated that some of the environmental problems affecting our globe include the following: pollution, dwindling biodiversity, and climate change benefits to the business, investors, and clients.

2.1.2 Recycling

Recycling is the process of converting waste materials into re-usable objects to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, energy usage, air pollution (from incineration) and water pollution (from landfilling) by decreasing the need for “conventional” waste disposal and lowering greenhouse gas emissions compared to plastic production (Bureau of International Recycling, 2021) . Recycling is a key component of modern waste reduction and it is the third component of the “reduce, reuse and recycle” (Corrêa and Corrêa, 2020). Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products (Ragaert, Delva, and Van Geem, 2017). An important way to mitigate the issues caused by plastic waste is to recycle the plastics into new materials (Li, Wang, Su, Zou, Duan, & Zhang, 2020), which can reduce the amount of waste that will enter the environment (De Souza Machado, Kloas, Zarfl, Hempel, and Rillig, 2018).

There are two main methods of plastic recycling, mechanical and chemical (Vollmer, Jenks, Roelands, White, van Harmelen, de Wild, van der Laan, Meirer, Keurentjes, and Weckhuysen, 2020). Mechanical recycling uses physical and mechanical processes to sort waste into different types of plastic, and cut the material down into granulates, which can then be reprocessed into new plastic products (Bennett, and Alexandridis, 2021). Chemical recycling breaks down the polymers into small hydrocarbon molecules which can be used as fuel or processed into specialty chemicals (Ragaert *et al.*, 2017). Mechanical recycling is more common as it is more economically viable and a more developed method. Chemical recycling methods are still being improved upon and the processes involved are becoming more efficient (Vollmer *et. al*., 2020).

Bennett and Alexandridis, (2021) currently stated that recycling programs include collection and recycling systems for consumers' plastic waste, product manufacturers to recycle plastic waste generated from production processes, and for sanitation efforts in removing plastic waste from the environment. Utilizing these plastic recycling processes will allow for plastic products to continue to be manufactured and used while reducing the numbers of plastic waste that will end up in the environment (Hees, Zhong, Sturzel and Mulhaupt, 2019). Reprocessing of recovered plastic scraps or wastes into usable products is called plastic recycling. Most plastics are non-biodegradable in nature, hence, the fundamental work is reduction of waste emissions, effective management and recycling of resulting wastes (Padanyi and Foldi, 2014; Hardesty, Good and Wilcox, 2015)). Recycling of plastics is a major aspect of the worldwide efforts in minimizing the yearly 8 million tonnes of plastics in the waste stream entering the Earth's ocean (Jambeck, Geyer, Wilcox, Siegler, and Perryman 2015; Alabi, Ologbonjaye. Awosolu, Alalade, 2019). According to Hopewell, Dvorak and Kosior (2009) plastic recycling terminology is complex due to varieties of recovery activities and recycling. There are four main categories of recycling which are: primary (which involves the mechanical reprocessing of plastics into a new product with equivalent properties), secondary (which involves the mechanical reprocessing of plastics into a product with lower properties), tertiary (which involves the recovery of the chemical constituents of the plastics) and quaternary (which involves energy recovery from the plastics).

2.1.3 Incineration

The waste incineration method refers to the burning of wastes in oxygen, which is chemically known as complete combustion (a chemical process in which a substance reacts rapidly with oxygen and gives off heat) that releases water molecules and carbon dioxide into the atmosphere (Shome, 2020). The waste produced after incineration is composed of different volatile chemicals, such as ash, and a small amount of hydrochloric acid. Generally, all plastic waste is not a good candidate for combustion; some are resistant to oxygen heating and explosives (Awoyera and Adesina, 2020). It is not an obligation that incineration can be used to treat all household waste plastic types properly (Thiounn and Smith, 2020). To select plastics to be incinerated, we must be careful on non-combustible waste to avoid these unprepared explosive accidents (Asgher, Qamar, Bilal, and Iqbal, 2020). The combustion of organic molecules can also produce energy which is known as fuel (Asgher, Urooj, Qamar and Khalid, 2020). Hence, the fuels can be presented in different physical states like liquid, solid and gas used by vehicles and airplane propulsion (Jaiswal, Sharma and Shukla, 2020).

According to Niyitanga, Sarmad, Muhammad, Damia and Hafiz, (2021), plastic wastes are rapidly produced and exposed at a high rate due to the world's industrial development and population growth. Both biodegradable and non-degradable wastes are highly generated from

man-made activities (operational sectors and climatic conditions, industrial growth, socio-economic development) and the natural processes of living creatures. Government municipalities, social communities, and local authorities have established different measures and environmental safety legislation rules that can guide the population to dispose of plastic waste after utilization (Yadav, Sherly, Ranjan, Tinoco, Boldrin, Damgaard and Laurent, 2020). In waste management, there are several scientific based strategies, such as incineration and landfills. These methods are established to have a clean environment and good plastic waste disposal (Benson, Fred-Ahmadu, Bassey and Atayero, 2021; David and Joel, 2018).

2.1.4 Net Profit Margin

Net Profit Margin (also known as "Profit Margin" or "Net Profit Margin Ratio") is a financial ratio used to calculate the percentage of profit a company produces from its total revenue (CFI, 2022). It measures the amount of net profit a company obtains per dollar of revenue gained. The net profit margin is equal to net profit (also known as net income) divided by total revenue, expressed as a percentage. However, Nariswari and Nugraha (2020) stated that Net Profit of Margin is a ratio of profitability that shows the comparison between net income and sales besides that, it can interpret the level of efficiency of the company as far as where the company is able to emphasize operational costs incurred within a certain period (Amalia, Fadjriah and Nugraha, 2020). Where the greater the net profit margin, the better, because it means companies is able to get a high profit through sales with the ability to properly reduce its operational costs. According to (Gitman, 2012) net profit margin measures the remaining percentage of sales after deducting with total expenses and costs, such as interest, tax and preference stock dividends. So if a company has a high NPM (Net Profit Margin) then the company can be called good.

The Corporate Finance Institute further added that net profit margin ratio is used to describe a company's ability to produce profit and to consider several scenarios, such as an increase in expenses which is deemed ineffective. It is used extensively in financial modeling and company valuation. It is further described as a strong indicator of a firm's overall success and is usually stated as a percentage. However, CFI added that a single number in a company report is rarely adequate to point out overall company performance. Hence, an increase in revenue might translate to a loss if followed by an increase in expenses. On the other hand, a decrease in revenue, followed by tight control over expenses, might put the company further in profit.

2.1.5 Customer Satisfaction

Oliver (1980) defines customer satisfaction as an individual's evaluation that results from a comparison between service performance and his or her expectation. Namkung and Jang (2007) explained that satisfaction occurs when service performance meets customer expectations; otherwise, customers may not be happy with the firm. Konuk (2019) has added that customer satisfaction can be evaluated based on two main stages: emotional and cognitive. Omar, Shaharudin, Jusoff and Ali (2011) emphasized that the emotional stage shows a person's sense or feeling to the service performance with their expectations. In contrast, the cognitive stage reveals the rational evaluation of the service utility while using it. Many industries have considered customer satisfaction a significant factor that can increase customer repurchase behavior (Abdul-Muhmin, 2010).

Customer satisfaction is a person's feelings of pleasure or disappointment that arise from comparing their perceived performance to their expectations, it can also be said to be a key

element in modern marketing thinking and practice (Luh and Giantari, 2022). Customer satisfaction is a fulfillment response from customers to a product or service received that has met customer needs and expectations. Good service quality is a factor that affects customer satisfaction (Zeithaml *et al.*, 2002).

2.2 Theoretical Review

Florence Nightingale Environmental Theory

This study was anchored on Florence Nightingale Environmental theory. Florence was a professional Nurse who lived between the 19th and early 20th century (1820-1910), she was the first Nurse theorist that existed at the time, she contributed to the development of modern nursing practices and she displayed an exemplary life which was worth emulating by her nursing colleagues and others around her at the time. The Environmental theory as propounded by Florence Nightingale proposes that Nurses should use the immediate environment of a patient as means for treatment and recovery, as the sequential process of restoring the patients is associated to some external factors within, and it can continually affect the biological, physiological and psychological processes of healing. She further identified five (5) environmental factors which were naturally related associated with healthy pattern of living, and if not adhere by man will be catastrophic; these factors included fresh air, pure water, efficient drainage, cleanliness or sanitation and illumination from sunlight.

One can wonder how these factors affect environmental sustainability with regards to plastic productions and it usage by people. It is very important to note that human activities of unreasonable burning of plastic and disposal has caused harm to the ecosystem, by diluting and poisoning the natural air and water consumes by human themselves. More so, the activities of littering plastic waste in our environment has caused blockage in our drainages, thereby living our immediate surroundings untidy and unhealthy for living. Consequently, this human activity of polluting the air and water has gone contrary to establishment of the Nightingale Environmental theory in the first instance. So for a healthy co-existence man, there is an urgent need to address these salient environmental issues that has hampered on the progress and environmental sustainability of plastic manufacturing firms.

2.3 Empirical Review

Ozili, (2022) from Nigeria conducted an empirical study on Sustainability and sustainable development research around the world. The study measured sustainable development with social, economic, resources, technology and environmental indicators. The study reviewed the existing research on sustainability and sustainable development around the world. It began by defining the sustainability and sustainable development concepts. The study found that the challenges have social, political, structural, institutional, and economic dimensions. Also, while sustainable development is a widely acknowledged concept in academia its practicality in policy circles has been contested. The study finally concluded that incorporating sustainability or sustainable development concerns into business or environmental management yields some positive benefits. Finally, some areas for future research are suggested.

Maji and Kalita, (2022) from India examined the climate change-related disclosure patterns of listed Indian firms and its impact on firm performance. Their study employed the content analysis of the annual reports and/or sustainability reports of 22 selected firms from the energy sector for the period spanning 2018–2019 and 2019–2020. They measured firms' performance with governance, strategy, risk management and target metrics, to compute the overall and respective climate-change disclosure scores. Furthermore, a panel data regression

model was used to appraise the impact of such disclosure on the performance of the firms. Their regression findings established a positive relationship between climate change-related financial disclosure and firm performance, indicating that firms can witness improved financial performance by disclosing more information on climate change.

Weiping, Jiashun, Chang and Xue, (2022) from China and Hong Kong examined the relationship between share pledging with corporate social responsibility (CSR). The CSR score measured firms' social responsibility from five categories: shareholders, supplier & customer, employees, society, and environment. CSR information was collected from the social responsibility report database constructed by 'Hexun' website; other financial information was acquired from the Chinese Stock Market and Accounting Research Database (CSMAR). They adopted the descriptive statistics and the regression model for analyzing data collected. Their finding indicated that controlling shareholders' share pledging impedes firms' CSR investments, thereby leading to poorer firm performance.

Gamal, Wahba, and Correia, (2022) from Egypt examined the impact of firm life cycle stages on business activities, notably sustainability programs and CSR investments, which shed light on a company's CSR initiatives and sustainability choices. This study used 420 firm-year data samples from 2013 till 2018 in examining the association between CSR proxied by corporate sustainability performance (CSP) index and firm life cycle for firms listed in the S&P/EGX ESG index. Their findings show a significant relationship between CSP and firm life cycle stages. The results also show that the firm life cycle has greater explanatory power for CSP levels than previously thought. Therefore, organizations should choose and implement CSR initiatives based on their life cycle stage to ensure long-term value and growth.

Mohammad, Murad, Gema, Antonio, Hengky, Imran, and Shakir, (2022) from Saudi Arabia, Spain, United Kingdom, Indonesia and United States of America examined how adaptive capability and environmental behavior affect corporate sustainability performance and financial performance. The study used the Partial least squares-structural equation modeling (PLS-SEM) approach to analyze the data collected from 311 ISO 14001 certified firms in Saudi Arabia. The empirical analysis of the data reveals that, as it both adaptive capability and environmental behavior have a positive and significant effect on corporate sustainability performance as well as on financial performance.

Kammoun, Ben, Loukil and Ibenrissoul, (2021) from Morocco and Tunisia analyzed the complexity of the linkages between corporate social responsibility (CSR) and firm performance in Morocco and to decompose this complexity through a bidirectional sense of causality. They measured CSR with social and economic indicators, while Firms performance was measured with Technology and Human Resources Using data surveyed from 74 Moroccan listed firms; they conducted an econometric modeling to measure this relationship bilaterally and to investigate the underlying factors behind this association. They adopted an empirical study which proved that the existence of a positive association between CSR and firm performance in both directions in the Moroccan context and suggests that the more social enterprises are, the more they achieve better financial results.

Iheanacho, (2021) from Nigeria investigated the sustainable business of Nigeria organizations, using the three pillars of sustainability, such as economic, social and environmental measures to improve business performance when entrenched into long term strategies of a business. The study also addressed the challenges of power supply, multiple

taxation, pollution and waste management faced in the business environment. Qualitative method was used to review extant literature and to examine sustainability practices of business from selected industries, such as construction, manufacturing, banking and hospitality industries based on availability of sustainability reports of the industry leaders. However, the study found that disclosing sustainable practices of companies helps maintain transparency about risks and opportunities faced as a business, alleviating negative ecological, social and governance impacts and improving the reputation of the brands.

Gupta and Gupta, (2020) from India unraveled the impact of environmental sustainability on multiple dimensions of a firm's performance. The study considered financial performance, customer performance, internal business process performance, and learning & growth performance as four dimensions of a firm's performance. They used well-established scales for the concepts, and all are validated in Indian demography, using confirmatory factor analysis in AMOS. They collected 200 cross-sectional respondents sample from the senior executives of Indian business organizations. They also analyzed the association of environmental sustainability on the firm's performance using structural equation modeling in AMOS. Their finding indicated that environmental sustainability has a positive and significant influence on the four vital functional performances of firms.

Fotis and Polemis, (2018) from Germany investigated the relationship between sustainable development environmental policy and renewable energy use. They utilize a dynamic GMM approach over a panel of 34 European Union (EU) countries spanning the period 2005-2013. They argue that EU countries must increase the use of new technology and renewable energy capacity in order to align environmental policies towards more efficient energy use and sustainable development among the EU periphery. Their findings revealed a positive monotonic relationship between development and pollution. Energy saving positively affects environmental degradation, while energy intensity increases air pollution.

Olorunfemi, Tomola, Felix, Ogunleye, (2013) from Nigeria conducted a research on the Nigeria Manufacturing Performance in Nigeria an Implication for Sustainable Development. The study examined manufacturing performance for sustainable economic development in Nigeria. Panel data analysis was used as the secondary data from 1980 -2008, and it was extracted from CBN Statistical Bulletin. However, there is a negative relationship between manufacturing and each of investment, exchange rate, and export the study concludes that the key to reversing the poor performance of Nigerian manufacturing is to provide incentives for firms to become more export oriented.

2.4 Gap in Literature

Prior study under the theme of environmental sustainability had focus on the global issues of climate change, biodiversity and land degradation, to the best of our knowledge only a very few studies have concentrated on how to resolve peculiar environmental issue like constant burning of plastic waste in some part of the developing countries in Africa, or even cities in Nigeria. To speak of geographical gap under the theme of environmental sustainability, a few studies like the study of Ozalla (2022); Olorunfemi, Tomola, Felix, Ogunleye (2013): Micah, (2019): Aifuwa (2020): Noor, Arshad, Omar and Muda (2021) and a few more had carried out a research in Nigeria. To add up on the gaps identified in this study was the sectoral gap (Manufacturing firms into the production of Industrial Goods), the study by prior scholars on this theme focused more on other sectors.

3.1 Methodology

This study adopted the descriptive survey research design. The study was conducted in Enugu state of Nigeria which housed seven (7) plastic manufacturing firms such as: Eagle Heights Plastic Industries Ltd (86); Eastern Plastics Ltd (83): Eagle Plastic Industries Ltd(125): Innoson Technical & Ind. Co. Ltd (423): Jully Plastic Industries Limited (85): Uc Plastic Industry (105): Masters Energy Plastics Industries Ltd(136). From a population element of 1,043, the Borg & Gall formula: **$n= [(Zx)^2 (e) (N)]$** was adopted to obtain the sample size for the study. However, the sample size for the study was 200.

A structured likert questionnaire was employed. Similarly, the researcher used information from the literatures that were studied to create the instrument. Additionally, the likert questionnaire was split into parts A and B. While Section B solicited information on respondents' perceptions of the link between environmental sustainability and performance, Section A requested information on respondents' socio-demographic background and status. The instrument was created using a 5-point Likert scale, with the following tags: very high extent (very high extent = 5), high extent (high extent = 4), moderate (3), tiny extent (2), and zero extent (1). Three experts from the Field of Management Sciences, Statistics and environmental sciences evaluated the questionnaire's face and content validity, and the cronbach Alpha outcome yielded a coefficient of 0.818. Furthermore, for testing the hypotheses of the study the Paired Sample T-test included in SPSS version 23.

3.2 Model Specification

The nexus between Environmental Sustainability and Performance of this present study were ascertained using the following model:

Performance = *f* (Environmental Sustainability) +

Thus,

X_1, Y_1 $NPM = \beta_o + \beta_1 RCG + \mu$ - - - - - **-Ho_1**

X_2, Y_2 $CS = \beta_o + \beta_1 INC + \mu$ - - - - - - **-Ho_2**

Where:

β_o = Constant (Intercept)
β_i = Coefficients of the independent variable
Y = Dependent variable (Performance)
X = Independent Variable (Environmental Sustainability)
Y_1 NPM = Net Profit Margin
X_1 RCG = Recycling
Y_2 CS = Customer Satisfaction
X_2 INC = Incineration
μ = Error term

Presentation and Analysis of Data

4.1.1 Test of Hypothesis One

Ho_1: Recycling has no significant positive relationship with Net Profit Margin of plastic manufacturing firms in Enugu State, Nigeria.

Table 1 **Paired Samples Test**

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 RCY vs NPM	6.2308	1.30497	.08093	.46371	.78244	7.699	259	.013

Source: SPSS IBM version 23 computation.

The paired sample t-test showed that Net profit margin level increased significantly when the perceived Recycling waste management approach was adopted to address the environmental sustainability issue of pollution and waste control. A t-test value of perceived outcome is said to be significantly high when it is above 1.00 (t-value > 1.00), but when the t-value is less than 1.00 (t-value < 1.00), it is concluded that the perceived outcome within the paired sample has no significant relationship. In conclusion to this result, the t-value was obtained at 7.699 which is significant high. The study therefore concluded that there is a significantly high positive relationship between Recycling and Net profit margin of plastic manufacturing firms in Enugu State, Nigeria.

Decision Rule: Accept the null hypothesis if the p-value is greater than 0.05, otherwise, reject.

Decision: We reject the null hypothesis, since the p-value is 0.013^{**} which is less than the critical value 0.05, this study reveals that Recycling has a positive significant relationship with Net profit margin of plastic manufacturing firms sector in Enugu State, Nigeria.

4.1.2 Test of Hypothesis Two

$H0_2$: Incineration improves Customer Satisfaction of plastic manufacturing firms in Enugu State, Nigeria.

Table 2 **Paired Samples Test**

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 INC vs CS	2.4615	1.9329	.05786	-.06778	.16009	.798	259	.426

The paired sample t-test showed that Customer satisfaction level did not increased even when the perceived incineration waste management approach was adopted to address the environmental sustainability issue of pollution and waste control. A t-test value of perceived outcome is said to be significantly high when it is above 1.00 (t-value > 1.00), but when the t-value is less than 1.00 (t-value < 1.00), it is concluded that the perceived outcome within the paired sample has no significant relationship. In conclusion to this result, the t-value was obtained at 0.798 which is significant low. The study therefore concluded that there is no significantly positive relationship between incineration and Customer satisfaction of plastic manufacturing firms in Enugu State, Nigeria.

Decision Rule: Accept the null hypothesis if the p-value is greater than 0.05, otherwise, reject.

Decision: We accept the null hypothesis, since the p-value is 0.426** and does not pose any significance with the critical value of 0.05, this study reveals that incineration has a no significant relationship with customer satisfaction of plastic manufacturing firms' sector in Enugu State, Nigeria.

4.2 Discussion of Findings

The outcome of the paired sample test for theory number one revealed that recycling and net profit margin had a very strong positive association. A t-value of 7.699 and a p-value of 0.001 are shown in Table 1. This suggests that recycling has a favorable impact on the net profit margin of Enugu State plastic manufacturing companies. As a result, the null hypothesis was disproved and the alternative hypothesis was accepted.

The link between the indicator of the dependent variable (Customers Satisfaction) and the indicator of the independent variable (Incineration) was examined in the second hypothesis. Customer happiness served as a performance indicator, while incineration was modeled to operate as environmental sustainability. The study found no association between incineration and customer satisfaction at the second hypothesis testing stage, with a coefficient value of 0.425. In the meanwhile, it was important to comprehend the significance of several values in the correlation table. For example, the number +1 denotes a substantial correlation when any positive value more than or equal to 1 is read. Any negative value that was determined to be negative above 1 or negative equal to 1 is considered to have a negative connection when a value reads -1. Finally, it is argued that there is no correlation or link when a value is zero.

According to the aforementioned claim, it was found that the burning technique of waste management had no discernible relationship to customer happiness; hence, incineration measures would always have no discernible impact on customer satisfaction. The result of this study is consistent with those of Matthias, Annette, Nina, and Sonja (2021) and Firas (2020), whose research found a negative correlation between corporate sustainability and business success. We must agree on what customer happiness actually implies in order to support the conclusions on Hypotheses 2. Accordingly, Luh and Giantari (2022) asserted that "customer satisfaction" is defined as a person's feelings of pleasure or disappointment that result from comparing their perceived performance to their expectations. It can also be defined as a customer's fulfillment response to a product or service that has met their needs and expectations. In the context of this study, customer satisfaction refers to the satisfaction that customers have after using the plastic product they purchased. However, the results of this study showed that waste incineration is clearly profitable for the plastic companies, and regardless of whether the money made from waste management supports the companies' social and economic well-being, it does not lower the cost per unit of a plastic good that consumers buy. Customers are therefore not very impressed by the incineration-based waste management strategies used by the plastic companies.

5.1 Conclusion

The study through its findings has revealed the impact of environmental pollution to attainment of manufacturing firms' objectives and its adverse effect on human health. In addition are the environmental challenges posed by manufacturing firms' unethical activities of consistent burning of plastic and disposal of plastic waste in the seas, and the human surroundings which causes blockage in our drainages. It is therefore very expedient to realize how much air pollution has also endangered the atmosphere, biodiversity and recurrent climate change issues, and strategize a sustainable approach to mitigate these environmental challenges.

5.3 Recommendations

1. **Recycling:** By reducing, reusing, and remolding, we provide our businesses with more money-making chances. By implementing efficient collection techniques and creating markets for recovered plastic waste, plastic companies are being urged to improve their recycling infrastructure and waste management systems. This will save them money, increase their organization's cash flow, and provide employment opportunities for people who land fill empty plastic cans.

6. **Incineration:** Manufacturing companies have not seen a substantial improvement in performance after adopting the incineration technique of trash. In light of this well-established fact, the research calls on plastic companies to explore alternatives to burning plastic that will result in maximum consumer satisfaction. A favorable atmosphere for everyone may be created by plastic companies starting to develop extremely practical bio-plastic that is biodegradable.

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