



## Environmental Sustainability: A Strategy and Panacea for Operational Efficiency by Listed Multinational Manufacturing Firms in Nigeria.

*Sadiq Otaru Hamisu and Adegbie Folajimi Festus*

Babcock University, Department of Accounting, Ilishan- Remo, Ogun State

[hamisuotaru@yahoo.com](mailto:hamisuotaru@yahoo.com); [adegbief@babcock.edu.ng](mailto:adegbief@babcock.edu.ng)

Correspondence Email: [hamisuotaru@yahoo.com](mailto:hamisuotaru@yahoo.com)

### ABSTRACT

*Operational efficiency saves money and time by cutting wastes while maintaining quality service to boost organizational performance. In Nigeria, there is little or no study that focused on how environmental accounting can enhance operational efficiency of a firm. Consequently, this study investigated environmental sustainability as a strategy and panacea by listed multinational food and beverages firms in Nigeria to boost their operational efficiency. The study adopted a survey research design and its sample size of 150 was arrived at using purposive sampling technique. Primary method of data collection was used by administering questionnaires to respondents out of which 137 returned their questionnaires. The data was analyzed using multiple regression technique of data analysis while the reliability of the study was done using Cronbach alpha results. It was found that Adjusted R<sup>2</sup> was 0.801 while F-statistics was 0.000 and all independent variables of the study had positive and significant effects on operational efficiency. It was recommended that the top management of listed food and beverages manufacturing firms should increase their funding for employee health and safety, corporate social responsibility as well as environmental protection in order to boost the operational efficiency of listed foods and beverages manufacturing firms in Nigeria.*

**Key terms:** Corporate social responsibility employee health and safety, environmental protection, and operational efficiency.

### 1. Introduction

It is a well-known fact that the major objective of a firm or multinational company is wealth maximization for its numerous shareholders and investors. Consequently, global climatic change as a result of industrial companies producing goods and services for various categories of consumers has remained a major challenge to stakeholders interested in a clean environment devoid of environmental pollution and other hazards. AS a result of this wealth maximization objective, Enofe, Mgbame, Obazee, and Edeoghon (2013) opined that managers of multinational manufacturing companies to a large extent are operating without considering the impact of their operations and production processes on the immediate environment. With the dangers posed by climatic changes, many international bodies have risen to the challenge of ameliorating the situation for a more favorable and cleaner environment.

Ezejiyor, Akamelu, and Chigbo (2016) noted that the awareness being created is intended to include each and every person, business, non-profit organization, and even government bodies that are obliged to establish laws, rules, and policies to deal with climate change and promote sustainable development in all spheres of economic life. Presently, multinational companies operate in an environment that has a substantial direct or indirect impact on their operations and as a result, they are becoming more conscious of their corporate responsibility in response to the environmental damage by considering the effect of their operations on host communities and other different stakeholders. Alawode and Adegbie (2020) opined that environmental accounting introduces responsibility and openness, especially in the realm of resource management and specifically with regard to natural resources. It includes sustainability reporting as well as the identification, measurement, and control of costs, liabilities, and consequential assets that may be impacted during routine company operations (Adegbie et al. 2021).

Thus, this challenge affects how multinational companies restructure the processes they utilize to create the goods and services they provide to meet the needs of their numerous customers, because multinational manufacturing companies presently demonstrate that their main concern is no longer the satisfaction of their shareholders but rather a broad consideration of all stakeholders' interests in the entire society (Ekwueme, 2011). Aondoaka (2015) opined that managers of multinational manufacturing firms are increasingly focused on environmental sustainability and aligning their production methods and processes because the conventional emphasis on production and profit-making are no longer the only option given the impact of their operations on the environment. As a result of the emphasis on environmental sustainability, multinational manufacturing industries now place a strong emphasis on reducing risks, reduction of workplace accidents, poor product quality, rationale usage of raw materials by integrating environmental sustainability as tools for their long-term success in their operations (Enofe, Mgbame, Obazee & Edeoghon, 2013).

Okoye and Ezejiyor (2013) opined that environmental protection begins with each and every person such as individuals, corporate organizations, and private/public organizations. The social responsibility of multinational manufacturing companies should also include improving the quality of life in the

areas where they operate through the demonstration of corporate social responsibility (CSR). According to Fijabi and Adegbe (2022) there should be strategies through corporate social responsibility to deal with environmental sustainability such as management of water consumption, energy consumption level, effluents and waste disposal, good working environment, employee health and safety, human rights protection, responsible consumption, equal opportunity for employees and product qualities amongst others which will ultimately enhance the efficient performance of multinational companies.

It is therefore believed that implementation of environmental sustainability characteristics such as corporate social responsibility to immediate communities of operation and others such as environmental protection, employee health, and safety, reduction in the rate of energy consumption and products and safety would go a long way in enhancing the efficient performance of the firm (Okoye and Ezejiofor, 2013; Aondoaka, 2015; Odewale et al., 2020). Consequently, it is against this background that this study is assessing the effect of sustainability reporting on the operational efficiency of listed foods and beverages multinational manufacturing firms in Nigeria. Specifically, the study shall be assessing the effect of environmental sustainability efforts using independent variables of employee health and safety, corporate social responsibility (community relations efforts) and environmental protection on operational efficiency of listed foods and beverages multinational manufacturing firms in Nigeria.

Operational efficiency saves money and time by cutting waste while maintaining quality and service. Also, in an efficient organization, employees are more likely to be interested in their work if they believe that the work they do has a purpose to boost organizational performance which will ultimately increase the share price of the firm. In Nigeria, most similar studies, such as those of Uwigbe (2011), Uwaoma and Ordu (2016), Uyagu et al (2019) focused on the effect of firm characteristics on sustainability reporting by listed firms while the study by Fijabi and Adegbe (2022) focused on effect of environmental accounting on sustainability of Nigerian economy without the use of operational efficiency as the dependent variable and this presents a gap to be filled by this study. Besides, the research design of these previous studies were either ex-post facto research design or a panel data research design, unlike this current study which uses survey research design which also presents a gap to be filled by this study. Furthermore, the only study that used efficiency as a dependent variable is that of Niyonzima (2020) which was examined in Rwanda, a developing country such as Nigeria.

Operations refer to anything a firm does to produce goods or services efficiently and a firm may be wasting time and money if its activities are inefficient. This study, therefore, is investigating the effect of environmental sustainability on operational efficiency by listed multinational firms based on a Nigerian perspective and this equally presents a gap to be filled by this current study.

The findings of this study will benefit regulators who need to know the effect of sustainability reporting on multinational manufacturing companies operating in Nigeria. The findings shall also educate investors and other stakeholders on the effect of environmental sustainability efforts being made by multinational firms. In order to achieve the objectives of the study, the following hypotheses were formulated and tested in null forms.

H<sub>01</sub> Corporate social responsibility has no significant effect on operational efficiency of listed foods and beverages manufacturing firms in Nigeria.

H<sub>02</sub> Environmental protection efforts have no significant effect on operational efficiency by listed foods and beverages manufacturing firms in Nigeria.

H<sub>03</sub> Employee health and safety efforts have no significant effect on operational efficiency by listed foods and beverages manufacturing firms in Nigeria.

## 2. Literature Review/Theoretical Review

### 2.1 Conceptual Review

#### Sustainability

Environmental sustainability refers to the process of ensuring that the current operations of multinational companies coexist with the environment in which they operate without endangering or destroying the environment. According to Onsrud and Simon (2013), environmental sustainability entails a system where human activities must consume natural resources at a rate that allows for some of those resources to be replenished organically on their own. Consequently, the act of allowing some resources to be replenished by managers is currently responsible for conducting manufacturing operations in a sustainable manner.

Adedeji and Eziyi (2019) noted that environmental sustainability also refers to the process of producing goods and services that meet the needs of people and other ecosystem inhabitants while preserving natural resources such as water, energy, and other resources. This usually takes place when multinational manufacturing firms find innovative ways to produce without harming people, animals, and plants that depend on the environment for their existence, as well as ways to improve their well-being in their local communities. Sustainability is also known as the capacity of an organization to look after its stakeholders while also maintaining a stable and growing stream of revenue for its long-term commercial operations.

As a result of the importance attached to environmental sustainability, multinational firms are now establishing environmental directors as a requirement for the sustainability of the environment in every multinational manufacturing company operation by analyzing and strategically planning for the business sustainability of their organizations through the needs of the local community and the environment of operation (Rabah, Ibrahim, Ijah & Manga, 2011). Presently, the companies' concern for the environment ensures that waste products such as garbage can be recycled by other businesses that will pay additional revenue to the multinational manufacturing firm. (Chukwuma, Tagbo, Anike, Obinna & Ikechukwu, 2021)

Based on the conceptual review of environmental sustainability above, it can be seen that it is a crucial element in maintaining the social, economic and ecological components for the beneficiaries such as the host community of operations, employees' health and safety, products safety and reliance for present and future generations.

### **Corporate Social Responsibility (CSR)**

As a key indicator of accounting ethics, Corporate Social Responsibility shows that it is the duty of multinational firms to contribute to and uphold the society in which they operate to enhance social, economic, and environmental degradation as well as to reduce the risks associated with such activities. Additionally, corporate governance which considers the actions to be taken by a firm should put a strong emphasis on the wellbeing of the stakeholders in collaboration with the multinational companies (Cordero, Ziga, & Rueda, 2014). The existence and sustainability of an entity operating in a difficult environment is a pertinent problem for Corporate Social Responsibility because the company's goals and objectives have to go beyond conventional economic goals towards socially desirable and conscious goals. This is actually justified by moving beyond economic growth and profit realization of a typical multinational company because no business can be sustained if its surroundings are unsafe, consequently, managers of corporations should be concerned about what is happening in the nearby business environment and plan how to address social and environmental issues so that they do not affect the business' existence and sustainability. Singha and Dhingrab, (2021) opined that this emphasis on concern for the environment results in inclusive economic, social, and environmental growth all of which must occur simultaneously with the original objective of the multinational company which is wealth maximization.

### **Employment Health and Safety**

Employees are vital resources of an organization and as a result employee protection is one of the environmental sustainability metrics because workers should be protected from workplace accidents and other serious harm that might result from unethical work practices when employers fail to uphold workplace safety standards. According to Abayomi and Ayobami, (2021) Multinational entities are required to provide and maintain a healthy and safe working environment that enables their employees to feel secure and work hard; according to the working regulations and standards from appropriate labor bodies in order to meet various stakeholders' needs of the multinational firm. As a result of this concerted effort by management, dangerous situations must be avoided and eradicated from work areas, and various workplace safety standards must be strictly adhered to for an enhanced working environment for boosting productivity.

### **Environmental Protection**

Governments across the globe, are ensuring that multinational companies work towards protecting the environment in which they operate in order to protect the humans such as the employees of the multinational company and those residing in the host community of the multinational companies. It is therefore pertinent for multinational companies to mobilize and include in their annual budget the amount of money that will be spent on environmental protection and even plan a community work where the staff, management, and surrounding society put their efforts together to clean up or plant trees that will enhance good air quality to their environment (Jui-Che & Huang, 2015). All companies are required by law for those countries with mandatory environmental disclosure to include in their narrative reports the quantities and activities of environmental protection during the year of report. According to Jones (2019), environmental protection disclosure has become a necessary component of both voluntary and obligatory disclosures that aid in the analysis and measurement of a company's long-term viability. Multinational companies' management is currently required to prepare an environmental accounting report to show what is being done to secure the working environment to indicate the environmental status of the multinational companies by the decision makers (Shofiqul, Miah, & Fakir, 2015).

### **Operational Efficiency**

Adegboyega and Taiwo, (2019) noted that the ratio between the resources used and the results or output from those uses by multinational companies is known as operational efficiency. Accordingly, if there are improvements in the output to input relational ratio, operational efficiency has been achieved. This clarifies that production costs should be reduced without sacrificing the number and quality of the results/products; as a result, quality and quantity should be improved or maintained (Oyesiku, Muyiwa & Duwole, 2016). Olalere, Temitope, John, and Oluwatobi (2015) defined operational efficiency as the capacity to produce goods or services at a minimal cost of input compared to the value of output. Rabah, Ibrahim, Ijah and Manga (2011) opined that "operational efficiency as a productivity tool includes two ways of measuring how financial resources are employed. Increase both input and output, but output should increase faster than input; decrease both input and output, but input (used resources) should decrease faster than output; or increase both input and output, but output should increase faster than input". Oyesiku, Muyiwa, and Duwole (2016) defined operational efficiency as "the comparison of the quantity and value of economic resources or components of production employed in a given project in order to provide outputs that are good or better in terms of quantity and quality". Manufacturing firms that increase environmental management and sustainability without sacrificing their revenue and efficiency are those that are strategically managed efficiently (Graedel & Allenby, 2019). According to Tien, Chung, and Tsai (2002), in order to make all of these characteristics feasible, manufacturing processes must adopt new technology and enhance their technological capabilities. This will allow costs to be kept as low as possible without compromising the quality of the products they produce. The efficiency of the manufacturing process is heavily influenced by usage of natural resources such as water, energy, and waste management. If poorly handled, they can be significant loss-making factors for manufacturing organizations but with appropriate technology in a knowledge-based manner environmental protection management can even enhance the operation of the firm.

## 2.2 Theoretical Review

This study is underpinned by two theories namely; the legitimacy theory and the stake-holders theory. Legitimacy theory which was propounded by Dowling and Pfeffer (1975) assumes that multinational company's operation value system should be compatible with the expectations of the society in which it operates. The process of recognizing multinational company's operations as a legitimate business in the host community is called legitimation and corporate environmental sustainability disclosures could be a part of this procedure. Accordingly, environmental sustainability is defined by legitimacy theory as a reaction to the pressures of the social, political, and economic environment to the multinational company. According to this notion, multinational companies should make an effort to create a balance between how they transact business and how external stakeholders view them and what society considers to be proper (Deegan, 2002). Consequently, if the social contract of the multinational company is broken, society's perceptions of the organization could have a long-term negative impact on its viability.

Another theory which is frequently used to underpin environmental sustainability is the Stakeholders' theory which was propounded by Freeman (1984) and it assumes that the company's primary goal is to create value jointly with all of its stakeholders as a component of ecosystems and social groups among multinational companies. Therefore, it is the responsibility of top management to exert significant efforts in varying the resources entrusted to them in order to generate profits that serve as the foundation for long-term payments of the interests of all stakeholders. The value of shareholders, potential investors, customers, banks and creditors, employees, governments, communities and the environment itself must all be viewed by managers as important factors in determining the success of their businesses (Freeman, 2003). Therefore, Freedman (2004), the founder of the stakeholders' theory opined that every stakeholders must work together in some capacity because all groups play a crucial role in the sustainability, survival, and effectiveness of the organization. According to Deegan (2013), stakeholders' theory explains the connections between multinational company, the government, and other regulatory authorities, as well as their employees and the surroundings of host community in which they operate. The theory discusses how multinational companies behave in response to each partner's interest and how their activities affect one another's ability to survive and continue to exist in business. Based on the above reviewed theories, this study is anchored on the stakeholders theory and legitimacy theory which seek that the firm must operate in a manner that meets and protect the interest of all stakeholders of the firm such as shareholders and potential investors, creditors, government, employees, community relations in order to gain legitimacy and operate to attain its objectives.

## 2.3 Empirical review

The notion of corporate social responsibility as a new management philosophy that explains how businesses can include social concerns into their operations without endangering the interests of their stakeholders and investors was investigated by Temitayo and Akin (2015). Their study assessed how corporate social responsibility which is a component of environmental sustainability at the strategic level of business organizations can foster corporate competitiveness and enhance profitability both in the short and long terms of business, especially in developing economies like Nigeria. The study used a sample of selected Nigeria listed deposit money banks and the data was analysed using multiple regression as a technique of data analysis. The association between corporate financial performance and Corporate Social Responsibility of Banks in Nigeria was established by the researcher using accounting profits such as profit after tax, return on equity, and return on assets as independent variables.

Also, Ezejiofor, Akamelu and Chigbo (2016) assessed effect of environmental sustainability on operational efficiency of listed firms in terms of cost savings and generation of income through waste management the study found that environmental sustainability efforts resulted in income generation. The study recommended that government agencies enforcing environmental protection should ensure that multinational firms strictly adhere to environmental protection laws and policies to enhance environmental sustainability.

Furthermore, in Rwanda Niyomonzima (2020) investigated the effect of environmental sustainability on operational efficiency of multinational companies using survey research design for the collection of primary data through the view of respondents on corporate social responsibility, environmental protection and employee health and safety as independent variables of the study. The sample size of the study was three multinational manufacturing corporations. The data of the study was analysed using multiple regression technique of data analysis and it was found that all the independent variables of the study had positive and significant effect on operational efficiency of the firms. The study recommended that multinational firms in Rwanda should be implementing corporate social responsibility, environmental protection and employee health and safety to enhance operational efficiency of the firms. The study noted that environmental protection efforts will result in a reduction in air pollution, waste disposal and a reduction in carbon dioxide.

Similarly, Otsupius and Akintaro's (2020) examined the connection between strategic agility and organizational sustainability in Nigerian Management Development Institutions (MDIs) by adopting survey research design with a sample size of 398 staff members which was arrived at using simple random sampling technique. The questionnaires were administered and 87.9% of responses were received and Pearson's Product Moment Correlation method of data analysis was employed using descriptive and inferential (correlation) statistics. The results of the study showed that there was a substantial and positive association between organizational sustainability and strategic agility.

Also, the impact of environmental sustainability on stakeholders' perceptions of listed manufacturing companies in Nigeria was examined by Odewale et al. (2020) using a survey research design. The five-point Likert scale, was utilized in primary data collection. 40 listed manufacturing firms were chosen and 400 copies of questionnaires were purposefully administered to respondents. Out of the 400 questionnaires administered, 326 copies were completed and returned. The statistical findings revealed that environmental sustainability has a negative, non-significant impact on management and staff, a negative, significant impact on shareholders, a negative, significant impact on community members, and a negative impact on government and regulatory

agencies. Based on the findings, the study recommended that organizations should take stakeholders' interests into account when conducting their regular business and that financial statements should also incorporate non-monetary environmental data in addition to monetary environmental data.

Besides, in Norway, Arild and Fanny (2021) evaluated the connection between sustainability innovations and competitiveness to find out if and under what conditions there is a positive association between sustainability innovations and business competitiveness. The study was conceptually done by reviewing 100 articles and the investigation came to the conclusion that there was a positive connection between the dependent and independent variables. The results thus confirmed the hypothesis that sustainability innovations can result in win-win circumstances for a multinational firm by boosting its competitiveness. The study recommended that multinational companies should continue to engage in sustainability innovation because it enhanced competitiveness of multinational companies.

Additionally, Adegbe, Ekpeni and Owolabi (2021) evaluated the impact of environmental accounting procedures on the stock value of Nigerian industrial firms. Ex-post facto research methodology was used in the study, which took into account a population of 34 manufacturing firms listed on the Nigerian Stock Exchange as of December 31, 2019. With the aid of the purposive sampling technique, the study chose a sample size of 11 firms comprising of 9 consumer products firms and 2 industrial goods firms. The study used descriptive and inferential statistics as techniques of data analysis and the results of the study showed that environmental accounting procedures with firm size as control variable had a considerable impact on the firm value of listed manufacturing firms in Nigeria. The study recommended that, listed manufacturing firms should work harder to comply with GRI's (Global Reporting Initiatives) standards to enhance environmental accounting practices.

Furthermore, Fijabi and Adegbe (2022) examined the link between Nigeria's environmental potential for sustainable economic growth and environmental accounting standards using a survey research design and information was gathered from twenty-two (22) firms engaged in the manufacturing industry in Nigeria. A linear regression model was used as a technique of data analysis and the results showed that environmental accounting practices and environmental capacity for a sustainable economy in Nigeria had a significant relationship (F-statistics - 0.000; Adjusted R2 - 0.911); non-compliance by companies had a significant impact (F-statistics - 0.012; Adjusted R2 - 0.506). The study recommended that firms should work together effectively to improve the environment for a sustainable economy to attain zero emissions.

### 3. Methodology

The population of this study is all the fourteen (14) listed foods and beverages manufacturing firms operating in the Nigerian Exchange Group as at 31<sup>st</sup> December 2022. The sample size of the firms was six (6) and it was arrived at using judgmental sampling technique based on the criteria, that the selected firm must be a multinational corporation (MNCs). The sample size included, Nestle Nigeria Plc, Cadbury Nigeria Plc, Flour Mills of Nigeria, PZ Nigeria Plc, Unilever Nigeria Plc and UAC Plc

This study targeted only the senior managers in the financial control units in headquarters of sampled listed foods and beverages firm in Nigeria who are in charge of preparation of financial statements including environmental disclosure. Consequently, the sample size of the unit of observation based on judgmental sampling was 25 senior accounting staff from each sampled firm which translates to (6\*25) 150 sample size for the study.

A 22 items structured questionnaire (five questions for each independent variable and 7 questions for dependent variable) was used to collect data and the independent variables of the study are employee health and safety, corporate social responsibility and environmental protection regulation with Cronbach alpha results of 0.722, 0.696 and 0.771, respectively. The dependent variable is operational efficiency with a Cronbach alpha results of 0.782 which indicated that they were all reliable enough for the study, because those values that are not up to the benchmark of 0.7 can be approximated to it.

The modified four- point Likert response scale of Strongly Disagree, Disagree, Agree and Strongly Agree was used and were awarded scores ranging from 1, 2, 3 and 4 respectively. The data collected was analyzed using different statistical procedures. The Bio-data sections of the respondents were subjected to simple percentages while the null hypotheses were tested using multiple regression through the aid of SPSS (Version) 23 software to find the strength of the relationship between operational efficiency as the dependent variable and employee health and safety, corporate social responsibility and environmental protection as independent variables of the study. The functional relationship of the multiple regression is given as follows.

$$OPEF = f(EMHE, COSR, EVIP, \dots) \dots \dots \dots (1)$$

With the aid of this equation the study arrived at a model which is mathematically presented as follows

$$OPEF_i = \beta_0 + \beta_1 EMHE_i + \beta_2 COSR_i + \beta_3 EVIP_i + U_i \dots \dots \dots (2)$$

Where, OPEF= Operational efficiency and as measured by response from questionnaires. EMHE=Employee health and safety as measured by response from questionnaires. COSR=Corporate social responsibility as measured by response from questionnaires and

EVIP= environmental protection as measured by response from questionnaires.  $\beta_0$  is the intercept while  $\beta_1$ -3 is the coefficient of the independent variables.

*A Priori expectation is that all the independent variables will have positive effect on operational efficiency*

#### 4. Data Analysis, Results and Discussion of findings

Table 1 presents a summary of the bio-data of sampled respondents in terms of their demographic (sex, age academic qualifications and working experience). The table indicates that out of the 137 valid responses received from 150 dispatched questionnaires, 78% were from male respondents while the remaining 22% were from females indicating that there were more males than females in the sampled firms. The explanation of this is that males have traditionally been more engaged in office jobs than females.

**Table 1 Demographic and other related issues of respondents**

Bio-data	Items	Frequency	Percentages (%)
Gender	Male	106	78
	Female	31	22
<b>Total</b>		<b>137</b>	<b>100</b>
Age	25-34 Years	48	35
	35-44 Years	21	15
	45-54 Years	62	45
	Above 54	6	5
<b>Total</b>		<b>137</b>	<b>100</b>
Academic qualification	B.Sc/HND/ICAN	126	92
	MSc/PhD	11	8
<b>Total</b>		<b>137</b>	<b>100</b>
Work Experience	5-10 Years	14	10
	11-15 Years	48	35
	16-20 YEARS	67	49
	20 AND ABOVE	8	6
	<b>Total</b>		<b>137</b>

**Source: Fieldwork 2023**

The table also conveys information on the age distribution of the respondents. It reports that the predominant age group falls between 45-54 years representing 45% of the respondents. The next largest age group was, 25-34 representing 35% of the respondents. These statistics suggest that about 80% of the respondents are in their prime age. Table 1 also sets out the working experience of the respondents, the dominant group is workers who have between 16-20 years working experience and it makes up 49% of the respondents. This group is closely followed by those with 11-15 years working experience making 35% of the respondents. These statistics reveal that all the staff that responded to the questionnaire have working experience to respond to the issues raised in the questionnaires meaningfully.

Furthermore, the table shows the educational qualification of the respondents. The highest category was those with B.Sc/HND/ICAN/ANAN qualifications which covers 92% of the respondents while the balance 8% of the respondent had Post graduate qualifications. The implication of this information is that most staff of listed food and beverages firms are very educated to handle the issues of environmental sustainability which requires good skills and experience. The table below is the descriptive statistics of the study.

**Table 2. Descriptive statistics of variables**

Variables	Obs	Minimum	Maximum	Mean	St Deviation
OPEF	137	12	32	25.19	4.182
EMHE	137	9	20	16.67	2.210
COSR	137	8	20	14.58	2.686
EVIP	137	5	20	14.09	4.012

**Source: SPSS Outputs 2023.**

OPEF has a mean of 25.19, a standard deviation of 4.182, a minimum of 12%, and a maximum of 32%, indicating that operational efficiency by sampled firms is highly dispersed because the mean is far from the standard deviation. The implication of this is that there is no uniform operational efficiency among sample firms of the study. The mean of employee health and safety (EMHE) is 16.67, with a standard deviation of 2.210 and a minimum and maximum values of 9 and 20, respectively. The result shows that some of the firms had modest employee health and safety relative to others, this revealed a significant dispersion on employee health and safety of sampled firms. This implies that not all the sampled firms are complying equally with employee health and safety.

Furthermore, corporate social responsibility had a mean of 14.58 and a standard deviation of 2.686, indicating a wide dispersion, which could be related to the fact that Nigerian sampled companies have no uniform rate of corporate social responsibility to their host communities. Corporate social responsibility also, had a minimum and maximum values of 8 and 20 respectively. Similarly, the mean and standard deviation of environmental protection was 14.09 and 4.012, respectively, implying that there were significant differences in environmental protection efforts among sampled firms because the

standard deviation values were widely dispersed from the mean with maximum environmental protection values of 20.00 while the minimum value was 5.00.

Table 3 illustrates the correlation between the dependent and independent variables with operational efficiency (OPEF) as the dependent variable while employee health and safety, corporate social responsibility and environmental protection all had positive correlation with operational efficiency. This meant that when the degree of employee health and safety, corporate social responsibility and environmental protection of sampled firms increased, so did the level of operational efficiency.

**Table 3 Correlation Matrix of Dependent and Independent variables**

Variables	OPEF	EMHE	COSR	EVIP	VIF
OPEF	1.000				
EMHE	.451	1.000			1.214
COSR	.656	.410	1.000		1.378
EVIP	.816	.255	.420	1.000	1.226

**Source: SPSS Outputs 2023.**

According to Hussain, Islam, and Andrew (2006), multicollinearity can occur when the correlation between independent variables is 0.9 or greater, however Emory (1982) considered more than 0.80 to be problematic. The extent of the correlation among the explanatory components normally exhibited no major multicollinearity challenges in the study, as evidenced by the greatest correlation coefficient of 0.816 between operational efficiency index and environmental protection. A Variance Inflation Factor (VIF) test was used to detect the presence of a collinearity problem and the results showed that there was no severe collinearity problem because the VIF test results ranged from a minimum of 1.214 to a maximum of 1.378, with a mean of 1.273. According to Neter, Kutner, Nachtsheim & Wasserman (1996), VIF of 5.00 can be used as a proof of the absence of collinearity problem.

Table 4 shows the multiple regression results for the dependent variable, Operational efficiency (OPEF) and the independent variables employee health and safety (EMHE), corporate social responsibility (COSR) and environmental protection (EVIP).

**Table 4 Regression Results**

Ind. Variables	Coefficients OLS	Standard Error OLS	T Statistics OLS	P-Values
Constants	3.542	1.290	2.746	.007
EMHE	.155	.080	3.673	.000
COSR	.324	.070	7.219	.000
EVIP	.641	.044	15.139	.000
No of Obs	137	137	137	137
R-Squared	.806			
Adjusted R-Squared	.801			
F-Statistic	183.671			
P-Value	0.0000			

**Source: SPSS Outputs 2023.**

The validity of the model under each of the estimations was obvious from the p-value of 0.000, which was statistically significant. The R-squared of 0.801 percent indicated that the explanatory variables were responsible for the difference in operational efficiency. Under multiple regressions, this meant that the independent variables could explain 80.1 percent of the changes in the dependent variable. Furthermore, the model's fitness was supported by its F-statistics of 183.671 and p-value of 0.000.

Employee health and safety exhibited a positive coefficient of 0.155 with a p-value of 0.000 at a 5% level of significance, according to Table 4. As a result, as the employee health and safety grew, so did the amount of operational efficiency and on this basis, the null hypothesis of the study was rejected. This finding corroborated that of Niyomzonzima (2020) who found that employee health and safety had positive and significant effect on operational efficiency of firms. Furthermore, at a 5% level of significance, corporate social responsibility has a positive coefficient of 0.324 and a p-value of 0.000. This implied that corporate social responsibility is positively associated with operational efficiency of sampled firms. Since the probability value of 0.000 was less than a 5% threshold of significance, the study rejected the null hypotheses. This finding is also in line with that of Niyomzonzima (2020) who found that corporate social responsibility had positive effect on operational efficiency of firms.

Besides, the multiple regression results for EVIP revealed a positive coefficient of 0.641 and a p-value of 0.000 implying that as the level of environmental protection of sampled companies increased, the level of operational efficiency also increased at a significant level and this called for rejection of the null hypotheses. Niyomzonzima (2020) identified a positive relationship between operational efficiency and environmental protection which is in tandem with this finding.

## 5. Conclusion and Recommendations

This study investigated the effect of environmental sustainability on operational efficiency of listed foods and beverages multinational manufacturing firms in Nigeria. The study used the key components of environmental sustainability which included employee health and safety, corporate social responsibility and environmental protection as independent variables while operational efficiency was the dependent variable. The study found that all the independent variables had positive and significant effect on operational efficiency by listed foods and beverages multinational manufacturing firms in Nigeria. Based on the findings of the study, it is recommended that management of listed foods and beverages firms in Nigeria should continue to implement environmental sustainability because it enhances operational efficiency. This can be done by increasing funding for employee health and safety, corporate social responsibility and environmental protection to take care of the environment, employees of multinational firms and the host communities where they operate.

## 6. Contribution to Future Research

This study was titled Environmental Sustainability: A Strategy and Panacea for operational efficiency by Listed Multinational Manufacturing Firms in Nigeria. In terms of contribution to future research, this study was only limited to the listed foods and beverages manufacturing sector. A similar study can be conducted using the entire listed manufacturing firms in Nigeria. Furthermore, a similar study can be conducted in the financial sector to include listed deposit money banks and listed insurance firms in Nigeria.

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#### **Population and Sample size\* of Listed Food and Beverages Firms**

1. Dangote Flour
2. Dangote Sugar Refinery
3. 7UP Bottling Company
4. Northern Nigeria Flour Mills
5. Flour Mills of Nigeria\*
6. National Salt Co. of Nigeria
7. PS Mandrites Plc
8. Union Dicon Salt
9. Nestle\*
10. Unilever\*
11. PZ\*
12. UAC\*

13. Cadbury\*

14. UTC

**Appendix B Copy of Questionnaires****SECTION A: BIO DATA****Instruction:** Please tick in the appropriate box as provided

- Sex: Male ( ) F ( )
- Age: 25-34 ( ) 34-44 ( ) 45-54 ( ) above 54 ( )
- Academic Qualification: B.Sc/HND/ICAN/ ( ) MSc/PhD ( )
- Work experience: 5-10 years ( ) 11-15 years ( ) 16-20 years ( ) 20 years and above ( )

**SECTION B:**

Please indicate the extent to which you agree or disagree with the following statements by ticking in the appropriate column.

**Key:** Strongly Agree (SA-4); Agree (A-3); Disagree (D-2) Strongly Disagree (SD-1)**1. Corporate social responsibility and operational efficiency**

ITEM	SA	A	D	SD
• Rehabilitation Programmes for local communities by your company enhances operational efficiency.				
• Donations to the charity, arts, sports, etc by your company enhances operational efficiency.				
• Establishment of Educational Institution(s) by your company enhances operational efficiency.				
• Medical Establishments by your company enhances operational efficiency.				
• Social welfare programmes by your company increases operational efficiency.				

**2. Environmental protection and operational efficiency**

ITEM	SA	A	D	SD
1. Your company's disclosure of Past and current expenditure for pollution control equipment and facilities helps operational efficiency.				
2. Solid waste disposal information by your company enhances operational efficiency.				
3. Environmental policies or company concern for the environment enhances operational efficiency.				
4. Conservation of natural resources by your company enhances operational efficiency.				
5. Use of recycling plant of waste products by your company enhances operational efficiency.				

**3. Employee health and safety and operational efficiency**

ITEM	SA	A	D	SD
a. Health and Safety Arrangements (i.e. safety of the employees) enhances operational efficiency.				
b. Training of the employees through in-house programmes enhances operational efficiency.				
c. Policies for the company's remuneration package/scheme enhances operational efficiency.				
d. Reduction or elimination of pollutants, irritants, or hazards in the work environment by your company increases operational efficiency.				
e. Granting of holidays and vacations by your company enhances operational efficiency.				

**4. Environmental Sustainability and operational efficiency**

ITEM	SA	A	D	SD
a. Corporate social responsibility by your company enhances operational efficiency.				
b. Environmental protection by your company enhances operational efficiency.				
c. Employee health and safety by your company enhances operational efficiency.				
d. Your company complies with environmental sustainability to achieve operational efficiency.				
e. Up to date information are used for environmental sustainability to enhance operational efficiency.				
f. Everything concerning environmental sustainability are taken seriously to enhance operational efficiency.				
g. Meetings are frequently held on environmental sustainability to enhance operational efficiency.				

Thank you for your cooperation

**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
OPEF	137	12	32	25.19	4.182
EMHE	137	9	20	16.67	2.210
COSR	137	8	20	14.58	2.686
EVIP	137	5	20	14.09	4.012
Valid N (listwise)	137				

**Correlations**

		OPEF	EMHE	COSR	EVIP
Pearson Correlation	OPEF	1.000	.451	.656	.816
	EMHE	.451	1.000	.410	.255
	COSR	.656	.410	1.000	.420
	EVIP	.816	.255	.420	1.000
Sig. (1-tailed)	OPEF	.	.000	.000	.000
	EMHE	.000	.	.000	.001
	COSR	.000	.000	.	.000
	EVIP	.000	.001	.000	.
N	OPEF	137	137	137	137
	EMHE	137	137	137	137
	COSR	137	137	137	137
	EVIP	137	137	137	137

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.898 <sup>a</sup>	.806	.801	1.865	.806	183.671	3	133	.000	1.840

a. Predictors: (Constant), EVIP, EMHE, COSR

b. Dependent Variable: OPEF

**ANOVA<sup>a</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1916.479	3	638.826	183.671	.000 <sup>b</sup>
	Residual	462.587	133	3.478		
	Total	2379.066	136			

a. Dependent Variable: OPEF

b. Predictors: (Constant), EVIP, EMHE, COSR

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
EMHE	.293	.080	.155	3.673	.000	.135	.451	.451	.303	.140	.824	1.214
COSR	.504	.070	.324	7.219	.000	.366	.643	.656	.531	.276	.726	1.378
EVIP	.668	.044	.641	15.139	.000	.581	.755	.816	.795	.579	.816	1.226

a. Dependent Variable: OPEF