Article

Effect of Environmental Management Practices and Sustainability on Some Selected Manufacturing Firms in South East Nigeria

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Abstract: The manufacturing sector in South East Nigeria has many challenges concerning the incorporation of sustainability into the corporate strategies and operations of the industry, given its extractive nature and the numerous social and environmental impacts related to production activity. Attaining organizational sustainability requires the implementation of environmental management practice tools that create long-term value by embracing opportunities and managing risks derived from economic, environmental, and social developments. Therefore, this study investigated the effect of environmental management practice tools on the sustainability of manufacturing organizations. The goal of the study was to determine the relationship between environmental management practice tools and sustainability. A survey design was used for this study. A total of 363 questionnaires were distributed to the employees of the manufacturing firms, which included managers, supervisors, and line staff. The data collected were analyzed using Principal Component Analysis (PCA). Primarily, the study established that environmental management practice tools were significantly and positively related to sustainability. Thus, the study concluded that environmental management practice tools contribute significantly and positively to firms' social, economic, and environmental sustainability. Additionally, the result of this study underlines the significance to manufacturing firms of carrying out environmental management practices. The ramifications are that manufacturing firms attempting to assert sustainability through EMP should have related knowledge with EMP. Furthermore, their environmental advantages will not convert into sustainability. The study adds to the body of knowledge by giving experimental pieces of proof identifying the interrelationships between EMP and sustainability.

Citation: Obamen, J.; Omonona, S.; Oni, O.; Ohunye, O.F. Effect of Environmental Management Practices and Sustainability on Some Selected Manufacturing Firms in South East Nigeria. *Sustainability* **2021**, *13*, 10372. <https://doi.org/10.3390/su131810372>

Academic Editors: Jennifer Martínez-Ferrero and Wen-Hsien Tsai

Received: 21 April 2021

Accepted: 21 June 2021

Published: 17 September 2021

Keywords: environmental management practices; environmental management practice tools; manufacturing sustainability

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1. Introduction

Environmental management practices (EMP) arose as a matter of international concern in the early 1960s due to a higher level of industrialization [1]. In response to the threat of industrialization, many nations took action to protect the environment within their borders. Governments, at all levels, recognized that pollution did not stop within their borders [2]. To address environmental and developmental challenges, starting the journey of sustainable development in the global scope, different conferences were held: The United Nations Conference on the Human Environment held in Stockholm, Sweden, in June 1972, and the Brazil "Rio Conference" or the "Earth Summit" of 1992. The results of those meetings awakened governments throughout the world to make substantial strides towards the security and preservation of the environment. Reference [3] characterized EMP as an ongoing procedure started by the management choices to screen exercises and

find a way to lessen any antagonistic environmental effects. That implies that EMP are any activity taken by little and large manufacturing companies to limit ecological harm.

Organizations and governments all over the world have seen the importance of implementing environmental management practices using the International Organization for Standardization (ISO). Reference [4] reported that the implementation of environmental ISO14001, 2005, life-cycle assessment, environmental auditing, environmental review, and environmental performance evaluation affected the economic, social, and environmental sustainability of manufacturing organizations. Sustainability in this context is characterized as growth or improvement that addresses the issues of the present without trading off the ability of the upcoming age to resolve their issues. In Reference [5], Sustainability is divided into three: social, economic, and environmental sustainability.

Although, environmental management practice tools are relatively new in Nigeria. Nevertheless, Nigeria came to the vanguard due to public disagreement as an after effect of the unlawful dumping of dangerous waste in Koko, South, Nigeria, by an Italian vessel in 1987.

Later, each of the 36 states in Nigeria was encouraged by FEPA to develop its ecological office known as the State Environmental Protection Agency (SEPA). FEPA and SEPA were charged with the general obligation regarding ecological management and protection, biodiversity, and environmental assets preservation for both manufacturing and non-manufacturing companies. The manufacturing firms aim in creating value and maximize profit without undermining the environment. In a bid to achieve their goals, most manufacturing firms in South East Nigeria, over the years, have been blamed for deceptive exercises, for example, harming the environment (socially and economically). Multinational organization denotes imperial terror against their environment where they operate [6]. Whether or not these charges are true or not, all these claims require the implementation of EMP [7].

Interestingly, the EMP literature has few studies that focus on social, economic, and environmental measures of sustainability. The study that has discussed the potential of EMP for sustainability indicates the importance of EMP to enhancing performance and sustainability in manufacturing firms. Although these studies contribute good understandings, most literature focuses on direct green effects within the firm's performance, thus painting only a partial image of EMP's influence. Although the existing study has analyzed different EMP tools, to the best of our knowledge, no study so far has attempted to analyze the EMP in manufacturing firms in South East Nigeria and the effect on sustainability. However, to fill this gap, this study investigates the effect of EMP on the sustainability of manufacturing firms in South East Nigeria through a sample of five firms out of 244 manufacturing firms in South East Nigeria.

The paper is organized as follows. Section 2 presents the conceptualization of EMP and discussion of the various variable measure for this study. In Section 3, we reviewed the theory related this study, Section 4 describes the methodology and data used to measure EMP and sustainability as well as interpretation of data, Section 5 provides the results of the study based on analysis of primary data collected from five manufacturing firms in South East Nigeria, and Section 6 shows the discussion of the study. Finally, the Section 7 provides conclusions, limitations, and avenue for future research.

A handful number of scholars, for example, References [8–10], have written on sustainable environmental management system integration and business performance; the impact of the ecological management on innovation in Shanghai and the provinces of Guangdong; and environmental policy, environmental objectives, environmental processes, organizational structures, and monitoring in Germany, Austria, and Switzerland, respectively, but none focus on the effect of environmental management practices and sustainability on some selected manufacturing firms in South East Nigeria.

However, the objective of this study is to investigate the effect of environmental management practice tools on the sustainability of manufacturing organizations, while the goal was to determine the relationship between environmental management practice tools

and sustainability. However, the study also put forward the following research questions. To what extent do environmental auditing, environmental accounting, environmental performance evaluation, product/process life-cycle assessment, and environmental policies affect sustainability? The study therefore hypothesizes that:

H1. *Environmental auditing has a significant effect on the sustainability of the selected manufacturing firms in South East Nigeria.*

H2. *Environmental accounting has a significant effect on the sustainability of the selected manufacturing firms in South East Nigeria.*

H3. *Environmental performance evaluation significantly relates to sustainability.*

H4. *Product/process life-cycle assessment has a significant effect on the sustainability of the selected manufacturing firms in South East Nigeria.*

H5. *Environmental policies has a significant effect on the sustainability of the selected manufacturing firms in South East Nigeria.*

2. Conceptualization of the Study

2.1. Environmental Management Practices

This section on the concept of environmental management practices describes the meaning of EMP how EMP affects the sustainability of organizations according to different authors in different working environments. Additionally, outline the various environment management practices that form the basis of this study. There are various perspectives on environmental management practices (EMP). Reference [9] characterizes EMP as a combination of manufacturing exercises targeting lessening asset utilization and improving waste removal. Environmental management practices include environmental management systems, total quality management, R&D, environmental policy, environmental accounting, product life-cycle assessments, environmental audits, and environmental performance evaluation. Reference [10] classifies EMP into internal EMP and green supply chain practices, while operational level EMP is usually internally focused; an example is a program to diminish water and vitality utilization. The strategic dimension of EMP falls somewhere close to operational and key practices and can be seen as speaking to both inner and outer environments. Environmental management practices (EMP) allude to the entirety of the strategies and tasks directed at diminishing the organization's effect on the environment caused by its business activities [11].

EMP is usually combined with the environment. It is imperative to separate management practices from the environment. Practices based on their scope, which could be operational, tactical, or strategic, are thus related to distinct goals representing distinct resource obligations. Manufacturing firms need to be concerned holistically with their environment, coordinating and incorporating practices across operational, tactical, and strategic levels [12]. ISO14000 characterized EMP to include environmental management frameworks, ecological auditing, environmental labeling, life-cycle assessment, environmental indicators, ecological policies, eco-balances, and environmental reporting (National Environment Commission). Different studies such as [9,13–18] also classified EMP in line with the previous studies above as environmental policy, ecological policies, life-cycle assessment, environmental auditing, and environmental performance. The above EMP outline will be discussed in detail below.

2.2. Environmental Auditing

Environmental auditing (EA) is a generally new idea in Nigerian practice. Ecological auditing is normally introduced as a voluntary management instrument utilized by an organization to improve its environmental execution and environmental control. Reference [19] expressed that a few organizations that have applied the standards of EA have just felt the advantages of utilizing it. Reference [20] characterized EA as an occasional assessment directed by a free authority with lawful power to decide the effect of the production firms

on the environment and its segments as a feature of the environmental management framework. Ecological auditing can be described as an efficient and precise screening process of the principles for interior environment performance and outside ecological execution guidelines of the establishment by a profoundly qualified reviewer to communicate a target-specialized conclusion on the proficiency of the administrative framework applied in the organization and its similarity to a universal standard. The goal of environmental auditing is to facilitate the investigation and evaluation of the ecological parts of monetary and different tasks, to enhance examination and appraisal of managerial acts in the field of environmental assurance, to justify the commencement of ecological exercises, and to distinguish proof of ecological issues of manufacturing domains [19].

2.3. Environmental Accounting

Environmental accounting was developed during the 1970s because of an expansion in natural mindfulness and worries about social and ecological prosperity [21]. Environmental accounting is a field that distinguishes asset use and quantifies and conveys the costs of an organization's or national monetary effect on the environment [22]. As indicated by the Ministry of the Environment, Japan, in 2005 [23], green bookkeeping is a quantitative evaluation of the expense and viability of endeavors in environmental insurance exercises. Associations are required to have precise records and reports and are guided to keep up a positive relationship with nature to actualize powerful and effective ecological exercises [24], characterizing green bookkeeping as the act of giving exact data on the plausible social expenses exuding from manufacturing externalities upon the environment and what number of intentional intercession costs have been caused to overcome any issues or gap between marginal social and private expenses.

2.4. Environmental Performance Evaluation (EPE)

Ecological performance evaluation (EPE) is the procedure that organizations can use to check, break down, and audit their natural execution against many criteria [25]. EPE comprehends what their ecological perspectives are and figures out what their large environment angles might be. This gives the production firms a chance to shape a gauge from which goals and focuses for upgrades can be determined [25]. In this manner, EPE is key to the enhancement of ecological execution and to think about a firm's execution against another comparable organization (benchmarking). An institution of production companies that are focused on enhancing their ecological execution should have the capacity to determine their execution level. Utilizing environmental performance indicators (EPIs), an organization will have the capacity to do as such [25].

2.5. Product or Process Life-Cycle Assessments

The International Standards Organization (ISO) portrayed LCA as a technique for surveying the natural perspectives and capacity impacts identified with a product through compiling a supply of significant data sources and yields of an item gadget, assessing the ability of ecological impacts identified with the sources of information and yields of the one, and interpreting the results of the stock investigation and effect appraisal stages concerning the objectives of the examination [26]. LCA has four phases [26]. This degree characterizes the point of the view, sets the framework limits, and records the suppositions needed inside the computation. The subsequent level, alluded to as the existence cycle stock (LCI), incorporates the arrangement of information and yield realities and a solidness calculation to all unit strategies' presence cycle.

The effects from the stock may be transformed into impacts on the surroundings inside the third stage, the life cycle impact assessment (LCIA). The very last degree of LCA is the interpretation of the consequences, which is based on all three preceding tiers of the evaluation and summarizes and discusses the conclusions and viable guidelines following the purpose and scope definition [26]. LCA plays a different role in EMP. Reference [27] reported that organizations and non-earning establishments have supported the LCA tool

to obtain several purposes, consisting of making strategic plans, product design development, and advertising and marketing [28]. The LCA is a useful device for the advertising of environmentally aware merchandise [29]. The LCA result is utilized to recognize chances for upgrades and to choose the privilege sustainability methodologies. Reference [30] revealed that LCA helps to improve the ecological performance of a product; educate clients, partners, and various organizations about ecological impacts from unique phases of a product life cycle; and publicize and promote purposes. LCA makes it conceivable to uncover alleviation focuses and fundamental stages close by the convey chain of an item, system, or a supplier and can likewise help to essentially change the management and encourage the execution and improvement of environmental management just as a specialized gadget.

2.6. Environmental Policies

The National Environment Commission (NEC) is a high-level self-sustaining agency of the Government mandated to look after all problems associated with the environment. The Commission also monitors the impact of development on the environment and aims to put in place the quintessential controls, guidelines, and incentives to the private/public sectors to gain sustainable development through the appropriate use of natural resources. NEC 2011 noted that environmental policies are a record that sets out the general aims and expectations of an organization concerning the general business atmosphere. Building up an ecological arrangement is regularly the initial step taken by organizations that wish to attempt EMP. Ecological policies flag a guarantee to EMP and can set up the path for further EMP. The framework ought to be embraced by the organization's senior supervisory team and ought to be openly accessible. It ought to be inculcated into the organization's business technique and be perfect with the organization's different strategies, e.g., on quality and wellbeing and security [31].

3. Theoretical Review

Ecological Modernization Theory ("Win-Win" Principle)

The perspective of ecological modernization is said to offer an optimistic approach to addressing environmental troubles and ensuring sustainability, with a crucial function assigned to technology [32]. The theory became advanced in the 1980s through the work of a German social scientist [33], Ecological modernization theory is involved in figuring out how modern societies construct their surroundings [34], how social and financial alternatives affect the surroundings and environmental family members [35], how social institutions may improve their treatment of environmental troubles [36]; and information about the social and monetary establishments that promote or face up to environmental sustainability [37–39]. The simple argument is that the crucial institutions of modern-day society may be converted to keep away from ecological disaster. Ecological modernization proposes that structural change ought to arise at the macro-monetary stage through wide sectoral shifts in the economic system and at the microeconomic degree through the use of recent and smooth technology by individual corporations [40]. Ecological modernization professionals have also been effective in bringing the ecological into globalization, considered through a portion of the books and extraordinary issues [32,39]. This examination extended an extra adjusted understanding of ways globalization elements influence the environment, even as contributing as appropriately to the investigation and applied ability of globalization with regard to ecological substitutes.

In South East Nigeria, it is obvious that it is no longer necessary to trade off economic growth for environmental quality. Ecological modernization scholars accept that the environmental issues confronting the present reality are the main impetus for an organization to execute EMP for monetary, social, and ecological sustainability. Environmental modernization theory depicts a "win-win" situation whereby innovative advancement and development can help industries and countries to achieve both economic and environmental sustainability [35,39] In effect, ecological modernization theory relates to

this study, and the hypotheses state that environmental auditing, environmental policy, environmental accounting, product or process life-cycle assessment, and environmental performance significantly and positively affect sustainability. The rationale for using this theory is that ecological modernization scholars accept that EMP tools act as a driving force for sustainability. The theory also trusts that it is conceivable to stimulate economic, social, and environmental sustainability by giving higher priority to environmental management practices.

4. Review of Related Empirical Literature

Several scholars carried out empirical studies relating to environmental management practice tools. Reference [8] studied sustainable environmental management system integration and business performance: The investigation indicated that EMS combination has different effects on business performance prospects. Reference [9] examined the impact of ecological management on innovation. The investigation showed that ecological management practices have essentially impacted innovation and technological performance and supply. Reference [7] researched the impacts of EMP on the sustainability of organizations in South-South, Nigeria. The examination discovered that quality administration practices influenced sustainability. Reference [41] investigated the role of EMP in sustainability. The investigation found that the current EMP has dissimilar effects on sustainability and closes by suggesting that this EMP be orchestrated across the various areas of society, which will bring about an improved sustainability development and advance green economic growth. Reference [10] studied ecological approach, ecological goals, ecological process, company designs, and monitoring. The outcomes recommend the charge of EMP inside the organization.

5. Materials and Methods

5.1. Instrument Design

The study adopted a survey design to ascertain the relationship between environmental management practice tools and the sustainability of manufacturing organizations in South East Nigeria. Data for the investigation was extracted from each primary source through a structured questionnaire survey technique designed to examine the anticipated study. Based on the literature review, we designed a structured questionnaire with six primary paradigms: environmental auditing, environmental accounting, environmental performance evaluation, product/process life-cycle assessment, environmental policies, and sustainability. In order to ensure that the questionnaire would be more accurate and precisely extracted, data were required for the current investigation to gain a better understanding of the opinions, knowledge, aspiration toward the perceived environmental management tools, and sustainability of manufacturing firms; interviews were arranged for 1 h and 40 min. The respondent was asked to carefully review and complete the various questions raised in the study (pretesting) to ascertain the ambiguity and suggest improvement to the questionnaire. A review of the feedback led to further modification and, eventually, the final form. The information utilized in this examination was measured in a 5-point Likert scale with strongly agree rated as 5, agree = 4, undecided = 3, strongly disagree = 2, and agree = 1. [42].

Sampling

The study aimed to examine environmental management practices in manufacturing firms in South East Nigeria. The sample frame of five manufacturing organizations was purposively selected from 244 manufacturing firms in South East Nigeria according to the manufacturing association of Nigeria. The reason for choosing the five firms is due to the fact that these firms have a formal environmental management practices policy on the ground, have received ISO14001 certification, have an existing structure of the management of EMP to guarantee sustainability, and are among the best-developed and most environmentally conscious firms in Nigeria. The activities of the manufacturing organizations

include production, packaging, and sales of alcoholic and malt beverages. An aggregate of 507 questionnaires was sent out for completion. A total of 129 questionnaires were sent to Guinness Nigeria Plc, 129 to Coca-Cola, 111 to 7up Bottling Company, 23 to SUB Miller, and 115 to Nigeria Brewery. A total of 363 were filled and returned, which represents 72%, while 144 were not returned, which represents 28%. The high return rate indicated the diligence of the research and the validity of the process.

5.2. Method of Data Collection

The focus of this study is environmental management practices, the tools of environmental management practices, and the sustainability of manufacturing firms. We sent the design questionnaire to production, marketing, purchases, operations and research, and development managers and non-managers in the manufacturing firms, because these functional managers tend to be the most familiar with the environmental management practices of the organization. The respondents received the questionnaires with an envelope that contained an introduction where assurance was given that the information given would be treated for the purpose of this study. Additionally, we encouraged all the respondents that the result of the survey will be sent back to the organization for perusal and reported gratitude for their participation. An aggregate of 507 questionnaires was sent out for completion, but 363 were filled and returned, which represents 72%, while 144 were not returned, which represents 28%. We received 250 copies the first time. We improved the respondent return rate of the questionnaire by a rigorous follow-up through consistent visiting of the organization, sending emails to the human resources and research department, and through mobile calls and an online questionnaire. We contacted departments again to return their questionnaire after 3 months, which increased the returned rate to 363. The high return rate indicated the diligence of the research and the validity of the process.

5.3. Data Analysis, Interpretations, and Discussion of Findings

The principal component analysis (PCA) with the varimax pivot technique was utilized to evaluate the legitimacy of constructs. This technique gives any potential low and twofold stacking item(s) and utilizations an edge eigenvalue of 1.0, which had stacking in various parts, and manageability, which recognized one twofold stacking segment. Additionally, Kaiser–Meyer–Olkin (KMO) and Bartlett’s Test of Sphericity (BTS) were used to measure the sampling adequacy and significant level, since obtaining acceptable values of these tests guarantees the appropriateness of EFA analysis. The Table 1 below shows a level variation in the average (mean) among variables. Environment performance evaluation, Product life-cycle assessment, Environmental audit and Environmental accounting shows a high value indicating that the data are spread out over a large range of values.

Table 1. Descriptive statistics.

	Mean	Std. Deviation	Analysis N
Environmental performance evaluation	3.0799	1.14270	363
Product life-cycle assessments	3.9669	1.07663	363
Environmental audit	3.6556	1.25037	363
Environmental accounting	3.9917	1.07325	363

Source: Researcher’s SPSS result 2020.

As demonstrated in Table 2, the KMO value was 0.814, which was inside the worthy reach where the base satisfactory worth is 0.70. The BTS reflected large outcomes (0.00), $p < 0.05$, since the worth was under 0.05. In a like manner, EFA was considered appropriate for this investigation.

Table 2. KMO and Bartlett's Test.

Kaiser–Meyer–Olkin Measure of Sampling Adequacy.	0.814
Approx. Chi-Square	2905.142
Bartlett's Test of Sphericity	Df
	10
	Sig.
	0.000

Source: Researcher's SPSS result 2020.

Table 3 shows the total variance explanation (factor analysis) of the tool of environmental management practices with factors explaining 86% of the total variance. This demonstrates a strong significance of the tools used for the implementations of environmental management practices on the sustainability of manufacturing organizations in South East Nigeria.

Table 3. Total variance explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.300	86.002	86.002	4.300	86.002	86.002
2	0.465	9.308	95.310			
3	0.161	3.216	98.526			
4	0.057	1.136	99.661			
5	0.017	0.339	100.000			

Source: Researcher's SPSS result 2020. Extraction method: principal component analysis.

Table 4 Component Matrix revealed the employee response to the significant environmental management tools used by organizations to implement environmental management practices. Five factors were loaded, and five factors were extracted based on principal component analysis. Table 4 shows that environmental performance evaluation—0.931, product life-cycle assessments—0.958, environmental audit—0.963, environmental accounting—0.828, and environmental policy—0.850 are the significant factors that influence the implementation of environmental management practices. This implies that the five-factor loaded environmental performance evaluation—environmental accounting, product life-cycle assessments, environmental audit, and environmental policy—is significant and positively related to sustainability. Therefore, the study concluded that the implementations of environmental management practices have a significant and positive relationship with the sustainability of manufacturing organizations.

Table 4. Component Matrix.

	Component
	1
Environmental performance evaluation	0.931
Product life-cycle assessments	0.958
Environmental audit	0.963
Environmental policy	0.950
Environmental accounting	0.828

Source: Researcher's SPSS result 2020. Extraction method: principal component analysis.

Furthermore, the approximated Chi-square value ($\chi^2_{c0} = 2905.142$) is higher than the Chi-square critical value ($\chi^2_{t = 018.307}$) with 10 degrees of freedom (df) at 0.05 level of alpha ($\chi^2_c = 2905.142$ $p < 0.05$), thus further indicating that there is a statistically significant positive effect of management practice tools on the sustainability of manufacturing companies

5.3.1. Multinomial Regression

Table 5 discloses the variables of the product lifecycle that significantly related to the sustainability of manufacturing organizations choosing “to a very high extent” rather than “undecided” in the multinomial logit model, and these are the manufacturing company (PLCASSESS = 1) and ((PLCASSESS = 2), with significant values of 0.000 and 0.000, respectively. The managerial and non-managerial cadre who were involved in the (PLCASSESS = 1) and (PLCASSESS = 2) categories were more likely to be in the group of respondents who declared “to a very high extent” rather than “undecided” for organizational sustainability. The likelihood of a managerial and non-managerial cadre who chose “to a very high extent” and “to a high extent” in (PLCASSESS) being involved to “a very high extent” appears to be 68,890,000% ($7.889001 - 1 = 6.889001$), respectively, more than the possibility of being involved in the “undecided” category.

Table 5. Multinomial regression parameter estimates.

ENVPE		B	Std. Error	Wald	Df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
To a very high extent	[PLCASSESS = 1.00]	15.881	1.625	88.752	1	0.0000	7.889×10^6	574,259.044	1.084×10^8
	[ENVAPREV = 2.00]	15.393	1.337	141.129	1	0.0000	4.844×10^6	489,404.802	4.794×10^7
To a low extent	[ENVAUDIT = 2.00]	2.338	1.444	3.993	1	0.046	17.917	1.057	303.751
To a very high extent	[ENVPOLICY = 2.00]	3.470	1.431	5.877	1	0.015	32.148	1.944	531.664
To a high extent	[ENVACC = 2.00]	3.224	1.360	5.624	1	0.018	25.140	1.750	361.163

Source: SPSS Results. Note: Reference category = undecided.

The variables of environmental performance evaluation that significantly related to the sustainability of manufacturing organizations choosing “to a very high extent” rather than “undecided” in the multinomial logit model are the manufacturing companies (ENVAPREV = 1) and (ENVAPREV = 2) with significant values of 0.000 and 0.000, respectively. The managerial and non-managerial cadre who were involved in the (ENVAPREV = 1) and (ENVAPREV = 2) categories were more likely to be in the group of respondents who declared “to a very high extent” rather than “undecided” for organizational sustainability. The likelihood of a managerial and non-managerial cadre who chose “to a very high extent” and “to a high extent” in (ENVAPREV) to be involved to “a very high extent” appears to be 4,8439,900% ($484,400 - 1 = 484,399$), respectively, more than the possibility of being involved in the “undecided” category.

Additionally, the company being involved in environmental auditing (ENVAUDIT = 2.00) has a significant value of 0.046 that is related to sustainability of manufacturing organizations that distinguished respondents’ decisions to choose “to a low extent” rather than “undecided” in the multinomial logit model. Respondents who were involved in the (ENVAUDIT = 2.00) categories were more likely to be in the group of respondents who declared “to a low extent” rather than “undecided” for organizational sustainability. The possibility of respondents who chose “to a high extent” in ENVAUDIT being involved in “to a low extent” appears to be 1691.7% ($17.917 - 1 = 16.917$) more than the possibility of being involved in the “undecided” category.

For manufacturing organizations in environmental policy, (ENVPOLICY = 2.00) has a significant value of 0.015. Managers and non-managerial cadre who were involved in the (ENVPOLICY = 2) categories were more likely to be in the group of respondents who declared “to a very high extent” rather than “undecided” for the high level of defects and reworks recorded in the company. The likelihood of respondents who chose “to a moderate extent” in ENVPOLICY being involved “to a very high extent” appears to be 3114.8% ($32.148 - 1 = 31.148$), respectively, more than the possibility of being involved in “undecided” category.

Additionally, ENVACC = 2 with a significant value of 0.018 relates to the sustainability of manufacturing organizations in distinguishing respondents' decisions to choose "to a high extent" rather than "to a very large extent" in the multinomial logit model. Respondents who were involved in the ENVACC = 2 categories were more likely to be in the group of respondents who declared "to a high extent" rather than "undecided" for the level of defects and reworks recorded in the company. The possibility of managerial and non-managerial cadre who chose "to a very high extent" in ENVACC to be involved "to a high extent" appears to be 2414.0% ($25.140 - 1 = 24.140$) more than the likelihood of being in the "undecided" category.

Table 6 above indicates a likelihood proportion trial of the model (Final) against one in which all the boundary coefficients are zero (Null). With the chi-square measurements of 48.534 at 0.031 significance value, we concluded that the final model that included independent variables was better than the one with only the intercept. As evident from the "Sig." section, $p = 0.031$, which implies that the full model genuinely significantly predicts the reliant variable better than the intercept-only model alone.

Table 6. Multinomial regression model fitting information.

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	−2 Log Likelihood	Chi-Square	Df	Sig.
Intercept-Only	196.005			
Final	147.470	48.534	32	0.031

Source: SPSS Result.

The goodness-of-fit table (Table 7) offers two tests with the null hypotheses that the model satisfactorily fits the information. The first column, named "Pearson", presents the Pearson chi-square measurement. Large chi-square qualities (found under the "Chi-Square" section) demonstrate a poor fit for the model. A genuinely significant outcome (i.e., $p < 0.05$) shows that the model does not fit the information well. You can see from the table that the p -value is 0.778 (i.e., $p = 0.778$) (from the "Sig." segment) and is, hence, not genuinely significant. In view of this action, the model fits the information well. The other line of the table (i.e., the "deviance" line) presents the deviance Chi-square measurement. In our model, both Pearson and deviance values are more than 0.05; thus, we can say that the information is reliable with the model presumptions.

Table 7. Multinomial regression goodness of fit.

	Chi-Square	Df	Sig.
Pearson	40.286	48	0.778
Deviance	46.449	48	0.537

Source: SPSS Result.

The Pseudo R^2 (Table 8) also measures the goodness-of-fit of our model, but, differently from the linear regression model, it does not explain the variation in the dependent variable due to the variation in the independent variable. Cox and Snell = 0.237, Nagelkerke = 0.249, and McFadden = 0.088 are all somewhere in the range of 0 and 1. It is likely to say that our model in this exploration is acknowledged as a fitting model in general.

Table 8. Multinomial regression pseudo R-square.

Cox and Snell	0.237
Nagelkerke	0.249
McFadden	0.088

Source: SPSS result.

In Table 9, after defining the validity of the model, as revealed by the model fitting information, the next point is to check the influence of each independent variable in the multinomial model. For each impact, the 2 log-probability is utilized for the decreased model; that is, a model without impact. The Chi-square measurement is the contrast between the -2 log-probabilities of the decreased model and the last model revealed in the model fitting data table. If the significance of the test is under 0.05, the impact adds to the model. Table 9 shows which of the independent constructs are genuinely significant. As shown in Table 9, the product life cycle (the “product life cycle” line) was significant on the grounds that $p = 0.043$ (the “Sig.” section). In addition, for the ecological review, $p = 0.043$, which is measurably critical. Ecological policy was measurably significant on the grounds that $p = 0.019$, while environmental accounting was genuinely critical in light of the fact that $p = 0.0000$. There is not typically any intrigue in the model intercept (i.e., the “intercept” column). It is therefore clear that Table 9 above indicates that the manufacturing organizations deliberately carried out environmental management practice tools such as environmental performance evaluation (PLCASSESS 0.043), product life-cycle, environmental policy (ENVPOLICY 0.019), environmental accounting (ENVACC 0.000), and environmental auditing (ENVAUDIT 0.005) that had a significant and positive relationship with organizational sustainability at 0.05 significance level.

Table 9. Multinomial regression likelihood ratio test.

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
Intercept	1.475×10^2	0.000	0	
PLCASSESS	168.793	21.322	16	0.043
ENVAUDIT	311.043	34.017	16	0.005
ENVPOLICY	113.206	29.890	16	0.019
ENVACC	162.916	41.500	16	0.000

Source: SPSS Result.

5.3.2. Decision

The null hypotheses are rejected. Hence, environmental management practice is significantly and positively related to the organizational sustainability of manufacturing organizations.

6. Discussion of the Result

There are sufficient studies on the effect of environmental management practice tools on sustainability. However, the contention in the subject matter is the environmental management tools that affect the sustainability of manufacturing firms in South East Nigeria. The findings of the study were to establish that environmental management practices—environmental auditing, environmental policy, environmental accounting, product or process life-cycle assessment, and environmental performance evaluation—affect the sustainability of manufacturing organizations. The factor analysis results show a strong significant and positive effect of environmental management practice tools on the sustainability of manufacturing organizations in South East Nigeria. This result is in tandem with the finding [8], showing that EMS integration has diverse effects on business performance probability. Reference [9]’s empirical findings showed that EMP had a positive effect on performance, and [7] discovered that quality EMP influenced monetary sustainability and that the sustainability of international organizations relies upon the implementation of EMP. Reference [41] discovered that the presence of EMP has a diverse effect on the sustainability of organizations.

The findings on environmental auditing and manufacturing sustainability showed a strong effect. This is in tandem with [41], showing that environmental auditing is an essential instrument for estimating the impacts of specific exercises on the environment against set criteria or measures. Reference [42] expressed that environmental evaluation helped companies and institutions satisfy their administrative responsibility and control of

ecological works by following ecological directions and organizational objectives. They also expressed that environmental auditing is used to investigate, understand, and identify environmental performance. Reference [43] uncovered significant connections between green auditing and sustainable development. In accomplishing the ideal sustainable improvement through ecological examination, organizations, government, and partners need to set out for ecological enlightenment to tell residents the outcomes of environmental negligence and contamination.

The finding on life-cycle assessment and sustainability of manufacturing organizations showed a positive effect. Reference [44] stated that life-cycle assessment (LCA) is a commonly utilized apparatus to analyze the potential environmental effect of a product or services for an incredible duration cycle. Reference [45] expressed that LCA systems have been utilized for the environmental evaluation of the product for quite a while, yet applications to the manufacturing businesses showed up as of late, just before the start of the 21st century. It has been effectively used to assess the ecological effect and vitality on the performance of structures and building materials. Likewise, examinations of LCA connected to the performance assessment of structures have developed to the point of having the capacity to discover contextual investigations along with diverse nations.

The finding of environmental accounting and sustainability showed a positive effect. This aligned with the study [46], which showed that there is a connection between environmental accounting and sustainable development; it stated that associations require physical data to control natural effects, for example, the number of gas discharges, waste, and amount of reused squander treatment, and afterward to characterize outflow and waste decrease targets. Reference [47] discovered that ecological bookkeeping enables organizations to organize counteractive action against ecological harm before it happens, because dealing with the ecological harm will acquire far greater expense than avoidance. Reference [48] concurred that green bookkeeping performance markers can be produced through physical elements related to money. This lines up with the finding of [49] that environmental accounting and sustainability are correlated. Reference [50] concluded in their study that the implementations of green bookkeeping as reused materials, a sustainable power source, and green cost allocations had a positive and significant effect on improving environmental execution. Reference [51] found a positive impact of ecological bookkeeping performance on organizational esteem. Furthermore, ecological bookkeeping usage can recognize measures and allot ecological expenses suitably to process an item. It makes it simpler to take control and improves productivity.

In addition, the findings of environmental performance evaluation and sustainability indicated a positive effect. This is in line with [52] on the environmental performance evaluation and analysis using ISO 14031 Guidelines in Construction Sector Industries, asserting a significant relationship between environmental performance evaluation and the organization. In addition, [53] confirms a relationship between the environmental performance evaluation and sustainability performance evaluation of organizations.

Lastly, the last hypothesis discovered that environmental policy has a significant effect on sustainability, this finding lining up with [54] that changing ecological policies' arrangements can viably affect the updating of organization design, consequently advancing excellent territorial financial growth. Reference [55] reasoned that in environmental policy, green development has a critical beneficial outcome for the canny redesigning of production firms. Moreover, it uncovers that green development plays an in-part intervening job in the connection between ecological guidelines and the keen overhauling of production undertakings. This implies that environmental policy influences development, both over the long haul and in the short run, by influencing the efficiency of speculation and the investment funds conduct of buyers. The environment gives important contributions to financial creation and aggregation measures. Consequently, upgrades in ecological quality that follow a natural arrangement may support the efficiency of the climate and development.

7. Conclusions

The paper presented and discussed current environmental management practices and sustainability in South East Nigeria. A clarification of the concepts behind the environmental management practice tools has been undertaken by looking at the possible meanings of environmental management practices, environmental policy, environmental accounting, and environmental auditing, environmental management systems, environmental performance evaluation, and life-cycle assessment. Three sustainability measurements—social, economic, and environmental—have been considered. The previous studies were compared considering their methodology, sample, and geographical location criteria. Overall, this study established a significant and positive relationship between environmental auditing, environmental policy, environmental accounting, product or process life-cycle assessment, and environmental performance on sustainability (social, economic, and environmental sustainability).

The findings have further implications for policy formulators and government decisions in ensuring a sustainable environment. The managerial corollaries are that the manufacturing manager ought to understand that EMP promotes the sustainability of manufacturing organizations. Due to compounding air quality, soil defilement, water contamination, and other ecological issues, manufacturing organizations are confronted with the increasing pressure of environmental safety by society and government.

The manufacturing organization case for ecologically sustainable practices proposes that government and private institutions and every partner should consider the detailing of arrangements that stimulate reception and performance. This will enhance the long-haul sustainability of manufacturing firms in South East Nigeria, being the economic hub in Nigeria. Moreover, the investigation's discoveries have a positive proposition for governments that have since wanted and strived for ecological security measures. For the management of any nation to improve sustainability, the task by manufacturing firms is a beneficial thought. Consequently, the institutions can accomplish more prominent ecologically friendly environmental conditions on the off chance that they can actualize approaches and techniques that support ecological protection and mandate all manufacturing firms to implement the right environmental tools required by law. The discussion has helped to show that the manufacturing organizations should implement environmental management practices to bolster sustainable business just as individuals' prosperity and environmental safety objectives.

8. Limitations of the Study and Further Study

Despite the fact that the study presents agreeable outcomes from the findings and review of literature, this study acknowledges some limitations that call for urgent attention. The study is limited to a single industry that allows greater specificity in describing the forms of EMP but potentially limits generalizability. Additionally, our decisions merit further thought in more significant examples and increasingly broad firms' circumstances. If the sample measure was sufficiently extensive, it would be obliged to propel the legitimacy and dependability of the outcomes and increment the exactness of expectation. Second, a potential future study would be to analyze the different impacts of various measurement tools of environmental management practices, as they affect sustainability. The investigation was mainly performed through non-probability examining techniques. In that capacity, the representativeness of the sample is endangered. Along these lines, the outcomes should be recreated in different territories to substantiate the findings in this examination. Additionally, the sample used in this investigation was from five states in South East Nigeria out of thirty states, implying that the outcomes cannot be applied to the remaining states of Nigeria. Therefore, the study suggested that future examinations in different parts of the nation and also of a more extensive range should be carried out, as they set an exploration gap. For the most part, future research investigation should be done in a more extensive African setting to find the outcome hypothesized in this investigation.

Author Contributions: Conceptualization, S.O. and J.O.; methodology and data analysis, J.O.; validation, O.F.O. and J.O.; writing—original draft preparation, J.O.; writing—S.O.; supervision, O.O.; funding acquisition, O.O. and O.F.O. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Consent of each respondent were sought and they voluntarily participated in the exercise. Confidentiality of all respondents were strictly adhere to.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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