

Financial Performance Implications of Corporate Sustainable Expenditures in Economic Capital: The case of Listed Manufacturing Firms in Nigeria

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Abstract

Manufacturing firms' financial performance is anchored on their respective capital expenditures. Extant studies have not conclusively agreed on the implications of respective capital expenditures on the firms' financial performance. This study sought to contribute to the discourse by examining the implications of expenditures in economic capital on financial performance of listed manufacturing firms in Nigeria. The study is quantitative, combining descriptive and inferential approaches. A sample of 33 firms, with their annual reports from 2008 to 2022, was surveyed. Panel data from the firms' annual reports were analysed using generalized least squares regression on STATA. Three hypotheses were tested. Results show that firms' expenditures in economic capital do have important positive implications for financial performance of the manufacturing firms. Expenditures in research and development displayed the highest positive and significant effect, while expenditures in technological innovation and additions to fixed assets showed positive but insignificant effects on the firms' financial performance. The a-priori expectation that all three components of sustainable expenditures on economic capitals have positive effects on the firms' financial performance was met. The study concludes that sustainable expenditures in economic capitals are important for improving financial performance of firms. This suggests that listed manufacturing firms in Nigeria strengthen their policy commitment to consistently engage in research and developments, technological innovations and maintenance of a robust asset structure. The study recommends increased expenditures in technological innovation and fixed assets for the manufacturing firms, and suggests that further research seek to clarify the insignificant effects depicted by these expenditures.

Keywords: Economic Value Added, Economic Capital, Technological Innovation, Fixed Assets, Sustainable Expenditures.

1.0 Introduction

A subsisting goal of business enterprises, particularly manufacturing firms, is the degree by which they use resources and manage operations efficiently. A firm uses its resources efficiently when it produces more outputs that are valued in a free-market economy, and operational efficiency results when a firm applies business processes to meet customers' orders profitably in a competitive environment (Azapagic & Perdan, 2000). Robust financial performance enhances an enterprise's capacity to survive and consistently create values that are sensible to diverse stakeholder groups. As noted by Kujala et al. (2019) and Gutterman (2023), the firm is an embodiment of interdependent groups of stakeholders with varying levels of stakes in the performance of the firm. With growing advances in knowledge and science, and increasing concern about environmental sustainability, corporate management is obliged to alter the firms' economic processes and operations in ways that ensure sustainability and would contribute to the firm's improved financial performance (Parmar, et al., 2014).

Manufacturing enterprises source and transform material inputs from the environment to create and distribute values for a growing society's complex needs. Improvements in their financial performance are cardinal for their continued capacity to create value through innovative and creative capabilities. Over the fifteen years from 2008 to 2022, the share of manufacturing industries in Nigeria's gross domestic product (GDP) grew from 8.40% to 13.59%, with an average annual growth of 1.44% (Macrotrends, 2023). Compared to the global average of 15.7%, manufacturing firms in Nigeria are a significant sector of the economy. With improved efficiency in asset utilization and management of operations, the firms will contribute more significantly to the national economy and enhance stakeholder values in a sustainable manner. There is therefore the need to examine how expenditures in the firms' economic capital affect their financial performance over the period from 2008 to 2022.

2.0 Literature Review and Hypotheses Development

This section discussed the variables of the study and reviewed extant literature relevant to this work. The variables of the study were explained and presented in a conceptual model to vividly portray their interconnectedness as established by theory and previous studies. This was followed by the review of empirical studies on relationships among the predictor and outcome variables, and the theory underlying the study. The review provides a grounded perspective of the contribution of this study to continuing discourse about the implications of corporate expenditures on firm financial performance.

Conceptual Framework

Performance is a measure of a firm's achievement of stakeholders' expectations, which may be quantitative or qualitative, financial or non-financial. Financial performance is the monetary measure of the value generated by firms from their creative and innovative deployment of resources. Many indicators such as firm's accounting returns (profit before tax, earning after tax, earnings per share, and others) and market value are commonly used in literature as proxies of financial performance (Combs et al., 2005; Thaler, 2004; Gentry & Shen, 2010; Miller et al., 2013; Ehiedu & Toria, 2022). On the basis of accounting returns, financial performance include return on assets (ROA), return on equity (ROE), return on investment capital (ROIC), earnings per share and employee productivity. The market measures of financial performance consist of market-to-book value of the corporate worth, dividend yield, Tobin's Q, shareholders' returns and stock performance (Singh et al., 2017; Tobin, 1969). The market measures reflect a firm's present and future financial earnings as viewed by investors on the basis of the accounting profit reported by management. However, both the accounting and market measures of performance have been criticized for being prone to earnings management rather than value-based performance (Awan et al., 2014; Ahmed, 2015).

Another measure of financial performance is contribution to gross domestic product (GDP). GDP is a readily available indicator for measuring the welfare and economic performance of a country. It is an estimate of a nation's entire production output prepared by the nation's integrated systems of macroeconomic accounting, primarily to enable government monitor the economy regularly. A firm's contribution to the gross domestic product relates the firm's financial performance to this macro performance indicator in an economy (Abraham & Balogun, 2012). Azapagic and Perdan (2000) stated that this measure is relevant for assessing manufacturing firm's potential for growth and integration into the economy, thus it reflects sectoral attainment of sustainability. By relating micro to macro-economic considerations, the sector's contribution to GDP provides a measure of the industrial integration with the national economy. For manufacturing enterprises, contribution to GDP reveals their potential for growth, a demonstration of industrial advancement and the enhancement of environmental sustainability. Since, industrial contributions to GDP are normally aggregated for the relevant sectors,

this measure of financial performance is not considered appropriate for the present study. Against the limitations of the accounting and market-oriented measures of corporate financial performance, and the grouping effect of contributions to GDP, Azapagic and Perdan (2000) explain that firms' financial performance be assessed on the bases of their flow and stock of capital, noting that capital encompasses economic, human, environmental and social capitals. In assessing the sustainability expenditures of firms and mitigating risks of business, Sushil (2017) suggests value-based measures particularly the economic value added (EVA). This approach therefore, rather than the strictly accounting or market-based metrics, more closely gauges a company's financial performance and is adopted for this study. Thus, this study takes the financial performance as net economic value generated of the firm in the relevant year.

Economic value added reflects a firm's capacity to generate wealth and contribute to society's wellbeing. The value added by a firm is the residue of income after providing for input costs of materials, related items and the associated cost of capital (Gilchrist, 1971). The economic value-added (EVA) is defined as the net operating income less an allowance for capital consumption (Stewart III & Ehrbar, 1998). EVA reflects the true economic profit of the firm, and has direct bearing on the firm's goal of maximizing shareholders' wealth. Moreover, it indicates the firm's sustainability performance by implicitly contributing to human, social and environmental capitals. This implies that EVA serves a dual purpose: it is a measure of business profit generated from operations; and it is an environmental performance indicator since a comparatively high EVA for a manufacturing firm may mean low drain on natural resources and the efficient utilization of energy and material stocks.

EVA has been widely applied in extant studies, especially in advanced economies, to assess firms' ability to generate value from an appropriate use of resources and compete in a dynamic global economy (Ahmed, 2015; Costin, 2017). Whereas Sharma and Kumar (2010) pointed out that EVA is acclaimed an important performance management tool in advanced economies, they found that few studies have been conducted in developing economies to support its applicability. Unlike the accounting based financial performance indices, EVA accounts for all the business costs of generating value. In addition, EVA improves investment decisions and fosters short to long-term strategic mind-sets as its computation recognizes the costs of both debt and equity capitals employed in generating value. Costin (2017) added that EVA can help a business to achieve sustainable significant development. By adopting EVA as a measure of the firms' financial performance, this study contributes to justification for employing this financial measure in evaluation of corporate performances in Nigeria, a developing economy.

Sustainable expenditures are conscious commitments of corporate resources in activities, processes and products to enhance the quality of life and protect the environment for both present and future generations (FAO, 2020; Ghardallou, 2022). Global Sustainability Investment Alliance (GSIA) considers sustainable investments as an approach that evaluates environmental, social and governance factors in portfolio selection and management (GSIA, 2019). Talan and Sharma (2019) pointed out that the diverse terminologies connoting sustainable expenditures are intertwined and reflect a germane research field which manifests in an evolving clarity of concepts. The narratives about sustainable expenditures and sustainability concern firm efforts to prioritize and integrate human responses to environmental and societal issues at human, social, economic and ecological domains (Goodland, 2002; and Daly, 1999). Manufacturing firms exert effects on the environment across the value chain at the input, process and output ends. Since environmental sources and sinks are limited, firms need to make necessary expenditures to transit from environmentally inimical conventional practices to systems and technologies that ensure their processes and products enhance sustainability.

Measures to guide assessment of firms' investments in the various domains and their levels of sustainability performance are outlined in the Global Reporting Initiative (GRI) (Global Reporting Initiative (GRI) Fourth Review (G4), 2013) and domesticated by the Nigerian Exchange Group (NGX) in 2015 to provide model guidance (MG) on reporting environmental, social and governance (ESG) information for companies listed on the exchange (NSE, 2019). As pointed out by Mainoma and Nasir (2023), effective disclosure of relevant matters shows how the firm deals with sustainability and ethical issues, and such disclosure is important for the firm's continued financial performance. Azapagic and Perdan (2000) explicated a modular framework of appropriate indices to show a firm's commitment to sustainability from year to year. These measures and principles provide guidance for discussing the economic capital component of firms' sustainable expenditures.

Sustainable expenditures in economic capital (EcoSI) comprise all expenditures connected with firms' products and services from design to disposal. This dimension of sustainability exemplifies the economic implications for trade and industry among various stakeholders throughout the entire society. Alfalih (2023) explicated that management determines corporate outputs by their expenditures in requisite resources, and such practices need to be appropriately disclosed for the interests of relevant stakeholders. The GRI fourth review stressed that the economic aspects of sustainability cover the magnitudes of the firm's effects on stakeholders' economic conditions and economic systems at all levels (GRI-G4, 2013). Firms are expected to take responsibility for their entire value chain and ensure that the products and services they offer satisfy appropriate functional and safety requirements, and that these products and services contribute to sustainability.

Firms need to make expenditures in their processes and technologies to enhance efficiency and effectiveness in ways that are environmentally sustainable. Appropriate disclosures of corporate sustainability expenditures demonstrate managerial effectiveness among quoted manufacturing firms in Nigeria (Sanni et al., 2023). According to the provisions of GRI-G4 (2013), items in firms' annual reports that indicate their economic capital include expenditures on research and development to improve processes and product qualities; technological innovations such as adoption of energy efficient smart processes, lighting and heating; and improvements to fixed assets, which include operational premises, machineries, construction of green buildings with appropriate sewage systems that enhance environmental sustainability. Payments for environmental liabilities are important business costs aimed at correcting wrongs, compensating for damages caused by business operations, or restoring and reclaiming natural resources destroyed in the course of business. Aside the challenges and barriers to sustainability reporting (Abdullahi & Abubakar, 2023), full and complete disclosures of these expenditure components are important.

Sustainable Expenditures on Research and Development and Firm Financial Performance

A study by Duque-Grisales et al. (2020) found that investments in research and development have positive moderating effect on the nexus between implementing sustainability initiatives and firm performance. The study examines panel data from 86 listed firms' data from 2013 to 2017 using hierarchical linear regression. The authors discovered that implementation of green innovations by multinational firms from Latin America did not just improve their financial performance. However, been guided by conscientious research and development information, the firms' financial performance improved as the implement green innovations. The study, thus, demonstrate that R&D do not only contribute to improving the financial performance of firms, but equally influences the potential effects of other corporate strategies designed to enhance performance. Affirming this conclusion, Paula and

Rocha (2020) explained that research and development have both direct and indirect effects on firm financial performance. Their study covered 751 firms across six Latin American countries.

The study of Ozkan (2022) covered 500 firms across 25 industrial sectors in Turkey, and obtained financial performance data from 2013 to 2019. The investigation revealed that research and development expenditures negatively affect the current-year performance of the subsectors, but that the effects are positive in the subsequent year. They further noted that the positive effect is short-termed, in the long run the effect is negative. The author concluded by recommending that firms establish a policy of consistent investments in robust research and development to ensure sustained financial performance. Examining the policy implications of environmental issues on economy, Heim et al., (2023) found that economic, environmental and social issues are interdependent and the trade-offs in a bid to adopt new technologies must be carefully evaluated. The study focused on gas flaring in oil producing regions of Russian. Using the trade-off approach with desirable triple bottom line, they found that an integrated policy is required to transform waste to wealth by incorporating international companies in the strategic concern on gas flaring. The waste of natural gas was transformed to positive economic activities that impact the wellbeing of societies, thus achieving dual positive externalities by also eliminating the greenhouse effects caused by emitting carbon monoxide (CO₂) into the atmosphere. Nigeria is also a country given to gas flaring; by informed redefinition of strategy, the huge waste and contamination of gas flaring can be turned to beneficial use. As this study probes the link between sustainable expenditures in economic capital and financial performance, it would avail policy makers and corporate investors information relevant to redefining the gas flaring activities in Nigeria. Thus, the following hypothesis:

H1: Sustainable expenditures in research and development by listed manufacturing firms in Nigeria do not significantly affect their financial performance.

Sustainable Expenditures on Technological Innovation and Firm Financial Performance

In the work of Torre et al. (2020), technology and intellectual capital were found to positively affect the performance of healthcare firms in Naples and Salerno (Italy). The study applied structural equation model to analyze a sample of cross-sectional data from 500 accountants of the firms. Although the study was not longitudinal whereby many years data could be explored, the findings show that integrating technology in service delivery enhances performance. Another study investigating the effects of innovative processing technologies on product quality, revealed that innovative areas abound for firms to improve their performance (Nilsen-Nygaard et al., 2021). The authors based their inferences on conceptual analysis, and advocated an increased consumer awareness and corporate strategic shift to sustainable biodegrade resources. The present study is an effort to add value and depth to understanding the performance effects of technology integration in corporate activities.

In exploring the impact of sustainable manufacturing practices on economic performance of small and medium scale firms, D'Angelo et al. (2022) surveyed 10,618 top level managers of small and medium enterprises (SME) across 28 European Union countries. They applied ordinal regression to analyze the data. Their results show that green practices exert positive effect on performance, but green investments exhibit U-shaped relationship with the firms' economic performance, with a threshold benefit where additional investments in sustainable activities begin to cause negative effects on turnover. Although the study proved that there is an effect relationship between the manufacturing firms' sustainable practices and financial performance, the study suffers some methodical flaws. The study used self-reports of the firms' top-level managers; which reports may not realistically explain customers' basis for patronage.

That the effect became negative at a point may be reflective of prior overstatement. Moreover, the study failed to define the threshold point of relevance. The present study overcame this biasness of self-reports as it utilized factual and unobtrusive data from the published audited reports of manufacturing firms.

From the premise that sustainability derives from harmonious interdependence and existence of humans and biosphere, Pederneiras et al., (2023) examined the sustainability of Portuguese public hospitals from environmental, social and economic perspectives. Using hybrid data envelopment analysis method on cross-sectional data from 29 public hospitals in 2018, the study found that 30% of the hospitals were efficient, but only one percent was remarkably sustainable. The study relied on self-reports of decision makers for the hospitals. However, (Azapagic & Perdan, 2000) explained that a longitudinal approach is required to fully comprehend the progress towards, and the consistency in commitments to, sustainability performance. By adopting a panel data approach, the present study illustrates a way to overcome this challenge and thus provides a complete information about the observed firms' sustainability performance.

Examining whether sustainability practices could be linked to corporate profitability in Jordan, Taha, et al (2023) found a significant positive nexus. The researchers surveyed 56 industrial firms in Jordan and applied panel data technique to analyze the effects of environmental, social and governance characteristics on the firms' profitability. Based on the results, Taha, et al (2023) suggested that companies in Jordan focus on improving corporate sustainability activities so as to enhance financial performance. Although the findings seem plausible, the authors relied on the accounting return on assets as proxy for corporate financial profitability. Gilchrist (1971) had explained that utilizing accounting-based measures of profit, without sufficient provision for the cost of capital employed in generating the profit, presents spurious conclusions. By adopting EVA as the measure of financial performance, this study overcame such weaknesses and proffers meaningful results.

In a study of 20 listed financial firms in Bahraini, Almashhadani and Almashhadani (2023) investigated the relationship between sustainability practices of the firms and their financial performance. They used partial least squares structural equation modelling to analyze cross-sectional data obtained from the audited reports of the firms and found that the sustainability practice of the firms, evidenced by their reporting behaviour, has positive and significant effect on both return on assets and return on equity. Whereas the study used secondary data, it focused on only one year which is insufficient to provide conclusive evidence. As explained by Apergis et al., (2019), a rounded study on corporate sustainability activities can only be achieved from a longitudinal approach, whereby attentions for environmental issues are evaluated together. This defect in literature (Almashhadani & Almashhadani, 2023) is remedied by the present study as it took a longitudinal perspective and integrate the economic dimensions of sustainability in the panel data analysis, by examining the following hypothesis:

H2. *Sustainable expenditures in technological innovation by listed manufacturing firms in Nigeria do not significantly affect their financial performance.*

Sustainable Expenditures on Fixed Assets and Firm Financial Performance

Firms draw on their operating resources to support sustainable developments. In this vein, Bhagav et al., (2022) examined the manufacturing sector in India. Based on ratio analysis of the firm's working capital in 2020 following the COVID-19 era they found that the firms' financial performance deteriorated, though debt to equity improved. The firms' asset quality displayed satisfactory performance, which attests to the firms' capacity to thrive through the challenges of the pandemic. Although the study

highlighted the relevance of quality asset structure for corporate sustainability in the face of myriad environmental challenges, it relied only on relative ratio analyses to draw conclusions. The findings therefore lack sufficient statistical rigor to permit generalization.

The study by Eksandy et al., (2023) focused on the economic implications for manufacturing companies of investing in tangible assets, information technology (IT) and water accounting. The study found a significant and positive linkage between the effector and explanatory factors, so the authors concluded that investing in assets is meaningful for the firms' growth and profitability. Notwithstanding the results, the study covered a period of four years, and only eight out of over 300 firms were surveyed. This sample size is low, meaning a weak statistical power – 10%. As such the result of the study tend not to be representative of the population. The present study is able to address this sample size defect as it covered a much larger sample and time periods; thus, ensuring an adequately reliable result.

The financing choices of firms reflects their investments in sustainable economic capital as demonstrated by Liu et al., (2023). They applied network data envelopment analysis on data from clean energy companies from 2013 to 2021. They observed that the companies proved economically efficient with an annual growth of 2.75%, a growth driven by efficient resource applications. In the study they found that not accounting for the inner structure of a firm's funds flows renders results about its financial performance inconclusive. They explained that the firms were equally discreet about sourcing the funds required for their activities. The study illustrated the essence of imbibing sustainability in firm strategic choices and actions as that enhances financial performance. However, the study covered a widely heterogenous array of firms, and it was not evident whether there is a representative inclusion of the various segments.

The above studies have shown that the assets of firms have various implications for the firms' performance. Therefore, this study makes effort to contribute to the discourse by testing the following hypothesis:

H3: Sustainable expenditures in acquisition of additional fixed assets by listed manufacturing firms in Nigeria do not significantly affect their financial performance

Theoretical Framework

Theories explain relationships among concepts and provide guidance for hypothesizing and examining phenomena. Accordingly, this study is underpinned by the resource base theory. The resource-based view or resource-based theory (RBV) of the firm asserts that corporate performance depends on firm's specific capabilities and resources that are heterogeneously distributed within the industry. As propounded by Barney (1991), the theory states that a firm can harness their resources to achieve competitive advantage in a free market system. Resources refer to assets, processes, knowledge, attributes, and information that the firm has and control that underlie the firm's choice of strategies to improve its effectiveness and efficiency (Barney, 1991). Resources are inputs in the business process that help the firm to explore opportunities in, and assuage threats from, the environment (Sauerhoff, 2014), When effectively deployed the resources form a strategic value for the firm and result in improved performance. Opaleye (2024), posited that appropriate expenditures by firms in relevant resources help to improve performance of the firms and promote environmental health. Resources enables the firm to maintain a dynamic and healthy interrelationship with the environment so it could easily sense and anticipate significant changes that are strategic to its sustained prosperity. Firm's resources tend to define

how corporate management invest in environmental concerns for improved strategic relevance, enhanced reputation and long-term profitability. This theory thus explains the nexus between the listed manufacturing firms' sustainable expenditures in economic capital and the firms' financial performance, and as such provide reasonable guidance for this study. Hence the hypotheses examined by this study.

3.0 Methodology

Research Design

This study is quantitative inclined; it applied the descriptive and inferential approach, combining a time series and cross-sectional data from published annual reports of the firms over a period of fifteen years. This approach is advantageous in many respects: it increased the number of observations; it is able to model time and space, as well as generalize across them; and the longitudinal components of the data facilitated dynamic analysis (Berrington, Smith, & Sturgis, 2006; Dettori, Norvell, & Chapman, 2022). Data obtained from the annual financial reports of the firms were systematically analysed according to the variable components. Other than that, no attempt was made to manipulate the data. The units of account are the firms covered by the study, and the selection of the firms followed the NGX specification as to which publicly listed firms are manufacturing.

Population and Sample Size

The population comprises 51 listed manufacturing firms that were on the data base of the Nigerian Exchange Group as at January 2023. It was hoped that the firms have been in consistent operation post-listing, and published audited annual financial statements for the last fifteen years (that is, 2008 to 2022). Unlike privately limited liability companies and unlisted firms, the financial reports of publicly listed firms are readily accessible, reasonably complete, and professionally certified. Based on the industrial sector categorisation of NGX, manufacturing firms comprise conglomerates and companies manufacturing consumer goods, healthcare products, industrial goods, and processing natural resources other than petroleum and mining. The study covered a time frame of fifteen years, that is the period from 2008 – 2022. Within this period the global concern for environmental sustainability and engagement of relevant entities became pronounced (GSIA, 2019; FAO, 2020). The study focused on manufacturing firms to ensure uniformity and completeness of data items (Wen et al., 2020). The data obtained from the annual reports of the firms are reasonably valid and reliable for achieving the objectives of this study.

This study adopts a census approach and examines all listed manufacturing firms comprised in the study population, which (1) have consistently carried on manufacturing operations and filed annual reports with the Exchange for the entire period in focus. (2) has not changed its reporting cycle within the period of this study, and (3) had not suffered distress or suspension from the Exchange as might have caused non-availability of any year-data during the relevant period. Eighteen (18) of the firms were filtered from the survey on the bases of cessation of operation (4 firms), not substantially engage in manufacturing (3 firms, and listing/firm age below span of survey (11); leaving thirty-three (33) listed manufacturing companies. Given the four (5) variables of the study (financial performance and sustainable expenditures in economic capital components), the analysis consisted of one thousand, nine hundred and eighty (i.e., $33 \times 15 \times 4 = 1,980$) data points.

Estimation Method

The data for this study were analysed through a panel regression approach with the firms' financial performance set as a function (f^{\square}) of sustainable expenditures in economic capital. The panel regression approach is capable of providing more information efficiently with cross-sectional and longitudinal data. while minimizing the bias of lumping cases into categories (Baltagi, 2008). This model is stated as:

$$FinPerf_{it} = f^n(SusExp_{it}, \mathcal{E}) \dots\dots\dots I$$

This function implies that financial performance ($FinPerf_{it}$) of the firms is a function (f^n) of the firms' sustainable expenditures ($SusExp_{it}$), while controlling for residual factors (\mathcal{E}) in the business environment. The study assumes a-priori that the independent variable components bear positive relationships with the dependent variable. The above function translates to:

$$FinPerf_{it} = a_1 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \gamma Z_i + \phi_{it} \dots\dots\dots II$$

Where: $FinPerf_{it}$ represent the dependent variable; X_{1-4it} are the vector of predictor variables - ResD, Tech and FxA, respectively; a_1 is the firm effects which capture the i -th firm-specific variables that are constant over time; β_{1-4} are the parameter estimates of the predictor variables which a-priori should be positive (i.e., $\beta_{1-4} > 0$); γ is the coefficient of time invariant variable Z_i that act as explanatory variable; and ϕ_{it} is the overall error terms.

4.0 Results and Discussion

Descriptive Analysis

The data from the 33 firms for the 15-year period surveyed is presented in Table 1 below.

Table 1

Descriptive Analysis of the Data

Variables	Obs	Mean	Std Dev.	Min.	Max.
Ln_FinPerf	495	26.72886	4.500184	8.780238	36.84005
Ln_ResD	495	12.58089	4.904087	0.6931472	20.03602
Ln_Tech	495	1.849173	3.319675	0.6931472	16.86340
Ln_FxA	495	12.06224	4.370598	0.6931472	18.48071

Notes: Descriptive statistics of the variables obtained from analysis of the survey data on STAT 14.2 (2024).

As shown in Table 1, the study used a balanced panel with 495 observations. All the variable values were log-transformed in consonance with Eom, Lee and Xu (2007). The average economic value generated by all the firms over the study period was 26.73, with a minimum of 8.78 and maximum of 36.84, with a variability is indicated by standard deviation of 4.57. In terms of predictor variables, more expenditures were made on research and development, and acquisition of fixed assets with mean expenditures of 12.59 and 12.06, respectively. The average expenditure on technological innovation was just over 1.84. The differences between the ease and maximum expenditures on economic capitals by all the firms over the surveyed period is much, implying a lack of consistent commitment to developing this critical resource.

Diagnostic Tests

Preliminary analyses were carried out on the data to identify any issue of multicollinearity using the variance inflation factor (VIF), autocorrelation of the residuals using Wooldridge test for panel data, normality of data distribution using Shapiro-Wilk (SWILK) test, and heteroskedasticity using Wald test. The mean VIF was 1.2 meaning that there were no multicollinearity issues in the data. With $F=0.52$ and $p=0.48$, the Wooldridge test show that there was no autocorrelation problem. Result of SWILK test show p-values of 0.00 to 0.01, indicating a departure from normality. Similarly, the Wald test show the presence of heteroskedasticity with $\chi^2=1119.61$ and $p=0.000$. Since the data is not homoscedastic, it is appropriate to apply generalised least squares regression to take care of the heterogeneities among the firms.

The panel was then checked to determine (i) if time fixed or longitudinal effects are present; (ii) if there are significant differences among the firms; and (iii) whether the differences among firms affect their expenditures. The assessment for presence of longitudinal effects was accomplished by the joint *F*-test. With $F(14, 32) = 4.02$ and $\text{Prob} > F = 0.0006$, the test found that there were significant differences among the year-coefficients, thus indicating the use of FE. The Breusch and Pagan LaGrange multiplier test (B-PLM) assessed presence of firm heterogeneities. With $\chi^2(01) = 687.65$ and $\text{Prob} > \chi^2 = 0.0000$, heterogeneity in the firms' characteristics is significant, thereby negating applicability of OLS and suggesting RE. The Hausman Specification test (HST) show whether the firms' heterogeneities correlate with their expenditures. This result is contained in Table 2 below:

Table 2

Results of Hausman Specification Test of Choice between RE and FE

Variables	Coefficients		(b-B) Difference	Sqrt(diag(v_b-v_B)) S.E.
	FE (b)	RE (B)		
Ln_ResD	.0676465	.0973127	-.0296663	.0050977
Ln_Tech	.038531	.0296026	.0089284	.0106757
Ln_FxA	.0253163	.0894997	-.0641834	.012825

Notes: *b* = consistent under **Ho** and **Ha**; obtained from xtreg. *B* = inconsistent under **Ha**, efficient under **Ho**; obtained from xtreg. Test: H_0 : difference in coefficients not systematic $\chi^2(3) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 49.70$ $\text{Prob} > \chi^2 = 0.0000$

The results in Table 2 demonstrated that differences among the firms were not systematic, they had significant ($P > \chi^2 = 0.0000$) effects on the predictors. Based on these results, and in accordance with Greene (2008), the fixed effects model was considered most appropriate for this study to test the hypotheses.

Regression Results

Table 3 below provides relevant results for testing the hypotheses of the study. The hypotheses were evaluated at the 95% level of significance. The test statistics are t-values and significance is determined by the p-values: $P(t) < 0.05$ is significant, while $P(t) > 0.05$ is not. Where $p < 0.05$, the null hypotheses (H_0) is rejected, otherwise ($p > 0.05$) H_0 is accepted.

Table 3

Fixed-effects Regression

Group variable: FIRM				Number of obs.		495
R-sq	Within =	0.0181	Number of groups		33	
	Between =	0.5919	Obs per group	(Min/avg/max)	15	
	Overall =	0.2430	F(3, 459)		2.82	
	Corr (u_i, xb) =	0.4910	Prob > F		0.0385	
<i>Ln_FinPerf</i>	Coef.	Std. Err.	t	p> t	(95% Conf. Interval)	
Ln_ResD	.0676465	.0273359	2.47	0.014	.0139274	.1213655
Ln_Tech	.038531	.0430961	0.89	0.372	-.0461591	.1232211
Ln_FxA	.0253163	.0396334	0.64	0.523	-.0525691	.1032016
_const	25.50119	.5552256	45.93	0.000	24.41009	26.59229
<i>Sigma_u</i>	3.7446759					
<i>Sigma_e</i>	2.3173966					
<i>rho</i>	0.7230780	(fraction of variance due to u_i)				
F-test that all u_i=0: F(32, 459) = 24.91					Prob > F =	0.0000

Notes: The table contains the fixed effects regression out obtained from Research analysis with STATA 14.2 (2024)

Hypothesis one states that the firms' sustainable expenditures on research and development (ResD) has no significant effect on financial performance of the firms. As shown in the Table 3, $t=2.47$ and $P(t)=0.014$ with a positive coefficient of 0.07, indicating that the firms' expenditures on research and development significantly and positively affected their financial performance. Hypothesis two asserts that the firms' financial performance is not significantly affected by their technological innovations. Table 3 show that for Ln_Tech, $t=0.89$. $P(t)=0.37$ and a positive coefficient of 0.04, which affirms the negation that expenditures on technological innovation do not contribute significantly to the financial performance of listed manufacturing firms in Nigeria. Hypothesis three declares that acquisitions of additional fixed assets by firms have no significant effect on the firms' financial performance. The details in Table 3 for Ln_FxA have $t=0.64$. $P(t)=0.52$ and a positive coefficient of 0.03, depicting that there is no statistical evidence to reject the hypothesis - additions to fixed assets do no significantly improve the manufacturing firms' financial performance.

Discussion of the Findings

The results of the study show that, generally, sustainable expenditures on economic capitals by listed manufacturing firms in Nigeria have important implications for their financial performance. As revealed by the results, these expenditures together made positive contributions to improve the firms' financial performance significantly by over 20% ($R^2=0.243$, with $F=2.82$ and $p(F)=0.03$). This disclosure corroborates the studies of Eksandy et al. (2023), and Liu et al. (2023) who found that good quality technology improves business growth and profitability. In addition, Heim et al. (2019) revealed that integrated policy of research and development transformed wastes, such as gas flaring, to wealth and promoted cleaner environment. Bhagav et al. (2022) equally found that improved asset quality helped Indian manufacturing firms to successfully thrive through certain challenges occasioned by the COVID-19 pandemic. Moreover, Opaleye (2024), stressed that appropriate expenditures in these domain fields are relevant for improved performance of the firms and the environmental health of nations.

This study revealed that although sustainable expenditures in economic capitals by the listed manufacturing firms have positive correlation with the firms' financial performance, not all the three components where the firms have made expenditures exhibited significant effect. Expenditures in research and development displayed significant effect on the financial performance of the firms. However, the expenditures in technological innovation and additions to fixed assets, though positive, did not statistically display significant effects on financial performance. Given the nomenclature of economic capital conceived for this study, it was a surprise to find that these two components did not show significant effects on the firms' financial performance. This discovery suggests the need for further investigation. The study showed statistically that sustainable expenditures in economic capitals contribute positively to improved financial performance for manufacturing firms that are listed on the Nigerian Exchange. The all-inclusive approach used in this study provides complete evidence for the operational alignment of corporate activities to achieve financial objectives. Moreover, the fact that the study applied a generalized least square model on the panel data, provides robust bases for extending the findings of the study to non-manufacturing sectors, which invariably also advances knowledge in this literature field.

The evidence provided by this study substantiates the resource-based theory that firms could leverage their economic capitals to gain competitive advantage and improve their financial performance. Notwithstanding the aggregate result of this study, all the independent variable components did not uniformly display significant effects on the firms' financial performance. The greatest proportion of this

result was achieved by research and development expenditures, making it a core area for sustainable financial performance by manufacturing firms. Since all the components are positively correlated with financial performance, the disproportionate effect of research and development could be attributed to the relatively higher expenditures involved as presented in the descriptive analysis. As had been revealed in literature, and affirmed by this study, it would be financially relevant for listed manufacturing firms in Nigeria to conscientiously spend more on technological and process innovations, as well as ensuring an effective culture of fixed assets acquisitions and upgrades. Differences in the sustainable expenditures on economic capitals by the firms was found to account for over 70% ($\rho=0.723$, Table 3) of the effects on the firms' financial performance. This means that firms that improve their expenditures on economic capital could substantially enhance their financial performance.

5.0 Conclusion and Recommendations

This study focused on the financial performance implications of sustainable expenditures on economic capital by manufacturing firms listed on the Nigeria Exchange. Based on the findings, this study concludes that sustainable expenditures in economic capital could substantially enhance the financial value of the firms. With their innovativeness and creative capabilities, manufacturing firms need to consistently make appropriate investments to improve their economic capitals for assured financial performance and enhanced sustainability. Expenditures in the domains of economic capital are crucial for any increased level of financial performance desired by the firms. Given the conclusion of this study, it is recommended that listed manufacturing firms in Nigeria increase expenditures in improving their process technologies and fixed assets replacements and upgrades, while maintaining a robust culture of research and development. This study established by factual evidence that firms' sustainable expenditures in economic capital have financial benefits for enterprises and communities. The results of the study also point to the fact that further academic inquiry is necessary to attest to the low, albeit positive, effects of technological innovation and additions to fixed assets on the firms' financial performance.

References

- Abdullahi, A., & Abubakar, A. (2023). Challenges and barriers to sustainability reporting in the Nigerian context. *FUDMA Journal of Accounting and Financial Research*, 1(3), 177-190. <https://doi.org/10.33003/fujafmr-2023.v1i3.70>
- Abraham, H., & Balogun, I. O. (2012). Contribution of microfinance to GDP in Nigeria: Is there any? *International Journal of Business and Social Science*, 3(17), 167-176.
- Ahmed, H. (2015). Impact of firms' earnings and economic value added on the market share value: An empirical study on the Islamic banks in Bangladesh. *Global Journal of Management and Business Research*, 15(2), 152-166.
- Alfalih, A. A. (2023). ESG disclosure practices and financial performance: A general and sector analysis of SP500 non-financial companies and the moderating effect of economic conditions. *Journal of Sustainable Financial Investment*, 13(4), 1506-1533.
- Almashhadani, M., & Almashhadani, H. A. (2023). The impact of sustainability reporting on promoting firm performance. *International Journal of Business and Management Innovation*, 12(4), 101-111. <https://doi.org/10.35629/8028-120410111>
- Apergis, N., Babalos, V., Christou, C., & Gupta, R. (2019). Are there really long-run diversified benefits from sustainable investments? *International Journal of Business and Economics*, 18(2), 141-143.
- Awan, A. G., Siddique, K., & Sarwar, G. (2014). The effect of economic value added on stock return: evidence from selected companies of Karachi stock exchange. *Research Journal of Finance and Accounting*, 5(23), 140-152.

- Awan, U., Sroufe, R., & Shahbaz, M. (2021). Industry 4.0 and the circular economy: A literature review and recommendations for future research. *Business Strategy and the Environment*, 30(4), 2038–2060. <https://doi.org/10.1002/bse.2731>
- Azapagic, A., & Perdan, S. (2000). Indicators of sustainable development for industry: A general framework. *Trans IChemE*, 78(B), 243–261.
- Baltagi, B. H. (2008). *Econometric Analysis of Panel Data*. New York: John Wiley and Sons.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Berrington, A., Smith, P. W., & Sturgis, P. (2006). *An overview of methods for the analysis of panel data*. Southampton: Economic & Social Research Council.
- Bhagav, S., Spulbar, C., Birau, R., Kumar, K. A., & Cinciulescu, D. (2022). Examining the financial performance of manufacturing companies in India: A case study. *Annals of the "Constantin Brancusi" University of Targu Jiu: Letter and Social Science Series*, 151–162. <https://alss.utgjiu.ro/>
- Combs, J. G., Crook, T. R., & Shook, C. L. (2005). The dimensionality of organizational performance and its implications for strategic management research. In D. J. Ketchen, & D. D. Bergh, *Research Methodology in Strategy and Management* 2, (259–286). Bingley, UK: Emerald.
- Costin, D. M. (2017). Economic value added – a general review of the concept. *Economic Sciences Series*, XVII (1), 167–173. <https://www.researchgate.net/publication/318792542>
- Daly, H. E. (1999). *Ecological Economics and the Ecology of Economics*. Cheltenham: E Elgar Publications.
- D'Angelo, V., Cappa, F., & Peruffo, E. (2022). Green manufacturing for sustainable development: The positive effects of green activities, green investments, and non-green products on economic performance. *Business Strategy and the Environment*, 1–14. <https://doi.org/10.1002/bse.3226>
- Dettori, J. R., Norvell, D. C., & Chapman, J. R. (2022). Fixed-effect vs random-effects models for meta-analysis: 3 points to consider. *Global Spine Journal*, 12(7), 1624–1626. <https://doi.org/10.1177/21925682221110527>
- Duque-Grisales, E., Aguilera-Caracuel, J., Guerrero-Villegas, J., & García-Sánchez, E. (2020). Does green innovation affect the financial performance of Multilatinas? The moderating role of ISO 14001 and R&D investment. *Business Strategy and the Environment*, 1, 1–17. <https://doi.org/10.1002/bse.2572>
- Economic Sustainability Committee (ESC). (2020). *Bouncing Back: Nigeria Economic Sustainability Plan*. Abuja: Federal Ministry of Finance and Planning.
- Ehiedu, V. C., & Toria, G. (2022). Audit indicators and financial performance of manufacturing firms in Nigeria. *Linguistics and Culture Review*, 6(S1), 14–41. <https://doi.org/10.21744/lingcure.v6nS1.1887>
- Eksandy, A., Sofia, I. P., Harianto, R., Pratama, F. A., & Sari, R. U. (2023). Economic performance of manufacturing companies in Indonesia: Tangible assets, IT capabilities and water accounting. *Jurnal Akuntansi*, 65–78. <http://doi.org/10.30656/Jak.V10i1.4900>
- Eom, T. H., Lee, S. H., & Xu, H. (2007). Introduction to panel data analysis: Concepts and practices. In J. Ganesan, *Handbook of Research Methods in Public Administration* (pp. 571–589). AU5384_C032: Miller Inc. <https://doi.org/10.1201/9781420013276.ch32>
- European Commission (EC). (2006). *Environment fact sheet: industrial development*. Great Britain: European Commission. <http://www.europa.eu.int/comm/environment/ipp>
- Food and Agricultural Organisation (FAO). (2020). *Sustainable development goals*. Bangkok, Thailand: FAO Regional Office for Asia and the Pacific. <http://www.un.org/sustainabledevelopment/>

- Gentry, R. J., & Shen, W. (2010). The relationship between accounting and market measures of firm financial performance: How strong is it? *Journal of Managerial Issues*, 22, 514-530.
- Ghardallou, W. (2022). Corporate sustainability and firm performance: The moderating role of CEO education and tenure. *Sustainability*, 14(3513), 1-16. <https://doi.org/10.3390/su14063513>
- Gilchrist, R. R. (1971). *Managing for Profit: The Added Value Concept*. London: George Allen and Unwin Ltd.
- Global Reporting Initiative (GRI) Fourth Review (G4) (2013). *Part 1: Reporting Principles and Standard Disclosures & Part 2: Implementation Manual*. Amsterdam, The Netherlands: Global Reporting Initiative. www.globalreporting.org
- Global Sustainable Investment Alliance (GSIA). (2019). *Global Sustainable Investment Review 2018*. London: GSIA.
- Goodland, R. (2002). *Sustainability: Human, Social, Economic and environmental*. Washington Dc: John Wiley & Sons, Ltd.
- Greene, W. H. (2008). *Econometric Analysis (6th ed.)*. New Jersey: Prentice Hall.
- Gutterman, A. S. (2023). Stakeholder theory. California: Sustainable Entrepreneurship Project. <https://www.researchgate.net/publication/369194606>
- Heim, I., Vigneau, A. C., & Kalyuz, Y. (2023). Environmental and socio-economic policies in oil and gas regions: triple bottom line approach. *Regional Studies*, 57(1), 181-195. <https://doi.org/10.1080/00343404.2022.2056589>
- Heim, I., Kalyuzhnova, Y., Li, W., & Liu, K. (2019). Value co-creation between foreign firms and indigenous small-and medium-sized enterprises (SMEs) in Kazakhstan's oil and gas industry: The role of information technology spillovers. *Thunderbird International Business Review*, 61(6), 911-927. <https://doi.org/10.1002/tie.22067>
- KPMG International. (2012). *Expect the unexpected: building business value in a changing world*. London: United Kingdom.
- KPMG International. (2020). *The time has come: The KPMG survey of sustainability reporting*. United Kingdom: KPMG International.
- Kujala, J., Lehtmaki, H., & Freeman, R. E. (2019). A stakeholder approach to value creation and leadership. In A. Kangas, J. Kujala, & A. Hekkinen, *Leading Change in a Complex World: Transdisciplinary Perspectives*. (pp. 123-144). Finland: Tampere University Press.
- Liu, H., Zhang, R., Zhou, L., & Li, A. (2023). Evaluating the financial performance of companies from the perspective of fund procurement and application: new strategy cross efficiency network data envelopment analysis model. *Energy*, 269, 1-9. <https://doi.org/10.1016/j.energy.2023.126739>
- Macrotrends. (2023). Nigeria Manufacturing Output. Lagos, Nigeria: Macrotrends. Retrieved from www.macrotrends.net
- Mainoma, H. M., & Nasir, A. M. (2023). Relationship in principle between corporate governance, intellectual capital disclosures and firm performance. *FUDMA Journal of Accounting and Financial Review*, 1(1), 65-76. <https://doi.org/10.33003/fujafr-2023.v1i1.10.65-76>
- Miller, C. C., Washburn, N. T., & Glick, W. H. (2013). The myth of firm performance. *Organization Science*, 24, 948-964.
- Nilsen-Nygaard, J., Fernández, E. N., Radusin, T., Rotabakk, B. T., Sarfraz, J., Sharmin, N., Sivertsvik, M., Sone, I., & Pettersen, M. K. (2021). Current status of biobased and biodegradable food packaging materials: Impact on food quality and effect of innovative processing technologies. *Comprehensive Reviews in Food Science and Food Safety*, 20, 1333-1380. <https://doi.org/10.1111/1541-4337.12715>
- Opaleye, O. (2024, March 11). Twenty reasons your organization needs wellness experts. *Business Day*, p. 11. www.businessday.ng

- Organization for Economic Cooperation and Development (OECD). (2021). Moving to sustainable industrial production. Accelerating Climate Action: Refocusing Policies through a Well-being Lens. Paris, France: OECD Publishing. <https://doi.org/10.1787/75413ccd-en>
- Orinya, J. O., Bambale, A. J., & Murtala, A. I. (2020). Corporate Characteristics, Investments in Human Capital and Financial Performance of Deposit Money Banks in Nigeria.
- Ozkan, N. (2022). R&D spending and financial performance: An investigation an emerging market. *International Journal of Management Economics and Business*, 18(1), 38-58. <http://dx.doi.org/10.17130/ijmeh.964849>
- Parmar, B. L., Freeman, E. R., Harrison, J. S., Wicks, A. C., de Colle, S., & Purnell, L. (2014). Stakeholder theory: The state of the art. *The Academy of Management Annals*, November, 1-61. <https://www.researchgate.net/publication/235458104>
- Paula, F. d., & Rocha, R. J. (2020). The effect of R&D investments and patents on the financial performance of Latin American firms. *Latin American Business Review*, 1, 1-20. <https://doi.org/10.1080/10978526.2020.1761258>
- Pederneiras, Y. M., Pereira, M. A., & Figueira, J. R. (2023). Are the Portuguese public hospitals sustainable? A triple bottom line data envelopment analysis approach. *International Transactions in Operations Research*, 30, 453-475. <https://doi.org/10.1111/itor.12966>
- Sanni, M., Alabere, A. J., & Lawal, A. A. (2023). Managerial Dynamics as a deciding factor for corporate social disclosures among quoted manufactruring companies in Nigeria. *FUDMA Journal of Accounting and Financial Research*, 1(3), 64-74. <https://doi.org/10.33003/fujafr-2023.v1i3.64>
- Sauerhoff, C. (2014). Competitive differentiation within the shipbuilding industry. Springer, XXiii, 232-240. https://doi/10.1007/978-3-658-05804-3_2
- Sharma, A. K., & Kumar, S. (2010). Economic value added (EVA) - literature review. *International Journal of Economics and Finance*, 2(2), 200-221.
- Singh, S., Tabassum, N., Batsakis, G., & Darwish, T. K. (2017). Corporate governance and Tobin's Q as a measure of organizational performance. *British Journal of Management*, 00, 1-20. <https://doi/10.1111/1467-8551.12237>
- Stern Value Management (SVM). (2016). Proprietary tools. Retrieved from Stern Value Management Web site: <http://sternvaluemanagement.com/intellectual.property.joel.stern>
- Stewart III, B. G., & Ehrbar, A. (1998). *EVA: The Real Key to Creating Wealth*. London, UK: John Wiley and Sons.
- Sushil, L. (2017). Does flexibility mitigate or enhance risk? *Global Journal of Flexible Systems Management*, 18(3), 169-171.
- Taha, R., Al-Omush, A., & Al-Nimer, M. (2023). Corporate sustainability performance and profitability: The moderating role of liquidity and stock price volatility - evidence from Jordan. *Cogent Business & Management*, 10(1), 1-17. <https://doi.org/10.1080/23311975.2022.2162685>
- Talan, G., & Sharma, G. (2019). Doing well by doing good: A systematic review and research agenda for sustainable investment. *Sustainability*, 353. <https://doi.org/10.3390/su1020353>
- Thaler, R. (2004). *Advances in Behavioural Finance*. New York: Russell Sage Foundation.
- The Nigerian Stock Exchange (NSE). (2019). *Sustainability Disclosure Guidelines*. Abuja, Nigeria: The Nigerian Stock Exchange.
- Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking*, February 1, 15-29.
- Torre, C., Tommasetti, A., & Maione, G. (2020). Technology usage, intellectual capital, firm performance and employee satisfaction: The accountants' idea. *The TQM Journal*, 1-23. <https://doi.org/10.1108/TQM-04-2020-0070>

- United Nation Industrial Development Organisation (UNIDO). (2020). *World manufacturing and production statistics*. Washington: UNIDO.
- Wen, W., Lui, H., & Ke, Y. (2020). Directors with foreign experience and corporate tax avoidance. *Journal of Corporate Finance*, 62, 1-28. <https://doi.org/10.1016/j.jcorpfin.2020.101624>
- Yip, W. S., Zhou, H. T., & To, S. (2023). A critical analysis on the triple bottom line of sustainable manufacturing: key findings and implications. *Environmental Science and Pollution Research*, 22-35. <https://doi.org/10.1007/s11356-022-25122-x>
- Yu, Z., Khan, S. A., & Liu, Y. (2019). Exploring the role of corporate social responsibility practices in enterprises. *Journal of Advanced Manufacturing Systems*, 1-15. <https://doi.org/10.1142/S0219686720500225>