



DETERMINANTS AND VALUE RELEVANCE OF ISO 14001 ADOPTION OF LISTED MANUFACTURING FIRMS IN NIGERIA

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Abstract

The study aims to examine the association between Environmental Management System (EMS) and the value it adds to firms. Specifically, it focuses on the effect of International Standard Organization (ISO) 14001 and the value of listed firms in Nigeria. Furthermore, the characteristics of the firms that are found engaging in such practices in terms of size and age were investigated. An ex-post facto design was adopted and secondary data were sourced from the annual reports and accounts of firms that are listed on the Nigerian Exchange Limited. Twenty-one (21) firms made up the population for the study and out of which twelve (12) firms were purposely selected as the sample of the study from the period 2012-2022. In the final analysis, only firms that have complete data for the sampled period were included in the study. The study employed a multiple regression model for the analysis. The result shows that ISO 14001 adoption has no significant impact on firm value. Furthermore, both firm size and firm age have significant effect on the level of ISO 14001 adoption, with firm size having a positive effect while the effect of firm age is negative. Given the benefits that accrue from firm's adoption of sound environmental management practice in terms of sustainability, the study recommends that organizations can boost their market value by applying ISO 14001 standards, and this will happen through improved corporate reputation, regulatory compliance, and environmental performance. The finding that the implementation of ISO 14001 is heavily reliant on the size of the organization informed the recommendation that industry associations and regulatory agencies should use awareness campaign and financial incentives to encourage smaller enterprises to adopt ISO 14001 standards. This is because of the benefits it provides.

Keywords: firm size, firm age, ISO 14001 standards, value relevance, listed manufacturing firms

1. Introduction

ISO 14001, an auditable standard for environmental management systems (EMS), provides a framework for performance improvement, control, and regulatory compliance. It also demonstrates to stakeholders and customers that a business is committed to its work. EMS embraces the concept of continuous improvement. It ensures that companies continue to learn from their experiences to improve their environmental performance in the future. The adoption of ISO 14001 is a planned response to the growing emphasis on stakeholder expectations, regulatory compliance, and environmental responsibility. Manufacturing firms are increasingly recognising

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the importance of addressing environmental challenges to strengthen their overall value proposition, as they operate in industries with a higher environmental effect by nature. EMS provides a proactive strategy for lowering environmental dangers, enhancing resource efficiency, and demonstrating a company's commitment to sustainable business practices.

There are numerous concerns about the legal and regulatory frameworks for environmental management. These shortcomings may result in insufficient implementation of environmental protection regulations, and this has led to problems such as pollution, resource depletion, and habitat loss (Oshiole & Daniel, 2020). Businesses may find it challenging to implement extensive and effective environmental management practices in such a situation.

Businesses can position themselves as industry leaders in corporate responsibility by highlighting and supporting ecologically friendly products (Oshiole & Daniel, 2020). Companies may appeal to a growing market of environmentally conscious customers while also promoting sustainable practices. With this strategic emphasis on eco-friendly items, the company's overall market competitiveness may be strengthened by attracting clients who value sustainability (Okezie, 2021).

In general, adoption of the ISO 14001 has both positive and negative effect on firm performance and value. While studies (Dowell, Hart & Yeung, 2000, Nishitani, 2011) have found that the adoption of ISO 14001 standard would improve a firm's performance in terms of Tobin's Q, return on assets (ROA), return on sales (ROS), and return on equity (ROE), whereas others have found neutral or even negative effects of ISO 14001 adoption on a firm's performance (King and Lenox, 2001).

There is also mixed result on the factors that are likely to influence the level of ISO 14001 adoption among listed firms. Studies such as Reis et al. (2018), Arocena et al. (2021), and Zhang (2021) have found firm size, industry type, profitability. Nigeria has adopted a variety of rules and regulations to mitigate the detrimental effects of its environmental issues, and that include legislative frameworks which require enterprises to conduct themselves deliberately and responsibly, reducing the detrimental impact of their operations in the area, but there is apparently paucity of studies that have examined the role of ISO 14001 certification as a potential tool for driving firms to be more environmentally responsible.

Most of the studies on the effect of ISO 14001 and firm value, as well as the determining factors are conducted in other parts of the world. In addition, where such studies are found in Nigeria, the mixed result remains an issue yet to be resolved and these are the motivation for the current study. The study's broad objective is to: (i) determine the impact of ISO 14001 adoption on firm value (Tobin Q) of listed manufacturing companies in Nigeria; (ii) examine the impact of corporate characteristics (firm size and firm age) on ISO 14001 adoption.

The rest of the paper is organised as follows: section 2 is the review of literature, theoretical framework and hypotheses for the study. Section 3 discusses the methodology. The focus of section 4 is the analysis and results, followed by discussion and conclusion in chapter 5.

2. Literature Review and Hypotheses Development

Environmental Management Systems

Melnyk et al. (2003) define an EMS as a system and formal database that integrate procedures and processes for staff training, monitoring, summarising, and publishing information

on a company's environmental performance to internal and external stakeholders. An environmental management system assists organisations in detecting, managing, analysing, and controlling their overall environmental effect (ISO, 2015), hence improving their environmental performance (Sartor et al., 2019). While external communication takes the form of annual reports that highlight the company's achievements to improve its reputation, internal environmental information focuses on the process, control, and minimisation of waste and pollution. As a result, the adoption of an environmental management system requires the implementation of a waste, energy, and pollution management system, as well as many productions process controls (Fronzel et al., 2018).

Furthermore, DAdamo et al. (2022) emphasises the numerous benefits of expanded sustainability corporate reporting, including stakeholder participation. ISO 14001 was developed by the International Organisation for Standardisation (ISO) to enhance worldwide environmental standards while also promoting commerce and lowering trade obstacles. This new international standard for the organization's environmental management system was adopted in 1996. The goal of this certification was to harmonise environmental management system requirements that would otherwise vary and often contradict each other across countries (Melnik et al., 2003).

Because ISO 14001 is process-oriented rather than results-oriented, managers may find it useful in maximising the costs associated with pollution reduction (Melnik et al., 2003). Thus, ISO 14001 is a globally accepted standard that specifies the requirements for an environmental management system. It provides a competitive advantage to organisations by aiding them in improving their environmental performance through waste reduction and resource efficiency. It also enhances stakeholder confidence.

ISO 14001 Standards

ISO 14001 is ISO's fundamental environmental management standard. ISO 14001, like ISO and ISO/TC 207, aims to help organisations identify, manage, and improve their interactions with the environment. It also aims to increase cross-border communication and environmental awareness. Because of its extensive acceptance and recognition, the standard—first issued in 1996—may be the most important environmental management system standard in the world. Many more organisations, including government bodies, are expected to adopt the standard without certification. Independent ISO 14001 accreditation has been granted to over 325,000 entities in 170 countries, including corporations, communities, service organisations, and spiritual communities.

As of 2014, about 6500 US organisations had ISO 14001 certification, covering somewhat more than 6900 physical locations. Twenty years after ISO 1401, the topic of whether the standard can deliver on its promise of increasing environmental performance remains highly contested. ISO 14001, while not specifying operations, product requirements, or environmental performance objectives, does provide guidance for the design and implementation of environmental management systems in enterprises (Ann et al., 2006).

ISO 14001, which specifies the requirements for establishing, implementing, and maintaining a system to manage environmental consequences and achieve environmental objectives within an organisation, applies to organisations of all sizes and locations. It aims to meet legal and other organisational requirements while also improving environmental performance. To accomplish environmental management, sustainability, and social responsibility, some Norwegian

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enterprises have embraced the worldwide standard ISO 14001 for environmental management systems (2015).

The standard describes the necessary features and subsystems of an EMS as a foundation for ongoing development, offering adopting companies a wide range of options for how to design the system appropriately and efficiently within the stated boundaries. Adopting organisations must implement environmental policies, objectives, and planned activities that address their specific environmental consequences, as well as legal and other environmental requirements. They are also expected to assess the system's effectiveness, identify concerns and discover solutions, and conduct reviews in order to improve it.

ISO 14001 and Value of Firms

As earlier discussed, EMS is a framework that organisations can use to manage their impact on the environment and improve environmental performance. But the big question is whether investors see value in international environmental management certification of ISO 14001 certification? Or what firms stand to gain by obtaining the certification, whether this action will not lead firms to incur additional cost? All of these bother on the value-adding effect if ISO 14001 adoption. More studies have focused on its relationship with financial performance (Hazudin et al., 2015; Bendizia et al., 2024). Despite the prominence of International Organization for Standardization (ISO) 14001 certification as a global strategy instrument, there is persistent doubt about its effectiveness as a value-adding effect. Hence, the current study hypothesizes that:

H₀₁:ISO 14001 adoption has no significant effect on the value of listed consumer goods companies in Nigeria.

Factors Determining the ISO 14001 Certification

The firm's financial success is one of the first topics covered in the literature. Increased financial success and a company's greatest environmental performance are positively associated. On the other hand, it was discovered that enterprises that beat the market average in terms of financial success are more likely to embrace environmental standards such as ISO 14001. However, as noted, implementing ISO 14001 is a costly and time-consuming procedure that may result in large expenses. As a result, organisations who follow the standard are already well-known and show consistent growth and success.

An important factor in a company's financial success is the distinct advantage that accreditation provides. Zhang, Zhang & Cao (2021) investigated how ISO 14001 influenced Chinese firms listed on the CSE that operate in highly polluting sectors in terms of environmental performance. The authors concluded that as a company's financial success increased, ISO 14001 certification positively influenced its environmental performance. As a result, organisations in a stronger financial position benefit more from certification, strengthening the rationale for adoption.

In a similar line, studies showed that enterprises with more short-term (one-year) financial capabilities perform better in terms of environmental sustainability. Another aspect highlighted in the literature as being important in the certification selection process is the kind of firm, namely its size and industry. Since ISO (2015) claims that ISO 14001 may be applied in any kind of organisation, it is vital to investigate if these features influence the possibility of certification acceptance.

Furthermore, Sartor et al. (2019) state that ISO 14001 is a comprehensive standard that many organizations may use. This implies that, although the standard does not impose any predefined plans or targets, firms may develop their own goals and performance indicators depending on their requirements and industry. Nishitani (2011) discovered that enterprises with high energy consumption and pollution emission would benefit the most from environmental certifications. These businesses may be the most motivated to implement ISO 14001.

In a similar line, Arocena et al. (2021) showed that larger enterprises experienced a greater increase in profitability after applying ISO 14001. Furthermore, certification may be an important issue for organisations that are worried about their reputation, image, or stakeholder signals (Riaz and Saeed, 2020). While certification is not necessary, it allows the company to signal to the market that it is more ecologically responsible. According to Frondel et al. (2018), while certification increases a company's financial success, implementing an environmental management system without certification has no effect on the firm's performance. As a result, companies that are more concerned about their reputation are more likely to seek certification if the signalling impact is big enough.

Reis et al. (2018) concluded that, in general, accredited enterprises are powerful and well-established in the marketplace. Despite this, they pursue accreditation in an effort to attract new clients and investors while also improving their reputation and image. The relevance of the signalling effect influences the public's environmental consciousness. For example, Ong et al. (2016) concluded that ISO 14001 boosts customer preference, indicating a better level of environmental concern. Investors, on the other hand, profit from it since they increasingly believe that enterprises that display a better level of environmental consciousness will be more sustainable than those that do not.

According to Ong et al. (2016), organisations with ISO 14001 certification have improved public perception and reputation, as well as a more advanced environmental management system that allows for larger cost savings than non-certified organisations. Furthermore, Arocena et al. (2021) demonstrated that countries with higher environmental consciousness benefit more economically from the application of ISO 14001. Its stock market participation is an important factor that may influence the decision to become certified in terms of reputational impact. Because shareholders must contribute to the capital of these businesses, they require a strong and dependable reputation.

Przychodzen and Przychodzen (2015), for example, show that environmental changes benefit the financial performance of Polish and Hungarian stock market enterprises. Furthermore, Sarumpaet (2005) found a strong relationship between a company's stock market listing and its environmental performance. With a focus on listed businesses, Riaz and Saeed (2020) noted that a number of studies show that the adoption of ISO 14001 certification has a positive impact on the market because the certification is viewed as a sign of the company's commitment to the environment and increased operational efficiency. However, the influence varies depending on which research nations are emphasised in more developed countries where environmental performance is more important. The company's international market share and reputation may also influence the choice to get environmental certification. In response to worldwide demand, an exporting company may seek certification to improve its external validity and reputation (Darnall & Edwards, 2008). This indicates how important the reputation element is for global competitiveness.

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The study therefore, investigate the impact of firm-based characteristics on the level of ISO 14001 adoption and hypothesizes that:

H₀₂ Firm Size has no significant impact on the level of ISO 14001 adoption among listed consumer goods companies in Nigeria.

H₀₃ Firm Age has no significant impact on the level of ISO 14001 adoption among listed consumer goods companies in Nigeria.

Theoretical Review

The study is hinged on Natural Resource-Based View (NRBV) theory. According to Natural Resource-Based View (NRBV) theory, businesses have distinctive resources that they may use to gain competitive edge. This is achieved through increased resource efficiency, decrease waste, lowering environmental penalties and significant resources efficiency. Furthermore, simplified operations and improved environmental performance may boost operational efficiency. Again, by displaying their dedication to the environment, firms may boost their image and recruit environmentally concerned stakeholders and consumers.

3. Methodology

The study is based on ex-post facto research design with a population of twenty (21) firms within the manufacturing sector. Twelve (12) firms that formed the sample size for the study were purposely selected over the period 2012-2022. The study adopted purposive sampling technique based on the nature of data required for the study, and the final selection was based on companies with available data for the sampled period. Data were obtained from the firms' annual reports and accounts of selected firms.

Model specification

For objective 1, which seeks to examine the impact of ISO 14001 on firm value the model 1 is hereby formulated. Leverage is a control variable in the model. This is stated as follows:

$$FV_{it} = \beta_0 + \beta_1 ISO_{it} + \beta_2 LEV_{it} + \mu_{it} \text{-----} (1)$$

For objective 2, which seeks to examine the impact of firm characteristics (firm size and firm age) on the level of ISO 14001, the model 2 is hereby formulated. Firm size is a control variable in the model. This is stated as follows:

$$ISO_{it} = \beta_0 + \beta_1 FA_{it} + \beta_2 FS_{it} + \mu_{it} \text{-----} (2)$$

Where: FV is Firm Value; FS is Firm Size; FA is Firm Age; LEV is Leverage; β_0 is Constant term; B1-2 are Coefficients of the independent variables; μ is error term.

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Table 1

Measurement of Variables

Variables	Definition	Measurement	Source
Firm Value	Firm Value (Tobin Q)	Logarithm of market capitalization	Annual Reports
ISO 14001	Measure of international standardization activities	If stated in annual reports = 1, if it's not stated in annual reports=0	Annual Reports
Firm Size	Size of the firm typically measured by total assets or revenue	Logarithm of the total assets.	Annual Reports
Firm Age	Age of the firm measured as the number of years since incorporation	Number of years since the company's founding.	Annual Reports
Leverage	The ratio of a firm debt to its equity	Total debt / total equity.	Annual Reports

Source: Author's Conceptualisation

4. Results and Discussions

Descriptive Statistics

Table 2

Descriptive Statistics

Variables	Tobin's_q	Firm_Age	Firm Size	Leverage	ISO14001
Mean	1.40358	61.41667	384.2388	2.052525	0.083333
Median	0.792948	55	259.515	1.236183	0
Maximum	8.916942	123	1540.08	47.91196	1
Minimum	-2.67905	31	6.1	-2.98225	0
Std. Dev.	1.969043	22.64497	387.9453	4.496546	0.277438
Skewness	1.529669	1.341422	1.166125	8.364379	3.015113
Kurtosis	6.113577	3.989449	3.457325	83.86029	10.09091
Jarque-Bera	104.7965	44.97164	31.06695	37500.31	476.5455
Sum	185.2725	8107	50719.52	270.9333	11
Sum Sq. Dev.	507.9042	67176.08	19715709	2648.679	10.08333
Observations	132	132	132	132	132

Sources: Stata Output, 2025

The descriptive statistics for the study provide insight into the distribution and characteristics of the variables. The analysis reveals that ISO14001 certification is not widespread

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among the sampled firms with the average value of 0.083333, which suggests that only a small proportion of the firms in the sample are certified with ISO14001.

Inferential Statistics

Table 3

Regression Result of Firm Value and ISO 14001- Model 1

Variable	Coefficient	Std, Error	t- Stat	P Value
ISO 14001	-0.700297	0.618705	-1.131876	0.2598
Leverage	0.148792	0.038174	1.278133	0.2035
Constant	1.361791	0.196040	6.946515	0.0000
R-Squared: 0.320534		Adjusted R-Squared: 0.318395		
F-stat: 1.554544,		Prob (F-stat): 0.005217		

Source: Author's Computation using E-view 9.0 (2024)

The result in table 3 shows that ISO 14001 has no significant effect on the value of firms. Leverage serves as a control variable in the model, and it follows the same pattern.

Table 4

Regression Result of ISO 14001, Firm Size, and Firm Age- Model 2

Variable	Coefficient	Std, Error	t- Stat	P Value
Firm Age	-0.441725	0.064743	-6.822787	0.0000
Firm Size	0.062677	0.015181	4.128726	0.0001
Constant	1.548481	0.256528	6.036294	0.0000
R-Squared: 0.291679		Adjusted R-Squared: 0.280697		
F-stat: 26.56044,		Prob. (F-stat): 0.000000		

Source: Author's Computation using E-view 9.0 (2024)

The result in Table 4 shows that firm age (Firm_Age) has a coefficient of -0.441725 which is negative, with a standard error of 0.064743. The t-statistic of -6.822787 and accompanying p-value of 0.0000 indicate that firm age has a negative statistically significant effect on ISO 14001. The negative coefficient implies that ISO 14001 certification is negatively impacted by firm age. On the other hand, firm size has a significant positive impact on ISO 14001 certification. By implications, bigger firms have the tendency to engage in better EMS practice than the small ones.

Hypotheses Testing

Following the result of the regression in table 3, which shows that ISO 14001 has no significant effect on firm value ($\beta = -0.7002$; $p > 0.05$), H_{01} is hereby failed to be rejected and the study concludes that truly, ISO 14001 adoption does not substantially affect the value of listed manufacturing firms in Nigeria. The result in table 4 found that both firm size and firm age have a significant effect on the level of ISO 14001 adoption. Firm size ($\beta = -0.4417$; $p < 0.05$) and firm age ($\beta = 0.0626$; $p < 0.05$). Hence, H_{02} and H_{03} are hereby accepted.

Discussion of Findings

This statistical outcome of this study implies that not many firms have actually embraced or integrated ISO 14001 into their operations. Most organizations are either not adopting the standard at all or are doing so at a minimal level. Therefore, the average level of adoption is low, indicating that the standard is not widely implemented or is only partially applied. Probably due to the low level of EMS practice among the sampled firms, the value adding effect of ISO 14001 could not be highlighted from the current study in line with previous studies such as Bhuiyan et al. (2008) that have found a significant positive relationship between the two variables. This could be due to cost savings from improved environmental management, increased operational efficiency, and attracting environmentally conscious investors and customers.

The finding of the current study also shows that older organizations do poorly in terms of EMS practice, maybe due to factors such as lower growth potential, outdated company methods, or market saturation. Given that firm age has a significant negative impact on ISO 14001, it is plausible that younger organisations are more dynamic, or that ISO-related measures are expanding more rapidly. This is in line with Sharma and Henriques (2005), in a study which claimed that younger businesses may be more innovative and willing to adopt new environmental practices.

Contrariwise, Magno et al. (2014), in a study that claimed that adoption of ISO 14001 is a natural progression for established businesses that may already have established procedures and well-defined environmental policies. In terms of company size, the study shows that larger organisations are more likely to pursue ISO 14001 certification to demonstrate their environmental commitment because they often have more resources and a better public image (Hoffman 2001).

5. Conclusion and Recommendations

Based on the findings of this study in which the implementation of ISO 14001 is heavily reliant on the size of the organization, several key recommendations have emerged. First, industry associations and regulatory agencies can play a vital role in by launching awareness campaigns and offering financial incentives to encourage smaller enterprises to embrace ISO 14001 standards.

This initiative not only has the potential to enhance their commercial value but also significantly improve their environmental performance. Additionally, larger firms can enhance their financial success and solidify their market reputation by improving on the practice. Furthermore, businesses should come to recognize the substantial positive impact that adopting ISO 14001 can have on their overall business value.

Investing in environmental management systems not only promotes sustainability but can also yield long-term financial rewards. It is also essential for governments to consider developing policies that encourage and mandate the embracing of ISO 14001 across firms of all sizes. This approach could ensure broad environmental benefits and foster a collective commitment to sustainability. Further studies may examine ISO 14001 adoption across different sector of the economy.

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