BOARD ATTRIBUTES AND SUSTAINABILITY REPORTING QUALITY: MODERATING ROLE OF AUDIT QUALITY

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ABSTRACT

This study examines the moderating effect of audit quality on the relationship between board attributes and sustainability reporting quality of listed manufacturing companies in Nigeria. Reports and accounts of Forty-Six adjusted populations out of Seventy-Six populations of the study were used to extract data for ten years (2013-2022). Data analysis was conducted using descriptive statistics, correlation analysis, and multiple regression, with Driskoll-Kraay panel-corrected standard errors employed for estimation. The findings reveal that board independence, board diversity, and firm leverage significantly influence the sustainability reporting quality of listed manufacturing firms in Nigeria. Furthermore, audit quality was found to significantly moderate the relationship between board independence and sustainability reporting quality and between board diversity and sustainability reporting quality. However, audit quality did not have a significant moderating effect on the relationship between board expertise and sustainability reporting quality. Based on these findings, the study recommends that the remuneration committees of listed manufacturing firms in Nigeria collaborate with relevant stakeholders to regularly review and enhance audit fees, ensuring robust audit quality that supports accurate and reliable sustainability reporting.

Keywords: *Board Attributes, Sustainability Reporting Quality, Audit Quality*

Introduction

Sustainability reporting has become critical to corporate governance, particularly for firms seeking to demonstrate accountability in their environmental, social, and governance (ESG) practices. It involves the disclosure of a company's performance in these areas, providing stakeholders with insights into how the firm is addressing long-term sustainability challenges. In this context of manufacturing firms in Nigeria, the significance of sustainability reporting has grown as companies face increasing pressure from both local and international stakeholders to adopt responsible practices.

In Nigeria, where manufacturing plays a pivotal role in the economy, the quality of sustainability reporting is particularly important, given the sector's environmental impact and social responsibilities. The corporate governance structures of these firms, especially the composition and effectiveness of their boards, directly influence the reliability and completeness of their sustainability disclosures. Therefore, understanding the relationship between board attributes and sustainability reporting quality is vital for improving transparency, fostering stakeholder trust, and promoting sustainable business practices in Nigerian manufacturing firms.

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Numerous studies have explored the relationship between board attributes and sustainability reporting quality, with mixed findings, some significant and others insignificant. This calls for further research to examine this relationship by introducing the moderating variable of audit quality. Investigating how audit quality moderates the connection between board attributes and sustainability reporting quality will offer valuable insights into how robust audit processes can enhance the credibility and reliability of the sustainability information reported by companies.

Various factors, including board characteristics such as board independence, board expertise, and board gender diversity influence sustainability reporting quality. However, the moderating effect of audit quality can further shape the link between these board attributes and the quality of sustainability reporting. Exploring how audit quality influences these connections can help us more thoroughly understand the relationship between board independence, board expertise, board gender diversity, and sustainability reporting quality.

Board independence refers to the presence of independent directors on a company's board who are not influenced by the management. The independence of the board is crucial in ensuring ethical decision-making, accountability, and effective oversight of sustainability reporting (Cho et al., 2019; Odriozola & Baraibar-Diez, 2017; Chiu & Wang, 2015). The relationship between board independence and sustainability reporting quality can be strengthened by audit quality. Audit quality, defined by the competence, objectivity, and independence of external auditors, is a monitoring mechanism that enhances the reliability and accuracy of financial and non-financial disclosures, including sustainability reports. A high-quality audit process adds credibility to the sustainability information disclosed by the company. Therefore, when audit quality is high, the positive relationship between board independence and sustainability reporting quality is reinforced, as the independent board members' oversight is supported by the thorough scrutiny of the audit process (Elafify, 2021; Chen et al., 2020).

Board expertise, referring to the specialized knowledge and skills possessed by board members relevant to sustainability issues, can significantly contribute to improved decision-making, strategic planning, and oversight concerning sustainability practices, positively affecting the quality of sustainability reporting (Chen et al., 2020; Constançon, 2020). The effect of board expertise on sustainability reporting quality can also be moderated by audit quality. Competent auditors who carry out high-quality audits can assess the relevance and reliability of the sustainability information reported by the company. With high audit quality, the positive relationship between board expertise and sustainability reporting quality is strengthened, as the audit process provides an additional layer of verification and scrutiny to the expertise-driven decisions made by the board (Chen et al., 2020).

Moreover, gender-diverse boards have been linked to better governance practices, broader perspectives, and a stronger focus on stakeholder interests, including sustainability issues (Tilt et al., 2021; Cho et al., 2019; Ibrahim & Hanefah, 2016; Adams et al., 2016). Board gender diversity refers to the inclusion of both male and female directors on a company's board. The moderating role of audit quality can also influence the relationship between board gender diversity and sustainability reporting quality. High audit quality is crucial for ensuring the accuracy and reliability of sustainability reporting, regardless of the board's gender composition. When audit quality is high, the positive relationship between board gender diversity and sustainability reporting quality is further enhanced, as the audit process provides objective assurance about the completeness and credibility of the reported sustainability information, reinforcing the positive impact of gender-diverse boards on sustainability reporting quality (Chen et al., 2020)

Therefore, the study examined the moderating effect of board independence, board expertise, and board diversity on sustainability disclosure of listed manufacturing companies in Nigeria. The research questions were raised based on the study's specific objectives, and the research hypotheses were also formulated.

This study is categorized into the introduction, literature review, research methodology, result and discussion, and conclusion and recommendations.

Concept of the Study

Board independence refers to non-executive directors who are free from material relationships with the company, ensuring objective decision-making. Independent directors enhance corporate governance by overseeing management, reducing agency costs, and aligning decisions with shareholders' interests (Fama & Jensen, 1983; Adams & Ferreira, 2007). Independent boards also improve sustainability reporting, as they are more likely to advocate for transparency and corporate responsibility (Gul & Leung, 2019; Velte, 2020).

Board expertise refers to the knowledge and skills directors bring, such as financial, legal, and sustainability expertise, which enable effective decision-making and risk management. Directors with expertise provide valuable insights, particularly in financial oversight and aligning the company with market trends (Klein, 2002). Expertise in sustainability or CSR is increasingly important to align with global standards (Ntim et al., 2017).

Board diversity refers to the inclusion of varied perspectives based on gender, age, ethnicity, and professional background, which enhances decision-making and governance (Ali et al., 2014; Carter et al., 2010). A diverse board reduces groupthink and ensures consideration of diverse stakeholder interests, making the company more adaptable to changing market and regulatory conditions (Adams & Ferreira, 2009; Post & Byron, 2015).

Audit quality refers to audits performed in accordance with established standards, ensuring accurate and reliable financial reporting. Key factors include auditor independence, competence, and adherence to standards (Francis, 2011; Knechel et al., 2013). Independent auditors provide unbiased assessments, ensuring transparency and trust in financial statements (DeAngelo, 1981).

Financial leverage involves using debt to finance operations, increasing potential returns but also financial risk. High leverage can restrict a company's ability to invest in long-term sustainability, while lower leverage allows more flexibility to prioritize sustainability projects (Myers, 2001). Managing leverage is essential to balancing financial growth and sustainable development.

Empirical Review

Here, the study empirically reviewed the relevant studies.

Board Independence and Sustainability disclosure

Board independence, for the purpose of this study, is defined as the proportion of non-executive directors, also referred to as outside directors, on a company's board. The number of independent non-executive directors is believed to significantly influence corporate disclosure practices, including sustainability and environmental reporting (Ho & Wong, 2001). Despite numerous studies on sustainability disclosure, empirical research on the relationship between board independence and sustainability reporting remains limited, and findings in existing studies have been inconsistent, with some reporting positive and significant effects, others showing no significant effect, and some indicating negative relationships.

Previous studies provide varied perspectives on this issue. For example, Githaiga and Kosgei (2023) explored how board characteristics impact sustainability reporting in East African listed companies using data from 2011 to 2020. However, their focus was primarily on the extent of disclosure, not the quality of

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the reported information. Khan and Tasnim (2022) studied the impact of corporate governance on sustainability reporting among 27 listed companies on the Dhaka Stock Exchange from 2018 to 2019, finding that board independence had no significant influence on sustainability reporting. Elafify (2021) examined the relationship between corporate board structures and sustainability reporting for firms on the Egyptian Sustainability Index, but limited the study to only one variable, thereby reducing the comprehensiveness of the findings. Similarly, Mashudi et al. (2021) found that independent directors potentially enhance ESG disclosures in ASEAN countries but did not specify the statistical method used for their analysis.

In Malaysia, Azman and Rashid (2020) analyzed the effect of board membership characteristics on the quality of sustainability reporting using data from 2016 to 2018. Nguyen and Nguyen (2020) examined a sample of 120 manufacturing companies in Vietnam for the year 2019 and found insights into the factors affecting sustainability disclosure, though the scope of their analysis was limited to a single year. Abdelrahman (2019) studied the Global Fortune 100 companies over the period from 2011 to 2015 and found mixed results, with a significant positive relationship between the board chair's independence and sustainability reporting quality, but no significant link for other board members. However, this study relied on environmental and social indices while neglecting the economic dimension, which is critical in sustainability reporting.

Alotaibi (2020) focused on Saudi listed firms' board independence, using content analysis of annual reports from 2015 to 2017. The study found no significant link between board independence and sustainability reporting, possibly due to the voluntary nature of sustainability disclosures. Despite its limitations, this research highlights the ambiguous relationship between board independence and sustainability reporting.

Based on these findings, the study concludes that the relationship between board independence and sustainability disclosure is inconclusive. This suggests the need for further exploration of potential moderating factors, such as audit quality, to better understand how board independence influences sustainability reporting. In this study, board independence is measured by the ratio of non-executive directors to the total number of board members.

Board Expertise and Sustainability Disclosure

Despite the abundance of studies on board expertise and sustainability reporting, research in this area remains limited. Moreover, the findings have been inconsistent, with some studies showing a significant positive relationship, while others report insignificant or even negative effects. The following are examples of previous research on this topic:

Githaiga and Kosgei (2023) explored how board characteristics influence sustainability reporting in East African listed companies, using data from 2011 to 2020 and a sample of 79 companies from East African stock markets. However, their focus was on sustainability disclosure rather than the quality of the disclosures. Similarly, Al-Shaer and Zaman (2020) examined the relationship between audit committees and sustainability reporting assurance, employing resource dependency theory. Their findings suggest that audit committees, with their environmental expertise and oversight, add credibility and enhance the quality of sustainability reporting.

Yunusa (2017) investigated the relationship between corporate governance mechanisms and the quality of corporate social and environmental disclosures among listed firms in Nigeria. The study used the Global Reporting Initiative to assess disclosure quality and applied FGLS for analysis. However, the use of FGLS as an analytical tool may not be the most suitable for this type of study. Additionally, Tong (2017) studied the impact of company-specific variables on the extent of corporate social responsibility (CSR) information disclosed by publicly traded firms in the United Kingdom and Malaysia.

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Board Diversity and Sustainability Disclosure

Although there have been studies on board gender diversity in relation to sustainability disclosure, there remains a gap in the literature. Furthermore, the findings from existing research have been inconsistent, with some showing a significant positive effect, while others report insignificant or even negative results. Below are some key studies on this topic:

Buallay et al. (2022) explored the relationship between board gender diversity and sustainability reporting by analyzing data from 2,116 banks listed on the stock exchange over a ten-year period (2007–2016). Their study found a positive and significant impact on ESG disclosure when female board members made up 22–50% of the board, supporting gender diversity as a key factor in corporate governance disclosure. However, the study focused exclusively on banks, a sector that is sensitive to sustainability disclosure, limiting the generalizability of the findings.

Githaiga and Kosgei (2023) investigated how board characteristics influence sustainability reporting in East African listed companies, using data from 2011 to 2020 from 79 companies. This study focused on the extent of sustainability disclosure, rather than the quality of disclosure.

Hassan et al. (2021) employed a logistic regression model to analyze data from 138 companies listed on the Pakistan Stock Exchange between 2009 and 2018. Similarly, Mashudi et al. (2021) examined the link between corporate governance traits and ESG disclosure across ASEAN nations, using data from 2011 to 2014 and STATA 14 software for econometric modeling. Noureldin and Basuony (2021) studied the impact of female representation on management boards on sustainability performance in Egypt, using cross-sectional data from non-financial companies on the Egyptian Stock Exchange (2012–2019). While insightful, the study would have benefited from panel data, as this would have offered a longer time frame for analysis.

Azman and Rashid (2020) analyzed the influence of board membership and characteristics on sustainability reporting in Malaysia, using secondary data from 2016 to 2018. Velte (2019) conducted a meta-analysis of 51 empirical studies on board characteristics, including gender diversity, finding a strong association between board gender diversity and CSR reporting, particularly in countries with high shareholder protection and regulatory enforcement.

Ifeyinwa (2021) explored the effects of board demographics on sustainability reporting among non-financial firms in Nigeria between 2011 and 2020. The study used an ex-post facto design and cross-sectional data from 75 companies. The findings indicated that gender diversity negatively and significantly affected sustainability reporting. However, focusing solely on sustainability reporting rather than broader governance variables may have limited the study's scope.

The significance of female representation on boards is often explained through agency theory and legitimacy theory. Based on the above empirical evidence, this study concludes that the relationship between board diversity and sustainability disclosure remains unclear, suggesting the need for further exploration of moderating factors, such as audit quality

Methodology

This study employs a correlational research design and focuses on the population of seventy-six (76) manufacturing companies listed on the Nigerian Exchange Group (NGX), previously known as the Nigerian Stock Exchange (NSE), as of December 31st, 2023. These companies are categorized into six sectors:

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Table 1: Population of the Study

S/N	List of Companies	List of Population
1.	Consumer Goods Firms	26
2.	Industrials Goods Firms	22
3.	Healthcare Firms	6
4.	Natural Resources	9
5.	Oil and Gas Firms	12
6.	Utility	1
Total		**76**

Source: *NSE fact book, 2024. Nigerian Exchange (NGX) (african-markets.com)*

Additionally, the study employs census filtering criteria to derive an adjusted sample of forty-six (46) manufacturing companies. To be included in the sample, a company must meet specific requirements. These criteria include: the company must have been listed on the NGX between 2014 and 2023, as the study covers this period; the company must have remained consistently listed on the NGX throughout the study period; and the company must have published and made accessible its full annual reports throughout the study period

Table 2: *Adjusted Population of the Study*

S/N	List of Companies	List of Population	List of Sampled
1.	Consumer Goods Firms	26	18
2.	Industrials Goods Firms	22	10
3.	Healthcare Firms	6	5
4.	Natural Resources	9	3
5.	Oil and Gas Firms	12	10
1.	Utility	1	-
Total		**76**	**46**

Source: *Generated from table 1 population of the study*

Given is the operational definition of the variables.

Table 3: *Variables Definition and Measurement*

Variables	Operational Definition	Measurement	Sources
Dependent			
Sustainability disclosure	Economic, Environmental Social indices	GRI Standards (Environment, Social and Economics indices)	Permatasari et al. (2020); Romero et al. (2019)
Independent			
Board Independence	Board independence is known as non-executive directors which refers to outside directors.	Is measured as the non-executive board of directors divided by total board size (%).	Benameur et al. 2022).
Board Expertise	Board expertise refers to the board member with professional knowledge, skills, and experience of reporting know-how, legal matters or industry knowledge.	The ratio of board member with the profession in accounting/finance and other related field.	Dobija and Puławska (2022); Maroun and Prinsloo (2020)
Board Diversity	Board diversity, the number of women on the corporate board.	Is measured as the number of female	Ong and Djajadikerta

		directors divided by total board size (%)	(2020); Furlotti et al. (2019); Cucari et al. (2018)
Audit Quality	Audit quality is the assurance of the quality of reporting information by the company measured by audit fees.	Audit fees measured as log of total audit fee.	Koh et al. (2022); Haider and Nishitani (2020)
Control			
Financial Leverage	The financial leverage ratio is an indicator of how much debt a company is using to finance its assets.	Is measured as total liabilities divided by total asset	Bhatia and Tuli (2017)

Source: *Compiled by the Researcher, 2024*

Given is the model to estimate the relationship between board attributes and Sustainability disclosure.

$$SD_{it} = \beta_0 + \beta_1 BI_{it} + \beta_2 BE_{it} + \beta_3 BD_{it} + \beta_7 FL_{it} + \varepsilon_{it}$$

Where: SD = Sustainability disclosure; BI = Board Independence; BE = Board Expertise; BD = Board Diversity; FL = Firm Leverage; β_0 = Intercept; β_1 - β_3 = Coefficient of the independent variables; β_{11} = Coefficient of the control variable; i, t = Panel data attribute combination of cross sessional and time series data; and ε = Error term.

Result and Discussions

This section of the study covers the result analysis and interpretation.

Table 4: Descriptive Statistics

Variables	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Obs.**
SD	0.4562	0.1829	0.20	0.9000	460
BI	0.3094	0.1314	0.08	0.7084	460
BE	0.4300	0.1672	0.08	0.8500	460
BD	0.2622	0.1409	0	0.8332	460
AQ	4.1721	0.5282	3	5.8130	460
FL	0.3416	0.0940	0.1043	0.7124	460

Source: *STATA Output Result, (2024).*

According to the descriptive statistics presented in Table 4, the mean and standard deviation of sustainability disclosure (SD) are approximately 0.4562 and 0.1829, respectively. The table also reports the minimum and maximum values of sustainability disclosure as 0.20 and 0.90, respectively. The average value of sustainability disclosure suggests that most listed manufacturing companies in Nigeria fall into the "Average Reporting Quality" category during the study period.

Regarding board independence, Table 4 shows a mean value of 0.3094 with a standard deviation of 0.1314. The minimum and maximum values for board independence are 0.08 and 0.7084, respectively. This indicates that the proportion of external directors in most listed manufacturing companies is adequate to support their corporate strategies related to sustainability disclosure.

For board expertise, Table 4 reveals a mean value of 0.4300 with a standard deviation of 0.1672, with minimum and maximum values of 0.08 and 0.85, respectively. This suggests that most listed manufacturing companies have a sufficient proportion of directors with financial expertise to support their business strategies, particularly in relation to sustainability disclosure.

In terms of board diversity, Table 4 shows a mean value of 0.2622 with a standard deviation of 0.1409, indicating varying levels of attention to gender diversity among the companies. While some companies are less focused on gender diversity, others place greater emphasis on female representation on their boards.

Finally, for firm leverage, the table reports a mean value of 0.3416 with a standard deviation of 0.0940, with minimum and maximum values of 0.1043 and 0.7124, respectively.

Table 5: *Correlation Matrix*

Varr.	SD	BI	BE	BD	FL	VIF	1/VIF
SD	1.0000						
I	-0.0894 ***0.0554***	1.0000				1.33	0.750757
BE	-0.0835 ***0.0737***	0.3885* ***0.0000***	1.0000			1.22	0.822401
BD	0.0291 ***0.5336***	-0.1619* ***0.0005***	0.0334 ***0.4754***	1.0000		1.30	0.770687
AQ	0.037 0.435	0.124* 0.008	-0.035 0.450	-0.120* 0.010	0.103* 0.028		
FL	-0.1906* ***0.0000***	1690* ***0.0003***	0.1147* ***0.0138***	-0.2356* ***0.0000***	1.0000	1.16	0.861955

Source: *STATA Output Result, (2024).*

The correlation matrix table presents the relationships between the explanatory variables and the outcome variable, as well as the correlations among the explanatory variables, both individually and collectively. The results indicate the following beta coefficient values: -0.0894 for board independence, -0.0835 for board expertise, 0.0291 for board gender diversity, and -0.1906 for firm leverage. To assess the strength of the correlations, the analysis employs three benchmarks: Beneish (1997), Gujarati (2009), and Hair (2014).

According to the Beneish criteria, three correlation ranges are used: low correlation (0.00 to 0.29), intermediate correlation (0.30 to 0.49), and strong correlation (0.50 to 0.99). The results suggest that there is no strong correlation among the variables, indicating an absence of redundancy within the study's variables.

A robustness test was conducted to examine potential multicollinearity issues in the study. The test utilized Variance Inflation Factor (VIF) and tolerance values as key measures of collinearity. The findings show that the VIF values for all variables are greater than 1 but less than 10, with the average VIF being 1.20. Tolerance values are also all greater than 0 but less than 1. These results confirm the absence of multicollinearity among the explanatory variables, suggesting that multicollinearity does not pose a significant threat to the study's analysis.

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Table 6: *Panel Corrected Standard Error (PCSE)*

Parameters	Coefficients	T-Values	P-Values
Constant	0.453	11.77	0.000
AQ*BI	-0.219	-1.77	0.077
AQ*BE	0.010	0.12	0.906
AQ*BD	0.326	2.80	0.005
FL	-0.101	-2.20	0.028
Adjusted R^2			19.77
Wald Chi^2 (8)			123.78
Prob>Chi^2			0.000

Source: *STATA Output Result, (2024)*

The regression results presented in Table 6 show an adjusted R^2 value of 0.1977, indicating that the explanatory power of the model is approximately 19.77%. This means that board attributes, including board independence, board expertise, board diversity, firm leverage, and audit quality account for about 20% of the variations in sustainability disclosure among listed manufacturing companies in Nigeria during the study period. Conversely, approximately 80% of the changes in sustainability disclosure are attributed to other factors not captured by the model. Additionally, the Wald Chi^2 value of 123.78 suggests that the explanatory variables have been appropriately selected, combined, and utilized in the model. This is further validated by the prob>Chi^2 value of 0.0000, confirming that the model is statistically significant at the 1% level.

Regarding board independence moderated by audit quality shows the coefficient of -0.219 with a t-value of -1.77 and a p-value of 0.0.077 indicating a negative and statistically significant relationship with sustainability disclosure. This suggests that board independence moderated by audit quality has a negative significantly effect on the sustainability reporting quality of listed manufacturing companies in Nigeria. This suggests that paying a reasonable audit fee to auditors, along with increasing the number of independent directors on the board, can serve as an effective strategy for listed manufacturing firms to improve their sustainability reporting quality.

Similarly, the regression results show that board expertise moderated by audit quality has a coefficient of -0.0455, with t and p values of -0.94 and 0.349, respectively. The indication is that board expertise moderated by audit quality has a negative and insignificant effect on sustainability reporting quality. This suggests that paying a low audit fee to auditors, along with having directors with limited or no financial expertise, can detrimentally affect the sustainability reporting quality of listed manufacturing firms in Nigeria.

Moreover, table 6 shows a of board diversity moderated by audit quality with a coefficient of 0.326, t-value of 2.80, and p-value of 0.005. It signifies the board diversity moderated has a significant positive effect on sustainability disclosure. This implies that providing a reasonable audit fee to auditors, combined with a balanced presence of female directors on the board, can enhance the sustainability reporting quality of listed manufacturing firms in Nigeria.

Conclusions and Recommendations

The board independence moderated by audit quality, has a negative and significant effect on sustainability reporting quality in listed manufacturing firms in Nigeria. This suggests that paying reasonable audit fees and increasing board independence can enhance sustainability reporting quality. Thus, audit quality significantly moderates the relationship between board independence and sustainability reporting quality. The study recommends that remuneration committee of listed manufacturing firms in Nigeria should collaborate with relevant stakeholders to regularly review and improve audit fees, in consultation with independent directors, to enhance audit quality in line with both local and global sustainability reporting standards.

Conversely, board expertise, moderated by audit quality, has a negative and insignificant effect on sustainability reporting quality. This implies that low audit fees and limited financial expertise on the board negatively impact sustainability reporting. Hence, audit quality does not significantly moderate the relationship between board expertise and sustainability reporting quality. The remuneration committee should prioritize increasing audit fees, while the nomination committee should focus on bringing more directors with financial expertise onto the board. This combination could significantly improve the sustainability reporting quality of the firms.

Finally, board diversity, moderated by audit quality, has a positive and significant effect on sustainability reporting quality. This indicates that reasonable audit fees, combined with a more diverse board, particularly with female directors, improve sustainability reporting. Therefore, audit quality significantly moderates the relationship between board diversity and sustainability reporting quality. The remuneration committee should continue focusing on improving audit fees, while the nomination committee should pay greater attention to board diversity to enhance the sustainability reporting quality of listed manufacturing firms.

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