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The Impact of Corporate Sustainability Performance on Audit Opinion, Considering the Role of Audit Committee Independence in Companies Listed on the Tehran Stock Exchange

Mohsen Dastgir[1,*], Nayyere Sadat Tabayi Aghdayi[1]

[1] Department of Accounting, Hasht Behesht Institute of Higher Education of Isfahan, Isfahan, Iran; dastmw@yahoo.com.

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Abstract

The audit opinion, as the most important output of the audit process, reflects the independent auditor's professional judgment regarding the fairness of the financial statements and plays a decisive role in stakeholders' decision-making. In this regard, corporate sustainability performance, which reflects a firm's attention to Environmental, Social, and Governance (ESG) dimensions, can be considered as an indicator of financial reporting quality and risk management. On the other hand, Audit Committee Independence (AUDC_IND), as one of the key pillars of corporate governance, facilitates effective oversight of financial reporting and audit processes. This study seeks to examine the potential role of corporate sustainability performance and AUDC_IND in shaping audit opinion. Accordingly, the aim of this research is to determine the effect of corporate sustainability performance on audit opinion, considering the moderating role of AUDC_IND in companies listed on the Tehran Stock Exchange. To achieve this objective, two hypotheses were developed. For hypothesis testing, a systematic elimination (systematic sampling) method was used to select a sample of 150 companies from among firms listed on the TSE over the period 2019 to 2024 (1398–1403 in the Iranian calendar). This study is applied in nature, and the research models were estimated using multiple regression analysis. The results indicate that corporate sustainability performance has a negative and significant effect on modified audit opinions. Furthermore, AUDC_IND strengthens the relationship between corporate sustainability performance and modified audit opinions.

Keywords: Audit opinion, Corporate sustainability performance, Audit committee independence.

1 | Introduction

Stakeholders of financial information require access to financial data in order to make informed economic decisions. A prerequisite for such access is assurance regarding the accuracy, transparency, and reliability of this information. Consequently, stakeholders rely on available and commonly used mechanisms within

Corresponding Author: ansariaram87@gmail.com

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financial information control systems, such as external auditing, to obtain this assurance [1]. Auditing is a systematic process aimed at enhancing the reliability of financial information and reducing uncertainty for investors and other stakeholders [2]. Independent auditors, using professional standards and audit evidence, express their opinion in the form of an audit opinion. Audit opinions are generally classified into four types: Unqualified (clean), qualified, adverse, and disclaimer of opinion [3]. Among these, a qualified audit opinion is issued when there is a material misstatement in the financial statements or a limitation in the scope of the auditor's work; however, these issues are not sufficiently severe to warrant an adverse opinion. Accordingly, a qualified opinion not only signals deficiencies or ambiguities in financial reporting but may also indicate the need for improvements in internal control systems and financial reporting quality [4]. In recent years, auditing literature has shown that audit risk assessment is no longer confined to traditional financial indicators, and auditors increasingly incorporate non-financial information into their professional judgment. In particular, the quality of corporate Environmental, Social, and Governance (ESG) reporting is regarded as an indicator of the overall quality of internal control systems and corporate governance, and it may influence auditors' perceptions of material misstatement risk [5], [6].

Corporate sustainability performance, measured through ESG indicators, reflects an organization's commitment to the responsible management of resources and engagement with stakeholders, and entails not only economic implications but also governance-related consequences [5]. Within this framework, the environmental dimension encompasses practices such as emission reduction, energy conservation, and industrial waste management, which demonstrate the integration of environmental risks into the firm's strategic processes [7]. The social dimension refers to the organization's conduct toward employees, stakeholders' rights, and participation in community development, thereby indicating the level of corporate accountability and responsibility [8]. The governance dimension includes transparency in the management structure, accountability mechanisms, and effective control systems, reflecting the quality of the firm's supervisory framework [5]. Strong corporate sustainability performance is generally associated with improved financial reporting quality, as heightened requirements for transparency and accountability to stakeholders increase the level of information disclosure and assist auditors in obtaining reliable audit evidence; consequently, the likelihood of issuing a qualified audit opinion is reduced [4].

Furthermore, improvements in sustainability performance, particularly within corporate governance, through the strengthening of internal controls, the reduction of earnings management, and the enhancement of accounting system quality, mitigate audit risk and limit the propensity for modified audit opinions [7]. On the other hand, the social and environmental dimensions of sustainability performance, by fostering a positive reputation and increasing accountability pressures, reduce managerial incentives to provide incomplete or misleading reporting and indirectly enhance auditor confidence [3]. Therefore, sustainability performance can be regarded as an influential factor in reducing audit risk and increasing the likelihood of receiving an unqualified audit opinion.

Given that auditors' judgments and opinions depend on the quality of oversight systems and controls governing the financial reporting process, the accounting literature emphasizes that the audit committee, as one of the key pillars of corporate governance, can influence risk assessment through effective oversight of financial reporting processes and interaction with the external auditor [5], [9]. The audit committee is a supervisory body within the corporate governance structure that oversees the financial reporting process, internal controls, and liaises with the external auditor. Audit Committee Independence (AUDC_IND) refers to the separation of its members from executive management and the alignment of their interests with those of shareholders; this independence enhances oversight, reduces managerial bias, and improves the quality of evidence and disclosures in financial reporting. Empirical evidence indicates that a higher proportion of independent members on the audit committee is associated with a lower likelihood of significant internal control deficiencies and higher financial reporting quality [10].

Moreover, AUDC_IND and an appropriate committee composition are linked to fewer errors and post–financial statement adjustments, which signals improved reporting quality and more effective monitoring [9]. Research evidence further suggests that stronger corporate sustainability performance across ESG

dimensions reduces auditors' perceived risk by enhancing transparency and financial reporting quality, thereby decreasing the likelihood of issuing a qualified audit opinion [3], [4], [11]. In this context, an independent audit committee strengthens oversight of disclosures, improves the reliability of documentation, and integrates sustainability information into financial reporting, thereby limiting informational ambiguities that affect auditors' judgments [10]. In addition, AUDC_IND, by strengthening internal controls and curbing managerial opportunistic behavior, reduces the occurrence of material misstatements and audit scope limitations, thereby lowering the probability of a modified audit opinion [9]. Overall, AUDC_IND enhances the credibility of signals arising from strong sustainability performance for auditors, thereby reinforcing the negative association between sustainability performance and the likelihood of receiving a qualified audit opinion [4], [5], [12].

The aim of this study is to extend the literature on sustainability performance and financial reporting quality by examining the effect of corporate sustainability performance on the likelihood of auditors issuing a modified (qualified) audit opinion, as well as the extent to which AUDC_IND conditions this relationship. Most prior studies in this area have focused on developed markets, where measurement of sustainability performance is relatively less constrained compared to emerging economies. Over recent years, Iranian firms have begun to comply with sustainability-related regulations (environmental protection, social responsibility, and governance practices) and have gradually shifted their strategies toward more sustainable activities. However, the impact of sustainability performance on audit opinions remains underexplored in this context. This study contributes by operationalizing a more comprehensive dataset of sustainability-related information, including Corporate Social Responsibility (CSR), environmental, and governance performance, thereby providing more robust empirical evidence on the issue.

In addition, the study investigates how AUDC_IND affects the relationship between sustainability performance and audit opinion, given that independent auditors are directly involved in assuring both financial and non-financial information and, consequently, play a central role in managing corporate reporting quality and information risk. Although prior research has examined certain audit committee characteristics, such as committee size, expertise, and meeting frequency, as determinants of CSR, environmental and governance performance, as well as audit effort, this is among the first studies in the literature to provide evidence on the moderating role of AUDC_IND in the relationship between sustainability performance and the issuance of modified audit opinions. In doing so, it extends the evidence on the role of external auditors in Iranian firms. Examining the impact of corporate sustainability performance on audit opinions, while Accounting for AUDC_IND, can enhance understanding of the interaction between corporate governance, ESG responsibility, and financial reporting quality. This issue is not only of academic significance but also provides valuable guidance for policymakers, regulatory authorities, and investors in improving transparency and strengthening trust in financial markets. The remainder of the paper is organized as follows: first, the theoretical foundations and prior literature are presented, followed by the development of hypotheses, the methodology for testing them, and a description of the population and sample. Finally, the study's empirical findings and conclusions are presented [13].

2 | Literature Reviewe

In the current business environment, due to the increasing number of institutional and professional investors, firms' non-financial performance has attracted growing attention. Professional investors increasingly argue that profitability alone is not sufficient to ensure a firm's long-term growth [14]. Corporate sustainability has emerged over the past three decades and has evolved into a key corporate strategy that encompasses multiple dimensions of firm activities, including environmental and social responsibilities. A corporate activity is considered sustainable when it is socially and environmentally justifiable, conducted ethically, and capable of generating economic value while complying with existing laws and regulations [15], [16]. Under this broad definition, sustainability performance refers to the assessment of firms' ability to achieve specific objectives and performance indicators across various dimensions and sub-dimensions of social and environmental activities. Over time, sustainability-related activities and performance have grown exponentially, as corporate

executives, international organizations, and other stakeholders have become key actors in shaping sustainability practices and frameworks [5].

Within this framework, there has been a long-standing debate in the accounting literature regarding corporate sustainability performance and financial reporting quality. A strand of this literature suggests that sustainability is positively associated with accounting quality, as firms' sustainability engagement reduces agency problems by minimizing managers' incentives to exercise accounting discretion over financial reports for the purpose of pursuing personal benefits [17]. Existing studies in this area argue that firms investing resources in sustainability-related activities tend to be more ethical, honest, and reliable in their day-to-day operations [18]. A modified audit opinion is also regarded as an indicator of financial reporting quality, as a qualified audit report signals irregularities in a firm's financial statements arising from misreporting of financial figures, violations of accounting standards, and other forms of corporate misstatements that auditors are required to communicate to shareholders and other users of financial statements [17]. A qualified opinion refers to the auditor's expression of specific concerns, typically related to the application of accounting standards or accounting methods, which may have a significant impact on the reliability and transparency of financial reports [5].

Firms with superior sustainability performance ESG are less likely to receive modified audit opinions. This argument is grounded in the notion that when auditors face difficulties in assessing the transparency or reliability of financial reports, they rely on additional signals that reflect the integrity of managerial activities. Sustainability performance provides such signals of managerial integrity, which may reduce the threshold for issuing modified audit opinions. In contrast, firms exhibiting environmentally irresponsible behaviors are often associated with weakened managerial ethics, a condition that heightens auditors' concerns. In other words, sustainability-related information serves as a critical non-financial input in assurance activities [19], [20]. Sustainability performance represents a source of value-relevant information that, in turn, reduces information asymmetry between reporting firms and external auditors. This reduction in information asymmetry may enable auditors to conduct more comprehensive and accurate audit procedures and to form a more informed assessment of client risk, thereby influencing or even improving their professional judgment. Accordingly, auditors are less likely to issue a qualified audit opinion when auditing firms have stronger sustainability performance [5]. Therefore, it is expected that corporate sustainability performance reduces the likelihood of receiving a modified audit opinion.

One of the ways shareholders place trust in financial statements is through the auditor's opinion. If, however, the auditor issues a report aligned with managerial preferences, it may have adverse consequences for the firm, ultimately resulting in shareholder losses. In this regard, the audit committee, as one of the key corporate governance mechanisms, may help prevent the issuance of modified audit opinions [21]. Audit committees are among the most important mechanisms of effective corporate governance, as they enhance board oversight, reduce information asymmetry among corporate actors, improve accounting quality, and facilitate the work of external auditors [22], [23].

One of the distinctive characteristics of audit committees that has attracted considerable attention from researchers and regulatory bodies is AUDC_IND. This attribute refers to the composition and functioning of the audit committee, particularly the presence of a significant proportion of non-executive (independent) members [24]. When audit committees operate with independent members, they are more likely to exercise stronger oversight over management, thereby ensuring the provision of more transparent and reliable information to the public and more effectively evaluating internal control practices and policies [25]. Since the audit committee is responsible for expressing its view on the reliability of financial and non-financial information (as well as compliance with accounting standards), independence is a critical qualitative attribute for fulfilling this role. The American Institute of Certified Public Accountants [25] emphasized the importance of AUDC_IND in ensuring effective oversight of financial reporting, noting that when committee members are independent, it becomes more difficult for management to reject adjustments or corrections to financial statements proposed by external auditors. It implies that published financial statements are less likely to contain material misstatements, thereby reducing the probability of receiving a modified audit opinion [5].

Accordingly, it is expected that firms with higher AUDC_IND, in conjunction with their sustainability performance, are less likely to receive a modified audit opinion.

Therefore, in light of the above considerations, the objective of the present study is to address the following research questions: what is the effect of corporate sustainability performance on audit opinion in companies listed on the TSE? Furthermore, what is the effect of AUDC_IND on the relationship between corporate sustainability performance and audit opinion in these listed firms? Based on the above discussion, the following hypotheses are developed:

I. Corporate sustainability performance has a significant negative effect on the likelihood of receiving a modified audit opinion.

II. AUDC_IND strengthens the effect of corporate sustainability performance on the likelihood of receiving a modified audit opinion.

3 | Prior Research

Dimitropoulos [5], in a study titled "EU corporate sustainability performance and qualified audit opinion: the role of audit committee independence", examined the period from 2003 to 2019 using data from 144,317 firm-year observations of listed companies across 24 European Union countries. Employing logistic regression analysis, the results indicated that firms with higher sustainability performance are less likely to receive a modified audit opinion. Furthermore, this negative association is moderated by audit committee independence.

Karim et al. [26], in a study titled "Audit Committee Characteristics and Sustainable Firms' Performance: Evidence from the financial sector in Bangladesh", examined the period from 2011 to 2023 using data from 266 publicly listed banks in Bangladesh. The study employed the Generalized Method of Moments (GMM) regression technique. The findings indicated that larger audit committees contribute to more effective strategic oversight and improved corporate sustainability performance. Moreover, independent audit committee members enhance transparency, accountability, and alignment with sustainability objectives. However, the results also showed that frequent audit committee meetings are negatively associated with performance, suggesting that excessively frequent meetings may lead to inefficiencies rather than strengthening sustainability oversight [27].

Alhumoudi [28], in a study titled "The Impact of Audit Committee Characteristics on Financial Reporting Quality Evidence from Saudi Arabia", analyzed data from 292 non-financial firms listed in Saudi Arabia over the period 2019 to 2022 using panel data regression techniques. The results revealed that among audit committee characteristics (including independence, financial expertise, meeting frequency, and committee size), only financial expertise has a significant effect on financial reporting quality, measured through modified audit opinions. In contrast, audit committee independence, meeting frequency, and committee size were found to have no significant effect on modified audit opinions.

Florua and Borca [29], in a study titled "Impact of audit committee independence and expertise at company level in streamlining ESG reporting: quantitative research", examined the period from 2019 to 2022 using data from 224 publicly listed firms operating in the global automobile and truck manufacturing sector. Employing linear regression analysis, the findings revealed that audit committee independence has a positive and significant effect on sustainability performance reporting. In addition, audit committee expertise was also found to have a positive and significant impact on sustainability reporting practices.

Diab and Issa [3], in a study titled "ESG performance, auditor choice, and audit opinion: evidence from an emerging market", analyzed data from 68 firms listed on the Egyptian Stock Exchange over the period 2014 to 2022 using multivariate regression and logistic regression techniques. The results indicated that firms with higher sustainability performance are more likely to select one of the Big Four audit firms and are less likely to receive a modified audit opinion.

Wang et al. [4], in a study titled "How does a company's ESG performance affect the issuance of an audit opinion? The moderating role of auditor experience", examined 28,645 firm-year observations of companies listed on the Chinese Stock Exchange over the period 2009 to 2020 using logistic regression analysis. The findings showed that better sustainability performance is associated with a lower likelihood of receiving a modified audit opinion. Moreover, auditor experience plays a moderating role, indicating that less experienced auditors rely more heavily on sustainability-related information when forming audit opinions [30].

Zheng et al. [31], in a study titled "Research on the impact of enterprise ESG performance on audit opinions", analyzed 27,238 firm-year observations of listed companies in China over the period 2009 to 2021 using logistic regression. The results indicated that higher sustainability performance ratings are associated with lower firm risk and a higher likelihood of receiving an unqualified audit opinion. In other words, sustainability ratings influence audit opinions indirectly through their effect on reducing firm risk.

Zaid Alkilani et al. [32], in a study titled "The Influence of Audit Committee Characteristics on modified audit opinion in Jordan", examined the period from 2012 to 2017 using data from 117 companies listed on the Muscat Stock Exchange in Oman. Employing logistic regression analysis, the findings indicated that audit committee expertise reduces the likelihood of firms receiving a modified audit opinion. However, audit committee independence, size, and meeting frequency were found to have no significant effect on modified audit opinions.

Mahdavi and Hasili [33], in a study titled "The moderating effect of audit committee member characteristics on the relationship between fraudulent financial reporting and sustainability reporting", examined the period from 2013 to 2023 using data from 1,243 firm-year observations of companies listed on the TSE. Employing panel data regression analysis, the findings indicated that a higher proportion of female members in the audit committee, a larger audit committee size, and greater audit committee independence enhance sustainability reporting, thereby reducing fraudulent financial reporting and ultimately improving financial reporting quality.

Khosravabadi [34], in a study titled "The role of CSR and fraud probability in audit opinion type and the number of audit report paragraphs", analyzed data from 130 firms over the period 2013 to 2022 using fixed-effects panel regression models. The results showed that CSR leads to more favorable audit opinions (unqualified opinions) by strengthening the firm's monitoring environment. In addition, fraud risk was found to have a positive and significant effect on modified audit opinions. Furthermore, fraud risk also increases the number of explanatory paragraphs included in audit reports.

Zamani et al. [35], in a study titled "The role of audit committee attributes in corporate sustainability reporting", examined 228 firms over the period 2016 to 2021 using multiple regression analysis. The results indicated that audit committee independence, size, and expertise all have a positive and significant effect on corporate sustainability reporting.

Qarehdaghi et al. [36], in a study titled "Investigating the effect of environmental information disclosure level on audit fees in companies listed on the Tehran stock exchange", examined the period from 2016 to 2020 using data from 170 firms. Employing generalized least squares (GLS) regression, the results indicated that higher levels of environmental disclosure are associated with a lower likelihood of receiving a modified audit opinion (i.e., unqualified opinions). Conversely, lower levels of environmental disclosure are associated with a higher likelihood of modified (non-standard) audit opinions.

Valizadeh Larijani and Shokati Zaloobadi [37], in a study titled The Role of the Audit Committee in Corporate Sustainability Reporting, analyzed data from firms listed on the TSE over the period 2014 to 2019 using panel data regression techniques. The findings showed that audit committee expertise, audit committee size, and audit committee independence are all positively and significantly associated with the level of sustainability reporting disclosure.

4 | Methodology

The present study is applied in nature, as it investigates a specific and practical relationship in the field of auditing and corporate reporting using real data from listed companies and measurable variables. The findings are directly applicable to explaining auditors' behavior and corporate governance mechanisms in practice. This research is also based on a library research approach, as the required information has been collected through a review of credible academic sources, including journal articles, theses, specialized books, and institutional reports. The data used in this study consists of financial information and financial statements of companies listed on the TSE, obtained from the official website of the Securities and Exchange Organization of Iran and the Novin software database.

The statistical population of this study includes all companies listed on the TSE over the period 2019 to 2024. A systematic elimination (screening) method is used to select the final sample, whereby firms meeting the following criteria are included in the sample:

I. Their fiscal year-end coincides with the end of 29-12-xx each year, and they have not changed their fiscal year during the study period.

II. They are not classified within banking, leasing, credit institutions, investment companies, or holding companies, due to the distinct nature of their financial structure and reporting practices.

III. They must have been listed on the TSE prior to 2019 to ensure the availability of sufficient historical data.

IV. During the study period (2019–2024), they must not have experienced a trading suspension exceeding six consecutive months.

V. Their financial information must be fully and transparently available for the entire study period.

Given the applied constraints and using a systematic elimination (screening) approach, a total of 150 companies were selected as the final sample from firms listed on the TSE.

To test the research hypotheses, logistic regression is employed, which involves two main stages: 1) classical regression assumptions, such as multicollinearity, are examined using the Variance Inflation Factor (VIF). Given the nature of the logistic regression model, there is no need to conduct the Chow or Hausman tests, 2) to evaluate the overall model fit and the significance of the hypotheses, the Likelihood Ratio (LR) test and McFadden's pseudo R-squared are used to assess model adequacy and the explanatory power of the independent variables. In addition, the Breusch–Godfrey test is applied to ensure the absence of autocorrelation among variables. The collected data are processed using Microsoft Excel, and the empirical analysis is conducted using EViews 10 software.

5 | Research Model

Based on Dimitropoulos et al. [5], in order to test the research hypotheses, a panel-data-based logistic regression model is employed as specified in *Models (1)* and *(2)*.

Hypothesis 1.

$$QUAL_{it} = \beta_0 + \beta_1 SUST_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 ROA_{it} + \beta_5 GROWTH_{it} + \varepsilon_{it,} \quad (1)$$

where, in the above model, we have:

$QUAL_{it}$: audit opinion of firm i in year t.

$SUST_{it}$: sustainability performance of firm i in year t.

$SIZE_{it}$: firm size of firm i in year t.

LEV_{it}: the financial leverage of firm i in year t.

ROA_{it}: Return on Assets (ROA) of firm i in year t.

GROWTHit: sales growth of firm i in year t. If the coefficient β_1 is negative and statistically significant at the 95% confidence level, the first research hypothesis is not rejected.

Hypothesis 2.

$$QUAL_{it} = \beta_0 + \beta_1 SUST_{it} + \beta_2 AUDC\_IND_{it} + \beta_3 SUST_{it} * AUDC\_IND_{it} + \beta_4 SIZE_{it} + \beta_5 LEV_{it} + \beta_6 ROA_{it} + \beta_7 GROWTH_{it} + \varepsilon_{it,} \quad (2)$$

where, in the above model, we have:

$AUDC\_IND_{it}$: audit committee independence of firm i in year t.

If the coefficient β_3 is negative and statistically significant at the 95% confidence level, the second research hypothesis is not rejected.

5.1 | Research Variables

5.1.1 | Dependent variable

The dependent variable of the present study is the audit opinion (QUAL).

Based on the studies of Dimitropoulos et al. [5] and Afsai et al. [38], audit opinion is a dummy variable that takes the value of one if the firm receives a qualified audit opinion due to accounting errors, non-compliance with relevant accounting standards, or both, and zero otherwise.

5.1.2 | Independent variable

The independent variable of the present study is corporate Sustainability (SUST) performance.

In this study, the measurement of the independent variable is based on the weighted scoring model for assessing the extent of ESG disclosure in the Iranian capital market, developed through expert surveys in the study by Fakhari et al. [39]. Accordingly, content analysis of the board of directors' activity reports is employed.

Furthermore, the disclosure score for each indicator is obtained as the average score of its related criteria. The disclosure items comprise a total of 86 criteria across 30 indicators, as presented in *Table 1*. The scoring scheme for each criterion is defined as follows:

I. If the disclosure is quantitative or if it includes detailed qualitative explanations, figures, tables, or diagrams, a score of 1 is assigned.

II. If the disclosure is qualitative and limited to one or two sentences, a score of 0.5 is assigned.

III. If the item is not disclosed, a score of 0 is assigned.

Accordingly, using the checklist developed in the aforementioned study and through content analysis of board reports, the score of each indicator is determined. The weighted model is then applied to derive the corporate ESG disclosure score.

Content analysis is a text-coding method that classifies textual information into predefined categories based on specified criteria and is widely used in studies on non-financial reporting.

The weighted model used in this study is presented in *Eq. (1)*:

$$ESG = 0/337\,E + 0/388\,S + 0/275\,G,$$

where, in the above equation, we have:

ESG: score of ESG reporting, E: environmental dimension score, S: social dimension score, G: corporate governance dimension score.

5.1.3 | Moderating variable

The moderating variable in the present study is AUDC_IND.

Based on Dimitropoulos et al. [5] and Shamseddini et al. [21], AUDC_IND is measured as the ratio of non-executive (independent) members of the audit committee to the total number of audit committee members. An independent member, according to clause 1, article 1 of the Audit Committee Charter, is defined as a member who has no direct or indirect relationship or interest that may affect his or her independent judgment, lead to bias in favor of a particular individual or group of shareholders or other stakeholders, or result in the violation of equal treatment of shareholders [40].

5.1.4 | Control Variables

The control variables in the present study include firm size, financial leverage, ROA, and sales growth.

Firm Size (SIZE): Natural logarithm of total assets. Financial Leverage (LEV): ratio of total liabilities to total shareholders' equity. ROA: ratio of net profit to total assets. Sales Growth (GROWTH): change in net sales in the current year relative to the previous year.

6 | Findings

6.1 | Descriptive Statistics

The mean is considered the most important measure of central tendency. It indicates the value around which the data are distributed. As shown in *Table 2*, the mean of firm sustainability performance is 4.958, suggesting that, on average, the level of sustainability activities and disclosures among the sample firms is approximately 5. It indicates that firms are generally engaged in sustainability practices at a relatively acceptable level. The median represents the point at which half of the observations fall below and half fall above this value. The median is 4.901, indicating that half of the firms have sustainability performance above this level and the other half below it; therefore, the distribution of sustainability performance across firms is relatively balanced. The minimum value of this variable is zero, indicating that some firms have not reported or undertaken any sustainability activities, while the maximum value is 11.321, reflecting very strong sustainability performance among certain firms. Among the most important measures of dispersion required for regression analysis is the standard deviation.

As shown in *Tables 1-3*, the standard deviation of sustainability performance is 1.874, indicating a considerable level of dispersion across firms. This suggests significant differences among companies in terms of sustainability activities and reporting practices. Skewness reflects the asymmetry of the frequency distribution of a variable. A skewness coefficient of zero indicates a perfectly symmetric distribution; a positive value indicates right skewness, and a negative value indicates left skewness. The skewness value of 0.422 indicates a mild positive skewness, meaning that data are concentrated at lower values, although a limited number of firms exhibit very high sustainability performance. The mean of AUDC_IND is 0.744, indicating that, on average, approximately 74% of audit committee members in the sample firms are independent. It reflects a relatively favorable level of structural independence in most companies. The median of this variable is 0.666, indicating that in half of the firms, independent members constitute more than 66% of the audit committee, while in the other half, they constitute less than this proportion. The minimum value is zero, indicating that some firms have no independent members in their audit committees, whereas the maximum value is one, showing that in some firms the audit committee is fully independent. The standard deviation of this variable is 0.189, suggesting a moderate level of dispersion in AUDC_IND across firms; in other words, while firms are not uniform in terms of independence, the differences are not extreme. The skewness of this variable is -0.671, indicating a left-skewed distribution, meaning that most firms have relatively high levels of AUDC_IND, while only a small number of firms exhibit very low independence, which creates the left tail of the distribution.

Table 1. Frequency and percentage distribution of dummy variables.

Variable Name	Variable Symbol	Total Observations	Mode	Frequency	Percentage Frequency
Audit Opinion	QUAL	900	Client's observations	300	0.34
			Zero observations from the owner/subject	600	0.66

Source: Research findings.

Table 2. Descriptive Statistics of the Study Variables.

Variable Name	Variable Symbol	Mean	Median	Maximum (Value)	Minimum (Value)	Standard Deviation	Skewness
Audit opinion	QUAL	0.333	0	1	0	0.471	0.707
Sustainability performance	SUST	4.958	4.901	11.321	0	1.874	0.422
Audit committee independence	AUDCIND	0.744	0.666	1	0	0.189	-0.671
Firm size	SIZE	16.403	16.267	22.216	12.031	1.708	0.678
Financial leverage	LEV	0.467	0.462	0.994	0.017	0.208	0.106
Return on assets	ROA	0.215	0.205	0.681	0.1000	0.147	0.537
Sales growth	GROWTH	0.562	0.482	3.785	-0.909	0.516	2.144

Source: research findings.

7.2|Data Analysis

To analyze the data of each of the specified models, it is necessary to examine the classical assumptions of the model prior to estimation and hypothesis testing. Note: Given that the present study employs logistic regression, there is no need to conduct the Chow test (F-Limer test), Hausman test, or heteroscedasticity test.

7.2.1|Multicollinearity test

To examine multicollinearity among the variables, the VIF test was employed. As shown in *Tables 2* and *3*, since the VIF values for the study variables are below the threshold of 10, it can be concluded that no multicollinearity problem exists among the independent variables.

Table 3. Results of the Multicollinearity test.

Variable Symbol	VIF - Model 1	VIF - Model 2
SUST	1.010	2.648
AUDCIND	-	2.078
SUST*AUDCIND	-	2.523
SIZE	1.019	1.020
LEV	1.282	1.285
ROA	1.318	1.319
GROWTH	1.042	1.046

Source: research findings

7.2.2|Autocorrelation test

In this study, in order to examine autocorrelation related to the research hypotheses, the Breusch–Godfrey test was employed to assess serial correlation. If the Breusch–Godfrey statistic is less than 0.05, it indicates the presence of autocorrelation, and to address this issue, a first or second lag should be included in the final estimation model.

Table 4. Results of the Autocorrelation test.

Model	Classical Assumptions	Test Name	Significance Level	Result
First	Absence of autocorrelation	Breusch–godfrey	0.000	No autocorrelation
Second	Absence of autocorrelation	Breusch–godfrey	0.000	No autocorrelation

Source: research findings.

As shown in *Table 4*, the value of the Breusch–Godfrey test statistic is less than 5%, indicating the presence of serial autocorrelation among the variables. Accordingly, this issue was addressed in the final model estimation by incorporating a first-order lag correction.

7.3 | Results of the Research Models

After performing the required statistical tests, in order to determine the appropriate use of the data and to ensure the validity of the fitted model, the final results obtained from the estimation of the research models are presented below.

7.3.1 | Results of the first research model

The LR statistic in logistic regression is used to assess the overall significance of the model. It represents a comparison between the goodness-of-fit of the full model (including all independent variables) and the restricted model (containing only the intercept). A very small probability value associated with the LR statistic (such as 0.000) indicates that the full model fits the data significantly better than the intercept-only model. In other words, at the 99% confidence level, it can be concluded that the independent variables jointly have a statistically significant effect on the probability of the dependent variable.

Therefore, a significant LR statistic implies that the logistic regression model is well-fitted overall and that the relationships between the independent variables and the probability of the outcome are statistically reliable. Based on the results reported in *Table 5*, the LR statistic equals 0.000, indicating that at the 99% confidence level, the independent variables have a significant effect on the probability of the dependent variable.

Accordingly, the model is considered valid. McFadden's pseudo R-squared is a measure of model fit in logistic regression and plays a role analogous to the coefficient of determination in linear regression, although its numerical interpretation differs. It indicates the extent to which the model improves fit relative to a baseline model containing only the intercept. A value of 0.338 suggests that the logistic model provides approximately 33.8% improvement in fit over the null model. In logistic regression, values between 0.2 and 0.4 are generally considered to indicate very good model fit; therefore, a value of 0.33 reflects a strong goodness-of-fit.

Table 5. Results of the first research model test.

Variable Name	Symbol	Beta Coefficient (β)	Standard Error (SE)	t-Statistic (t-Value)	Significance Level (p-Value)
Sustainability performance	SUST	-0.068	0.030	-2.289	0.022
Firm size	SIZE	0.074	0.033	2.181	0.029
Financial leverage	LEV	-0.673	0.294	-2.284	0.022
Return on assets	ROA	-2.254	0.451	-4.996	0.000
Sales growth	GROWTH	-0.094	0.109	-0.868	0.385
Intercept	C	-1.175	0.611	-1.922	0.054
First-order lag (Lag 1)	QUAL (-1)	1.795	0.117	15.235	0.000
LR Statistic	P-value of the LR statistic			McFadden's pseudo R-squared	
322.045	0.000			0.338	

Source: Research findings.

Hypothesis 1 of the study states that firm sustainability performance has a negative and significant effect on qualified audit opinion.

As shown in *Table 5*, the significance level for the variable firm sustainability performance is 0.022. Since this value is lower than the 5% significance threshold, it indicates that the effect of this variable is statistically significant at the 95% confidence level. Moreover, the estimated coefficient for this variable is −0.068, and its negative sign indicates an inverse relationship. Accordingly, based on both the significance level and the estimated coefficient, it can be concluded that firm sustainability performance has a negative and significant effect on qualified audit opinion. Therefore, the first hypothesis of the study is not rejected.

7.3.2 | Results of the second research model

Based on the results reported in *Table 6*, the LR statistic is 0.000, indicating that at the 99% confidence level, the independent variables jointly have a statistically significant effect on the probability of the dependent variable. Therefore, the model is considered valid.

The McFadden's pseudo R-squared is 0.343, meaning that the logistic model explains approximately 34.3% of the improvement in fit compared to the baseline model. Accordingly, a value of 0.343 indicates a very good model fit.

Table 6. Results of the second research model.

Variable Name	Symbol	Beta Coefficient (β)	Standard Error (SE)	t-Statistic (t-Value)	Significance Level (p-Value)
Sustainability performance	SUST	0.195	0.135	1.440	0.149
Audit committee independence	AUDCIND	1.851	0.924	2.002	0.045
Interaction effect of sustainability performance and audit committee independence	SUST* AUDCIND	-0.350	0.176	-1.992	0.0463
Firm size	SIZE	0.078	0.034	2.296	0.021
Financial leverage	LEV	-0.683	0.296	-2.306	0.021
Return on assets (ROA)	ROA	-2.266	0.452	-5.006	0.000
Sales growth	GROWTH	-0.086	0.110	-0.781	0.434
Intercept	C	-2.638	0.958	-2.754	0.005
First-order lag (Lag 1)	QUAL (-1)	1.783	0.118	15.066	0.000
LR statistic	P-value of the LR statistic			McFadden's pseudo R-squared	
326.279	0.000			0.343	

Source: research findings.

Hypothesis 2 of the study states that AUDC_IND strengthens the effect of firm sustainability performance on qualified audit opinion.

As shown in *Table 6*, the significance level of the interaction term between firm sustainability performance and AUDC_IND is 0.046. Since this value is lower than the 5% significance threshold, it indicates that the effect of this variable is statistically significant at the 95% confidence level. Moreover, the estimated coefficient for this interaction term is −0.350, and its negative sign indicates an inverse relationship. Therefore, based on both the significance level and the estimated coefficient, it can be concluded that AUDC_IND strengthens the effect of firm sustainability performance on qualified audit opinion. Accordingly, the second hypothesis of the study is not rejected.

8 | Conclusion

This study aimed to examine the effect of firm sustainability performance on audit opinion, considering the moderating role of AUDC_IND in companies listed on the TSE. The empirical results indicate that none of the research hypotheses were rejected at the 95% confidence level.

8.1 | Analysis of Research Hypotheses

Hypothesis 1 of the study examined the effect of firm sustainability performance on qualified audit opinion. The results revealed that firm sustainability performance has a negative and significant effect on the likelihood of issuing a qualified audit opinion. In other words, higher levels of sustainability performance are associated with a lower probability of receiving a qualified audit opinion. Firms with strong sustainability performance are generally more structured and professional in their internal control systems, information transparency, regulatory compliance, and risk management practices. Improvements in these areas reduce the likelihood of

encountering material non-compliance, material misstatements, documentation deficiencies, or internal control weaknesses, factors that typically lead to the issuance of a qualified audit opinion.

Furthermore, firms with higher sustainability performance tend to demonstrate stronger commitment to responsible reporting, full disclosure, and accountability to stakeholders. These characteristics enhance the quality of financial reporting and increase auditors' confidence in the reliability of reported information. From a behavioral perspective, such firms usually exhibit stronger corporate governance structures, where the independence and effectiveness of audit committees contribute to reducing reporting errors and ambiguities. Overall, higher sustainability performance improves operational quality, internal controls, and disclosure practices, thereby facilitating the issuance of an unqualified audit opinion and reducing the likelihood of a qualified audit opinion. The findings of this hypothesis are consistent with prior studies by Dimitropoulos [5], Diab and Issa [3], Wang et al. [4], and Zheng et al. [31].

The purpose of testing *Hypothesis 2* of the study was to examine the moderating effect of AUDC_IND on the relationship between firm sustainability performance and qualified audit opinion. The results of the second hypothesis indicate that AUDC_IND strengthens the effect of firm sustainability performance on qualified audit opinion. AUDC_IND can play a reinforcing role in the relationship between firm sustainability performance and the reduction in the likelihood of receiving a qualified audit opinion, as an independent audit committee is capable of enhancing the quality of oversight over financial reporting processes, internal controls, and sustainability disclosures in an unbiased manner and without managerial influence. When a firm demonstrates higher sustainability performance, this performance is typically associated with improved control systems, reduced operational risk, enhanced environmental and social transparency, and increased accountability.

However, AUDC_IND ensures that these initiatives are not merely symbolic and are rigorously validated. An independent audit committee with strong oversight authority evaluates the accuracy and completeness of sustainability-related information, improves the quality of disclosures, and identifies and mitigates the risk of material misstatement in reports. As a result, the external auditor faces lower levels of uncertainty, which in turn reduces the likelihood of issuing a qualified audit opinion. Moreover, AUDC_IND, through effective monitoring pressure on management, prevents the concealment of risks, opportunistic behavior, and the provision of incomplete or unreliable information, thereby encouraging firms to genuinely improve their sustainability performance. In addition, an independent audit committee generally performs more effectively in selecting high-quality auditors, ensuring compliance with reporting standards, and continuously monitoring internal control processes. Therefore, the positive effect of sustainability performance on reducing misstatement risk and improving disclosure quality is strengthened in the presence of AUDC_IND. Ultimately, the combination of these two factors significantly reduces the probability of a qualified audit opinion. The findings of this hypothesis are consistent with the study by Dimitropoulos [5] and inconsistent with the studies of Alhumoudi [28], Zaid Alkilani et al. [32], and Shiri [41].

8.2 | Research Limitations

I. One of the most important limitations of this study relates to the nature of disclosure and the accessibility of information on firms' sustainability performance in Iran. The sustainability reporting system in Iran lacks a standardized framework, legal enforcement, and integrated practices comparable to the Global Reporting Initiative (GRI) and the International Financial Reporting Standards (IFRS), particularly Sustainability Disclosure Standards 1 and 2. Consequently, ESG-related information is not disclosed in a complete, quantitative, and comparable manner. Given that the present study was necessarily limited to a set of indicators and components that could be extracted from financial statements and accompanying notes, the employed sustainability performance index reflects only a partial representation of firms' actual sustainability performance. This limitation restricts the generalizability of the findings to broader dimensions of sustainability, such as human capital, professional ethics, energy management, or deep environmental responsibility. In addition, substantial differences across industries in the level and quality of disclosure reduce the comparability of sustainability data and introduce constraints in interpreting the results. In other words,

the findings of this study should be interpreted with the understanding that sustainability transparency in Iran is lower than international standards, and the employed index serves only as an approximate and measurable proxy for firms' actual sustainability performance.

II. The type of audit opinion in the Iranian context is also associated with certain limitations that may affect the study's results. The auditing profession in Iran, due to the regulatory role of bodies such as the Audit Organization and the Iranian Association of Certified Public Accountants, concentrated ownership structures in firms, and certain legal considerations, differs in several respects from international environments. These factors may, in some cases, influence the auditor's judgment process and the type of audit opinion issued. Moreover, the study data only capture the final audit opinion outcome and are not able to measure more qualitative factors such as auditors' risk aversion, informational pressures, limitations in access to audit evidence, or the dynamics of auditor–management interactions. Therefore, although the study examines a significant relationship between sustainability performance and audit opinion, this relationship may be influenced by characteristics specific to the Iranian auditing environment, and its generalizability to other countries or auditing systems should be interpreted with caution.

III. AUDC_IND is also subject to certain limitations that may partially constrain the study's findings. The independence measures used in this study are based on formal and observable indicators, such as the number of non-executive members, the absence of managerial employment among committee members, and the lack of formal affiliations with management. However, true independence extends beyond formal structure and encompasses behavioral independence, the ability to resist managerial influence, the level of practical expertise, and the quality of interaction with the external auditor, dimensions that are not measurable using the available data. In addition, in Iran, disclosure of information regarding indirect financial relationships, ancillary business ties, or family connections of audit committee members is not fully transparent, which increases the possibility of overestimating the level of independence. Furthermore, many audit committees in Iran are relatively nascent in structure, and their operational effectiveness has not yet reached the maturity level observed in international standards. These factors suggest that the study's findings primarily reflect structural and formal independence rather than true behavioral independence, thereby limiting the generalizability of the results.

8.3 | Recommendations Based on Research Findings

I. Based on the findings of the first hypothesis, which indicate that improvements in firm sustainability performance reduce the likelihood of receiving a qualified audit opinion, it is recommended that managers integrate a continuous monitoring system for sustainability indicators (such as energy consumption, waste management, and minority shareholders' rights) directly into the internal control framework. For example, Key Sustainability Performance Indicators (KPIs) can be defined within the management reporting system, accompanied by supervisory mechanisms to continuously monitor these indicators. Regulatory authorities are advised to strengthen the requirements for quantitative disclosure of these indicators in the primary financial statements. In addition, investors and financial analysts are encouraged to interpret weaknesses in sustainability indicators as warning signals of increased financial risk and a higher likelihood of future financial statement adjustments.

II. Based on the findings of *Hypothesis 2*, which show that AUDC_IND strengthens the effect of firm sustainability performance on reducing qualified audit opinions, it is recommended that boards of directors enhance the composition of audit committees by including fully independent members with expertise in organizational sustainability. This would enable the committee to effectively monitor and manage the linkage between sustainability indicators and financial reporting risks. Regulatory bodies are advised, in revising corporate governance regulations, to require at least one independent member with specialized knowledge in sustainability within the audit committee structure. Furthermore, investors are encouraged to consider the simultaneous presence of AUDC_IND and strong sustainability performance as a key indicator for assessing the reliability of financial reporting.

8.4 | Suggestions for Future Research

I. Examining the impact of climate-related risks on sustainability performance and their implications for the type of audit opinion in environmentally sensitive industries.

II. Investigating the relationship between the maturity of digital corporate governance (i.e., firms' use of digital technologies to enhance oversight, transparency, internal controls, and risk management) and audit opinion, with an emphasis on AUDC_IND.

III. Studying the role of AUDC_IND in the relationship between firm sustainability performance and audit risk reduction.

IV. Examining the effect of firm sustainability performance on audit opinion type, with the mediating role of integrated reporting.

V. Conducting a comparative study on the impact of institutional pressures on AUDC_IND and auditors' responses to sustainability reporting practices.

VI. Investigating the role of artificial intelligence in analyzing sustainability reports and its effect on audit risk and audit opinion type.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Data Availability

The datasets generated and/or analyzed during the current study are included in this article.

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Appendix

Table 1 presents the indicators underlying the environmental, social, and corporate governance reporting dimensions. Show is appewndix.

Table A1. Indicators of the dimensions of sustainability performance.

Dimensions	Indicators	Evaluation Criteria
Environmental dimensions	Environmental risk assessment	Disclosure of the potential risks of the company's activities to human health and the environment.
	Environmental training	Disclosure of employee training on production activities with regard to environmental considerations and the reduction of adverse environmental impacts (in terms of hours or costs). Disclosure of customer training on consumption practices with regard to environmental considerations and the reduction of adverse environmental impacts (in terms of hours or costs). Environmental Transparency
	Environmental transparency	Disclosure of environmental reporting in a separate section. Disclosure of the company's future environmental policies.
	Climate change	Measures to reduce the impact of activities on the atmospheric climate.
	Biodiversity	Disclosure of strategies for managing impacts on biodiversity and natural resources. Disclosure of measures aimed at reducing adverse effects, preventing or remediating environmental damage through land, soil, and forest restoration, as well as the development of green spaces, etc.
	Emissions, pollution, and waste	Disclosure of total waste and its classification into hazardous and non-hazardous categories, as well as methods of proper disposal. Disclosure of the level of pollution. Disclosure of measures undertaken to reduce emissions of greenhouse gases, toxic substances, and other pollutants.
	Environmental Management System (EMS)	Disclosure of the acquisition of EMS compliance certifications (ISO 14000, ISO 26000). Disclosure of environmental awards and recognitions related to compliance with environmental standards and practices.
	Energy and water efficiency	Energy and water consumption, disaggregated by source and quantity. The amount of energy and water saved as a result of improvements in the company's processes. The company's activities aimed at reducing water and energy consumption. The amount of renewable water and energy available for consumption. Environmental Issues
	Environmental issues of products, services, and the supply chain	Disclosure of the company's activities to comply with environmental issues from the perspectives of customers, consumers, the supply chain, and third parties, including organizing or participating in environmental conferences and similar events.

Table A1. Continued.

Dimensions	Indicators	Evaluation Criteria
Social dimensions	Socially responsible investment	Disclosure of capital market–based strategies and community-based strategies, such as investing in companies that comply with environmental standards or social institutions, or divesting from firms that do not adhere to social responsibility criteria. Social risk management, including periodic medical examinations, vaccination programs, life insurance, accident insurance, unemployment insurance, etc.
	Social learning and training	Disclosure of the total training hours, description of training activities, or total training costs for the entire workforce, etc.
	Social transparency	Disclosure of social performance reporting in a separate social section. Presentation of future social and health policies.
	Occupational health and safety	Disclosure of laws, regulations, and voluntary principles related to occupational health and production safety. The number of working hours lost due to accidents or the total number of accidents. Measures taken to reduce harmful factors in the workplace.
	Social issues related to customers and the supply chain	Disclosure of customer privacy protection practices. Warranty and after-sales services. Number of customer complaints received or the amount of compensation paid. Disclosure of supplier selection procedures. Provision of product specifications, quality, durability, and safety.
	Brand protection and anti-competitive conduct	Disclosure of commercial agreements with competitor companies. Disclosure of information regarding the company's product development or research projects aimed at improving production, or disclosure of research and development (R&D) expenditures.
	Labor rights	Disclosure of salaries and wages and other benefits. Employment and turnover rates of the workforce, or workforce composition profile. Disclosure of employee grievances and compensation payments made to employees. Flexible working arrangements and employee welfare programs for employees and their families, such as travel, retreats, gifts, etc.
	Occupational health, safety, and productivity	Disclosure of occupational health and safety standards. Total employee and contractor injuries and fatalities, including the type and severity of injuries. Labor productivity.
	Respect for human rights principles	Child labor, and support for working and street children. Adherence to voluntary principles of human rights.
	Social development and philanthropy	Disclosure of financial contributions in support of social activities, including internship programs and collaboration with universities, as well as donations to charitable organizations, mosques, schools, hospitals, etc. Financial assistance provided to victims of natural disasters and to foreign countries, etc.
	Stakeholders' social perception	Formation of labor unions and cooperatives. Grievance and suggestion systems. Measurement of customer and employee satisfaction, etc.

Table A1. Continued.

Dimensions	Indicators	Evaluation Criteria
Social dimensions	Non-discrimination and social inclusion	Disclosure of recruitment and hiring policies and procedures, as well as compensation and reward policies, etc. Disclosure of employees' distribution across categories based on age, gender, and membership in minority groups. Disclosure of employee bonuses and performance-based compensation arrangements.
Governance dimensions	Investment risk management	Disclosure of the company's measures for managing investment risk, including diversification and other related strategies.
	Supervisory actions and risk management	Disclosure of the internal control report. Disclosure of the audit report. Disclosure of the integrated Enterprise Risk Management (ERM) framework of the economic entity.
	Governance transparency	Disclosure of corporate governance in a separate section. Disclosure of future governance policies. Disclosure of related-party transactions. Disclosure of market presence and organizational culture, etc.
	Board composition	Disclosure of leadership duality (CEO duality). Industrial and financial experience. Number of board meetings. The attendance rate of board members at meetings. Presence of women on the board of directors. Tenure of board members (number of years in office). Executive or non-executive status. Number of committee meetings held by non-executive directors.
	Committees	Disclosure of the number of committees. Number of committee meetings. Disclosure of the risk committee. Audit committee. Nomination and performance compensation committee. Corporate Governance (CG), CSR, and ESG committees. Disclosure of independent directors in each committee. Procedures for auditor selection and replacement, as well as audit fees and performance-based compensation arrangements.
	Performance compensation	Disclosure of managerial salaries and bonuses. Disclosure of executive compensation schemes and other managerial benefits. Qualitative and quantitative factors used in evaluating managerial performance.
	Regulatory compliance	Disclosure of compliance with relevant commercial and legal regulations. Disclosure of legal disputes or anticipated litigation involving the company. Ethics and Corruption
	Ethics, corruption, and codes of conduct	Disclosure of codes, regulations, and ethical charters. Disclosure of the company's measures to prevent and combat corruption. Professional ethics training.

Table A1. Continued.

Dimensions	Indicators	Evaluation Criteria
Governance dimensions	Shareholder rights protection	Disclosure of proposed dividend distribution attributable to shareholders. Disclosure of the articles of association. Disclosure of contact information, email address, and the designated shareholder relations officer. Disclosure of guidelines on share ownership by company directors, etc. Shareholder rights protection

Source: Fakhari et al. [39].