TOP MANAGEMENT TEAM CHARACTERISTICS, CORPORATE ENVIRONMENTAL SUSTAINABILITY, AND EARNINGS MANAGEMENT STRATEGY: AN EMPIRICAL INVESTIGATION

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How to cite this paper: Al-Matari, E. M., Turki, H., Alnor, N. H. A., Eltahir, I. A. E., Ali, Z. T. A., & Misbah, H. M. (2026). Top management team characteristics, corporate environmental sustainability, and earnings management strategy: An empirical investigation. *Corporate and Business Strategy Review, 7*(1), 271–283. https://doi.org/10.22495/cbsrv7i1art24

ISSN Online: 2708-4965
ISSN Print: 2708-9924

Received: 02.09.2025
Revised: 04.12.2025; 07.01.2026
Accepted: 05.02.2026

JEL Classification: G34, L31, Q56
DOI: 10.22495/cbsrv7i1art24

Abstract

The proposed study would focus on the relationship between the characteristics of top management teams (TMTs) and the environmental sustainability of companies and their relationship with earnings management (EsM). The primary aim of this study is to reveal how these characteristics have a direct impact on the way business companies handle their profits. The relationship between controlling earnings, saving the environment, and the characteristics of TMTs was examined by using ordinary least squares (OLS). The information used in this study was that of the public companies between 2015 and 2021. The two-stage least squares (2SLS) approach was also employed in this study to ensure that the findings were correct. These findings indicated that EsM and TMT size had a statistically significant positive relationship. However, the negative correlation between TMT and the accounting and financial skills of EsM was statistically significant. Another weak negative correlation discovered in the course of the study was that of environmental protection and business management. Another significant finding of the study was that there is a significant relationship between the performance of top management and EsM. Stages of regression (2SLS) were also employed to ensure that the findings were correct. The key results of the former research are verified by the 2SLS data.

Keywords: Characteristics of Top Management Team, Corporate Environmental Sustainability, Earnings Management, Saudi Arabia

Authors' individual contribution: Conceptualization — E.M.A.-M., N.H.A.A., and H.T.; Data Curation — N.H.A.A.; Resources — H.M.M.; Writing — Original Draft — E.M.A.-M.; Writing — Review & Editing — Z.T.A.A. and I.A.E.E.; Visualization — H.M.M.

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

Acknowledgements: This work was funded by the Deanship of Graduate Studies and Scientific Research at Jouf University under grant No. DGSSR-2025-03-01333.

1. INTRODUCTION

Tactical and strategic phases of business around the globe are in a state of rapid change. The reason is that there are no things that do not interact with one another, such as the economy, the environment, and technology. With the evolving times, the enhancement of corporate governance (CG) is now a priority among investors as well as regulators. This is particularly so due to issues relating to the reliability of the financial reporting and emerging issues pertaining to the dishonesty of accounting practices like earnings management (EsM). EsM is considered to be two-sided, which can either be used to enhance the perceived stability of the corporate performance or to avoid accounting standards and deceive external consumers of the financial reports (Assad, 2025; Nguyen et al., 2025; Oreshile & Adeneye, 2025; Zhao, 2025). In this regard, it is more necessary to learn about the organizational and behavioral models that influence such practices and to seek what promotes financial prudence in the business environment. It is primarily the outside factors, such as the nature of the board, quality of external auditing, and the aggregate institutional ownership, that have been used to study EsM behavior (Hamdan et al., 2025; Kaur et al., 2025; Turshan, 2025). However, there is an increasing number of recent books and articles that concentrate on the topic of senior executive leadership, particularly, the characteristics of the top management team (TMT) as a significant element of the inner organization that influences the finance-related policies of a business (Aboramadan, 2021). The top manager model developed by Hamilton et al. (1984) holds that the history of the management team in terms of career and organization size is potentially directly relevant to strategy-making, such as the decision-making process of accounting. Indeed, recent studies have established that TMT characteristics such as team size, overall experience, and financial expertise are correlated to varied modes of behavior towards financial disclosure and openness (Al-Matari, 2025; Zhang, 2019).

Although there has been increased research on CG, there are few studies that have examined both the attributes of senior leaders and environmental sustainability as drivers of EsM, particularly in a non-Western context. These questions are best suited to the Saudi financial market due to the significant changes in rules and the economy that are currently occurring in the Kingdom in Saudi Vision 2030, as the goals of the latter are to facilitate a more open and compliant business environment and to make businesses more responsible (Efunniyi et al., 2024). The study of the connection between environmental sustainability practices, executive leadership characteristics, and EsM behavior is becoming increasingly more significant. The reason behind this is that the market is expanding, the number of public companies is increasing, and the responsibilities of non-financial disclosure are increasing. The work is significant as it brings new information to the literature on EsM in developing environments. Whereas previous studies have examined such variables as personal characteristics of chief executive officers (CEOs), not many studies have examined the TMT as an entity and its influence on the financial decisions of a company. Further evidence of long-term environmental health-business financial behavior is not conclusive yet, particularly in Gulf markets where environmental accounting systems are still in an early phase, and businesses are compelled to put the bottom line first. Therefore, a combination of two dimensions TMT traits and environmental sustainability) into a unified theory framework is the novel input to the literature in the field of accounting and government.

This study contributes to the literature by presenting an integrated analytical model that combines behavioral, agency, and legitimacy theories to explain how leadership characteristics interact with the institutional environment to shape accounting decisions. The study also combines longitudinal quantitative analysis with advanced economic models such as ordinary least squares (OLS) and two-stage least squares (2SLS) to provide relevant results. High dependability makes it possible to generalize in situations that are alike. From a practical point of view, this study's results can give regulatory bodies useful proof of the need to spread TMTs and strengthen environmental commitments as an unspoken tool for avoiding strategic accounting. To sum up, by looking at how TMT traits and environmental sustainability together affect EsM in the Saudi market, this study gives a new way of doing research on one of CG's most important problems. This study adds to the body of knowledge that helps us see how accounting behavior and environmental responsibility change over time with leadership by looking at longitudinal data from several public companies in the last few years. These findings could also help local lawmakers make stricter rules.

The rest of the paper is structured as follows. Section 2 reviews the literature and outlines study hypotheses. Section 3 describes the research methodologies used in this study. Section 4 presents the actual findings. Section 5 gives additional research. Section 6 provides the study's conclusion and limitations.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

2.1. Top management team characteristics and earnings management

TMT within companies is thought to be an important part that sets the strategic path and working efficiency of the business in both the short and long term (Eriksson et al., 2025). The CEO, chief financial officer (CFO), and other top leaders are usually on this team, and they make very important decisions that affect how well the company grows, makes money, and stays in business. This team is very important because it sets the organization's attitude, makes rules about money, makes sure that rules are followed, and is in charge of accounting reports and EsM (Hambrick & Mason, 1984; Andreou et al., 2014). As business settings get more complicated, researchers have been studying this team more on

its characteristics, especially its size and how much it knows about accounting and finance, since these things have a direct effect on the quality of leadership and the results of the company (Zhang, 2019).

The upper echelons theory is not the only management and organizational theory that explains the impact of TMT characteristics on the level of successful performance of a company. According to the upper echelons theory, the attributes of individuals at the highest leadership position directly impact the decisions made by the organization (Hambrick & Mason, 1984). In this perspective, a group with diverse knowledge, skills, and constituents makes it simpler to have a greater number of people express their opinions and think of additional options, and this leads to increased strategic decisions (Carayannis, 2008). Recent research has indicated that larger teams are in a better position to deal with complex information, provided that there is effective coordination. It implies that the decisions will be less personalized, and this is critically significant to EsM and financial disclosure (Zhang, 2019).

Alternatively, the agency theory indicates that the leaders can act contrary to the desires of the owners to acquire personal advantages, especially where they lack control. The accounting and financial intelligence of the TMT members plays a significant role in this instance since it could assist in enhancing the quality of financial reports and minimizing earnings cheating (Boulhaga et al., 2023). According to recent studies, the presence of individuals with special financial expertise in the executive team will result in higher conformity to accounting principles and reduced selfishness, particularly in the presence of weak institutional controls (Ananzeh, 2024). The highly informed executives are those who enable a team to learn and comprehend how a decision would impact the finances of the team. This will aid in establishing confidence among investors and the financial fraternity (Andreou et al., 2014).

The recent studies among various location settings, including developing markets, indicate that the size of a TMT may be either good or bad. Small teams can experience issues with seeing and comprehending information, and large teams can experience issues with coordination, which delays the decision-making process (Du & Shen, 2024). It is a good place to make decisions as a moderately sized and balanced team with adequate cognitive and professional diversity (Carayannis, 2008).

In addition, this enhances the standard of financial management and reduces the chances of fraudulent profits. The highest team maintains an oversight of things in a big manner by being professionals in accounting and finance. Individuals who have practiced or studied finance or accounting are less likely to make mistakes, and they are more likely to adhere to international financial reporting standards (Al-Okaily et al., 2024). This information also assists in the creation of trust in financial accounts through improved conversation and relationships with external accountants (Andreou et al., 2014; Sarapaivanich et al., 2024). TMT members have played so many management and leadership roles, thus demonstrating their experience as a group. This aids the group in being accustomed to new things and producing new ideas.

Carayannis (2008) says that when the leaders of an organization are very experienced in numerous fields, such as marketing, business, human resources, and new ideas, then the organization is easy to understand and correct. Such an experience also enhances the internal controls and assists the policies to concentrate on the long-term objectives that extend past the financial interests in the short term (Done et al., 2011). According to Saudi Vision 2030, the government is to be enhanced, women will enjoy greater rights, and the financial market will become more transparent and transparent. This concept should be depicted in the Saudi Arabian context. These works ought to tell us more about the effect of the highest leadership on accounting. They should also assist politicians in devising superior methods of employing, educating, and compensating TMTs that strike a proper balance between duty and speed.

2.1.1. The top management team size and earnings management

The association between the size of the top TMT and EsM is an important topic in CG and managerial finance. Establishing such a relationship is significant in establishing the influence of leadership organizations on the accuracy of financial statements and money-related activities of managers. The size of TMT is equal to the number of individuals in a company who occupy senior positions in the management, such as CEOs, CFOs, and senior vice presidents. It is an excellent indication of how the team can make intelligent financial choices and possess cognitive and professional diversity (Akter et al., 2024). This is a link to be considered since the size of the TMT has a significant influence on the decision-making process of companies. The right-sized management teams come with a lot of advantages, such for example, is that people can share ideas more easily and have better critical and evaluative skills. They are also in a position to check their own managing practices, particularly when it comes to EsM, which may involve the alteration of financial accounts. Carayannis (2008) explained that a team consisting of too many people may be difficult to coordinate, communicate, and make decisions within a short time. This may render financial controls less efficient. It is not necessarily a linear correlation between the size of the TMT and its management of earnings. Certain studies indicate that a team of approximately three to five people is most effective in seeking the optimal mix of skill variety and operational effectiveness. These teams are also likely to reduce the number of cunning methods to manipulate earnings and demand greater transparency in the financial reporting (Escribá-Esteve et al., 2009). Bwire (2018) has explained that TMT size is typically estimated in terms of senior members or proportionate to the size of the company or organization structure.

The analysis of the latest international research in recent years reveals that there is an increase in

interest in the impact of the size of a TMT on the quality of financial statements and EsM. Indicatively, Escriba-Esteve et al. (2009) discovered that medium-sized teams are more effective in preventing individuals from acting in an opportunistic manner due to the presence of a more diverse job and thought process. The opposite was also true, as Carayannis (2008) indicated that when organizational issues occur more frequently in larger organizations, it becomes difficult to make fast and effective decisions. This might render the regulations of controlling earnings weaker. Jabbour et al. (2013) argue that these smaller teams do not experience a lot of variety and have difficulties in managing things, which increases the probability of illegal EsM occurring. However, Boulhaga et al. (2023) demonstrate that the high number of workers of different types in teams makes the financial process easier and reduces the chances of theft. It is comparable to what is happening in Saudi Arabia, where governmental changes according to the Vision 2030 are supposed to enhance the information level and make businesses more responsible. Based on what has been mentioned, the following are the assumptions in this study.

H1: There is a negative relationship between moderate top management team size and earnings management.

2.1.2. The top management team's accounting and financial expertise and earnings management

Accounting and financial knowledge of TMT is a key factor that has a direct effect on how companies handle their earnings. The skills and knowledge that top executives have in areas like finance, auditing, accounting, and financial analysis are called their 'accounting and financial expertise'. Therefore, they have a deep and accurate understanding of financial reports, accounting standards, and the difficulties that arise when making financial accounts. One source of this knowledge is academic credentials, and the other is real-world experience gained in previous jobs or current senior positions (Chen et al., 2006). This knowledge is important because it helps with EsM, which is something that managers do all the time to reach specific goals, such as making the company look better or easing pressure from regulators. TMT members with knowledge of accounting and finance are able to notice and prevent fraudulent or unscrupulous ways of reporting funds. This translates to superior and honest financial reports (Zahra et al., 2007). Besides, the awareness facilitates the betterment of internal regulations and the development of trust in external inspectors. These two are significant in winning the confidence of the investors and other partners.

The idea of being aware of accounting and finance is highly associated with the degree to which a government performs. According to agency theory, highly experienced financial leaders are less prone to participate in opportunistic EsM as they will know about the risks involved legally and in regulations (Jensen & Meckling, 1976). The amount of knowledge at this level is usually determined by the number of years an employee has been working in accounting and finance, their educational background in accounting and finance, or professional-level qualifications, such as Certified Public Accountant (CPA) or Certified Financial Accountant (CFA) (among members of TMT) (Bwire, 2018). This connection is becoming more significant in developing nations and the Gulf. Studies such as Alghemary et al. (2024) indicate that having TMTs with knowledge regarding accounting and finance is an appropriate approach to make groups manage themselves, and as a result, it is less probable that people will engage in financial theft in areas where the government is weak. This is in concurrence with the efforts of Saudi Vision 2030 to simplify things. The Gulf research indicates that experience is significant in advancing the quality of the information and reducing the difference between financial reporting and the international standards. This proposes the following theory.

H2: There is a negative relationship between accounting and financial expertise within the top management team and earnings management practices.

2.1.3. The top management team's overall experience and earnings management

The overall experience of the TMT is the information and skills that are acquired by team members due to their various management and leadership positions. This is not financial and accounting knowledge but encompasses marketing, operations, human resources, strategy, and new ideas. It demonstrates the effectiveness of altering the team to the dynamic business conditions and the degree to which they are knowledgeable of the strategic and operational issues facing the organization (Hambrick & Mason, 1984). The general experience is critical as the TMT will be able to make a fair decision and pay attention to money only. The outcomes of these decisions must also be taken in terms of their impact on society, the economy, and the law. It is largely related to EsM, which is the art of achieving an ideal balance between the achievement of financial objectives and the satisfaction of all stakeholders. When the team consists of a great variety of diverse kinds of experiences, the team can become more open and accountable (Sacramento et al., 2024).

Third-world countries are increasingly becoming sensitive to this kind of relationship, particularly the Gulf countries. According to Alghemary et al. (2024), teams that have a high number of different types of experience are more capable of following the rules and addressing problems in the local market. This is what renders opportunistic EsM less probable. Additionally, a study conducted in the country reveals that a large amount of general experience can assist individuals in communicating more and making organizations appear more authoritative. This is very critical in areas that always evolve in terms of the economy and society (Alkebsee et al., 2025). On this, the theory presented below is proposed.

H3: There is a negative relationship between the general experience of the top management team and earnings management practices.

2.2. Corporate environmental sustainability and earnings management

Environmental sustainability implies that companies and organizations attempt to be less destructive to the environment, more economical of resources, and biologically balanced in the long run (Elkington, 1998). Environmental sustainability in business involves activities such as reducing carbon emissions, processing of trash, regulation of pollution, and sustainable use of resources. The concept does not only entail observing environmental regulations, but it also entails being proactive in the environment and incorporating environmental responsibility into the most crucial business operations (Hart & Milstein, 2003). Long term environmental health is now of great need in the realization that individuals such as investors, lawmakers, users, and society in general want companies to be more responsible for their effects on the environment. The perceived caring companies about the environment frequently receive a better reputation, an advantage over the competition, and have easier access to money (Clarkson et al., 2011). In addition, business control has also involved long-term environmental health, which has influenced the decision-making, as well as the citizens' remarks.

EsM and environmental protection are interconnected in a great number of ways. The financial reporting by managers can be modified to fit expectations or objectives, and this may make the true financial condition of any company difficult to discern (Healy & Wahlen, 1999). People call this EsM. Firms that take care of the environment tend to be more vigilant, and thus, in case they are found playing with profits, chances are that they receive more negative publicity. This provides such businesses with an incentive to cease playing games with their profits, with the aim of realizing short-term gains and simplifying things. However, Kim et al. (2012) state that profit management may be used by some businesses to conceal the expenses or issues with the attempt to contribute to the environment. One of the most common ways of measuring EsM is through discretionary accruals, which are based on models such as Jones (1991) and modified Jones (Dechow et al., 1995), as they reveal the number of changes in financial statements.

The latest world research studies of the past few years have been more and more showing that environmental sustainability and EsM are not conducive to one another. As an example, Boulhaga et al. (2023) discovered that more rules in and out of the company lead to businesses that are better for the environment engaging less in profit management. Similarly, Martínez-Ferrero et al. (2015) demonstrated that the financial records are also easier to work with and less dependent on the opinion of management when the environmental information is added. These tendencies are similar in the Gulf region and up-and-coming countries, yet the two regions have their problems. Alghemary et al. (2024) indicate that the intentions of Gulf companies to be environmentally sustainable are good towards CG and bad towards EsM. However, the effectiveness of this connection is determined by the regulations and the level of market development. According to a study based in a developing market by Ahmed Hashed and Ghaleb (2023), sustainability practices might not be that effective in preventing the change in earnings of companies due to the weaknesses in institutions and the market. The research and the holes that were discovered form the basis of the following theory:

H4: There is a negative relationship between environmental sustainability practices and earnings management.

3. METHOD OF RESEARCH

3.1. Data collection

To examine how TMT characteristics are associated with corporate environmental sustainability (CES) and EsM, data were collected in businesses across the Saudi Stock Exchange (Tadawul). The research took place between 2015 and the end of 2021, which is seven years. Following the examination of the initial group of data, 85 businesses were eliminated due to a lack of enough information on significant study variables such as the TMT mix, indicators of environmental sustainability, or the financial data required to quantify EsM. This was carried out to ensure the information was fine and accurate.

The end sample consisted of 131 companies, which required a lot of consideration, and full data was provided on all the years of study. The library of 917 observations can be utilized to benefit regression models that take into consideration the structural data (Arellano, 2003). This was multiplied by seven, giving the number of years. As an example, annual reports on the websites of businesses and the Tadawul site were mentioned as trustworthy. Financial databases such as Thomson Reuters and Bloomberg were also used to get information when necessary. They were abolished regarding the size of TMT, experience in accounting and finance, the comprehensive level of expertise, environmental sustainability values, and predetermined EsM values, as well as such control variables as the size of firms and leverage (Elamer et al., 2020).

3.2. Measurement of all variables

This section describes how the measurement of all the factors presented in Table 1 (independent, control, and dependent variables) took place.

Table 1. The definitions and measurements of all variables

Variable	*Abbreviation*	*Measurement*
Earnings management	*EsM*	To determine EsM, there is a use of discretionary accruals (DA). Dechow et al. (1995) made the Jones (1991) model better (Etemadi et al., 2018), and it is now a better method to find *EsM*. The two major components of DA are total accruals (TA) and nondiscretionary accruals (NDA)
$\frac{TA_{i,t}}{A_{i,t-1}} = \beta_1\left(\frac{1}{A_{i,t-1}}\right) + \beta_2\left(\frac{\Delta REV_{i,t}}{A_{i,t-1}}\right) + \beta_3\left(\frac{PRE_{i,t}}{A_{i,t-1}}\right) + \varepsilon_{i,t}$ (1)		
The size of top management	*TMS*	According to Al-Matari (2025), it can be measured by the number of top management members
Accounting and finance experience of top management	*TMSAC*	It is gauged by the proportion of top management members with expertise in finance and accounting (Al-Matari et al., 2024)
General experience of top management	*TMACX*	It is determined by counting the years of top management's overall experience (Escribá-Esteve et al., 2009)
Corporate environmental sustainability	*CES*	According to Qasem et al. (2022), the Bloomberg number is calculated based on the extent of information that a corporation reveals on environmental, social, and governance (ESG) issues
Leverage	*LVG*	Total debt to total assets is how it is calculated (Faqera et al., 2025; Farooq et al., 2025)
Total assets	*LGTS*	The market capitalization logarithm (Hussain et al., 2018)
Loss	*LOSS*	One dummy variable is used to measure it; 1 if the firm is losing, it is 0, otherwise (Al-Sayani & Al-Matari, 2023)
Big4	*Big4*	It is measured by Big4_Auditor = 1 → if audited by Deloitte, PricewaterhouseCoopers (PwC), Ernst & Young (EY), or Klynveld Peat Marwick Goerdeler (KPMG), or 0 → otherwise (Abdullah & Saleh, 2021)
Effectiveness of top management	*SCOREnew*	The score, which ranges from 0 to 3, is calculated by adding up three top management characteristics (*TMS*, *TMSAC,* and *TMACX*), with higher scores indicating better top management and lower scores indicating less effective top management

3.3. Model regression

As the primary statistical testing method, we have applied the OLS regression equation to test the relationship between the management of earnings and independent variables, including the characteristics and environmental sustainability of the TMT, and the control variables that appeared significant (Wooldridge, 2016). The sample comprises data on 131 of the Saudi Stock Exchange-traded businesses between 2015 and 2021. These companies possessed all the information that was required in the study; hence, they were selected. A total of 917 notes were created, and this resulted in an intensive analysis of the changes over time and differences between companies (Gujarati & Porter, 2008).

OLS was used to get the regression values, and the usual standard errors were fixed at the company and year level through clustering. This method ensures that the statistics are more credible by handling the possibility of endogeneity in errors within the data of an individual company or year. This is useful in minimizing bias in the process of calculating confidence intervals and significance tests (Cameron & Miller, 2015). It was also tested whether the model was right or not. As an example, variance inflation factors (VIFs) of the independent variables were verified to ensure that the variables did not have a strong relationship that could influence the predictions and thus render them inaccurate (O'Brien, 2007). One should ensure that the error variances are relatively constant to avoid regression values that do not perform well. This is achievable through seeking heteroscedasticity (White, 1980). This manner can be used to analyze other key economic and financial variables to examine the impact of the nature of the TMT and the long-term well-being of the environment on EsM. This facilitates arriving at the correct results, which are trustworthy, and how the companies under investigation spend money. This research uses the regression equation, which is like the one used in Campa et al. (2024) and Akter et al. (2024):

$$EsM = \alpha_0 + \beta_1 * TMS_{i,t} + \beta_2 * TMSAC_{i,t} + \beta_3 * TMACX_{i,t} + \beta_4 * CES_{i,t} + \beta_5 * LVG_{i,t} + \beta_6 * LGTS_{i,t} + \beta_7 * LOSS_{i,t} + \beta_8 * Big4_{i,t} + \varepsilon \quad (2)$$

4. EMPIRICAL RESULT

4.1. Descriptive statistics and correlation analysis

Descriptive statistics aim to give a general outline of the data of the study in measures that represent the data, e.g., means, standard deviations, and the lowest and highest values of each variable, as in Table 2. Based on the summary data, the average size of the TMT is 8.399 people, though with a variation due to the various companies. The average age of the accounting and finance experience of the top management team is 3.349 years, with the average general experience of top management being 82.998 years. This reveals the variations of the various TMTs with regard to experience and composition. The average of the corporate environmental sustainability was 0.980. This demonstrates that corporations are not undertaking numerous modifications to become greener. This could be due to their various resources and plans.

Descriptive statistics on financial factors like total assets and leverage also show a lot of variety. This shows that the sample companies have a lot of different kinds of financial numbers and spending arrangements. These results show what the study was about and what factors were looked at. They also help us make better choices about future statistical studies and make sure that the models we use are based on good data that is typical of the group that was looked at. The next job was to figure out Table 2, the VIF. Hair et al. (2010) said that if the VIF number is higher than 10, it means that multicollinearity is present. There was no multicollinearity because the VIF numbers were between 1.07 and 3.97.

Table 2. Descriptive statistics

Variable	Mean	Std. dev.	Min	Max	VIF	1 / VIF
EsM	-2.405	4.687	-6.034	5.985	-	-
TMS	8.399	3.390	2.000	16.000	2.12	0.472
TMSAC	3.349	1.995	1.000	9.000	3.97	0.252
TMACX	82.998	58.843	9.000	281.000	3.49	0.286
CES	0.980	0.718	-0.041	2.784	1.1	0.912
LVG	0.417	0.238	0.000	1.016	1.07	0.935
LGTS	6.011	1.662	0.000	9.282	1.01	0.989
LOSS	0.267	0.443	0.000	1.000	1.08	0.930
Big4	0.443	0.497	0.000	1.000	1.17	0.851
Mean VIF					1.88	

Note: The definitions of all variables are provided in Table 1.

Table 3 presents the findings of a Pearson correlation analysis that was performed to evaluate the degree of association between the research variables. The degree of link between the variables and their ability to measure it are shown by the correlation coefficient (r) values in Table 3. Cohen (1988) provided a more nuanced interpretation of correlations between 0 and 1.0; Hair et al. (2010) suggested that a correlation value of 0 denotes no link and ± 1.0 implies a perfect relationship. According to Cohen's scale, a correlation (r) between ± 0.1 and ± 0.29 signifies a weak link, between ± 0.30 and ± 0.49 implies a moderate relationship, and above ± 0.50 denotes a significant relationship. All associations had values less than 0.80, according to the study's findings. This is consistent with Gujarati and Porter's (2008) guideline that the correlation matrix should not exceed 0.80 to guarantee the absence of multicollinearity in the investigation.

Table 3. Correlation analysis

Variable	EsM	TMS	TMSAC	TMACX	CES	LVG	LGTS	LOSS	Big4
EsM	1.000								
TMS	0.061	1.000							
TMSAC	-0.009	0.711***	1.000						
TMACX	0.022	0.659***	0.835***	1.000					
CES	-0.034	0.011	0.049*	0.043	1.000				
LVG	-0.072**	-0.020	-0.030	-0.009	0.049*	1.000			
LGTS	-0.005	-0.024	-0.010	0.033	-0.034	0.024	1.000		
LOSS	-0.038	0.080**	-0.014	0.001	-0.123***	0.126***	0.046	1.000	
Big4	-0.070**	0.058	0.054*	0.120***	0.277***	0.196***	0.020	-0.140***	1.000

*Note: * p < 0.1; ** p < 0.05; *** p < 0.01.*

4.2. Regression results

Pearson's correlation coefficient results indicate statistically significant relationships between EsM and several independent variables. The correlation analysis revealed significant relationships between the main variables of the study. There is a positive but insignificant association between the size of TMT and EsM, indicating that a larger number of senior management members is associated with increased EsM practices. Conversely, a statistically significant negative association was found between the accounting and financial expertise of TMT and EsM, indicating that the presence of specialized financial and accounting expertise within senior management may reduce earnings manipulation practices. TMT's general experience had a good but weaker link with EsM. This means that its effect is less strong and maybe less important than the effect of financial knowledge.

As far as environmental sustainability is concerned, a weak and not significant negative correlation was established with EsM, which may suggest a tendency towards transparency and less manipulation in the companies that implement sustainable environmental practice, but the relation is not strong enough to be significant. There is also a weak positive relationship between financial debt and profit management. This may be because of the necessity to maintain the financial situation of the company in equilibrium, which compels the management to control revenue. The independent factors did not have any significant overlapping problems. This implies that the findings are accurate and reliable, and the appropriate measures have been established towards further statistical analysis.

The approach will be to apply the Breusch-Pagan Lagrange multiplier (LM) test to test the differences between OLS and random effects (RE) models. The main difference between these models is how they deal with their impact on individuals. A statistical test can be performed based on whether ui is present or absent, which means that it has a chance effect. The Breusch-Pagan LM test is a good choice for this evaluation. Individual varieties were not present if ui = 0 for all *i*. This was the main idea behind the test. When the Prob. > chibar2 number is greater than 0.05, as shown in Table 4, the shared OLS model is good. In these situations, Breusch and Pagan (1979, 1980) state that the shared OLS method is better.

In addition, the chance value (Prob. > chi2) is less than 0.05, as shown by the Breusch-Pagan/ Cook-Weisberg test for heteroskedasticity. The problem can be solved using strong estimation methods such as Eicker (1963) and White (1980), which show that the data are heteroskedastic. Huber came up with the idea of 'resilient standard errors' in 1967. Since then, better ways of determining solid standard errors in different situations, such as cross-sectional data and time-series data, have been created. Heteroscedasticity can be fixed using strong standard errors (Huber, 1967).

4.3. Results discussion

Table 4 results indicate that the size and EsM have a strong positive relationship. There are various ways of explaining this phenomenon in both scholarly and practical ways. According to Jensen and Meckling's (1976) agency theory, increasing the size of the management team may lead to divergence of interest and objective between managers and other stakeholders, thereby resulting in an easier ability to manipulate earnings. The opinion of people is that large management can have difficulties in coordinating and keeping an eye on things. The reason behind this is that by increasing the number, people might complicate the process of following the rules of the team and making clear decisions. In addition, job-based groups or teams internally might facilitate means of dealing with earnings in addressing personal or company objectives (Jensen, 1993). So, in the research studies that examine actual businesses, such as Healy and Wahlen (1999), it has been revealed that earnings manipulation may be more probable as a management group increases in size since internal control levels diminish and more individuals with differing interests are present. Cheng et al. (2021) also indicated that larger management teams tend to possess inaccurate financial records due to the ability to reach a compromise among all individuals over bad accounting habits.

Table 4 demonstrates that the accounting and financial expertise and EsM by the TMT have a statistically significant negative relationship. This is in line with the other research findings. When the top managers are well informed about accounting and finance, it becomes easy to understand and review accounting standards. This reduces the risks of earnings being tampered with by an individual (Krishnan, 2003). According to the internal control theory, possession of special knowledge enables individuals to control themselves because the managers are able to observe mistakes or any unlawful attempt to alter financial outcomes (Dechow et al., 1996). Moreover, managers who are aware of money have an opportunity to apply truthful and appropriate accounting practices, and this makes financial statements more credible. Recent studies, such as that by Chen et al. (2006), indicate that earnings manipulation will be less likely in case there is the presence of a CFO or any other member of the management team who has a high level of experience in the field of finance and accounting. It is an indicator that they are effective in ensuring that the company engages in the right accounting and financial practices.

Considering the statistics, one should exercise caution since there is a correlation between TMT general understanding and pay management practices. Employees with general business experience, such as management, marketing, or operations, have a more global understanding of the business and the market. This broad base of experience can assist the management in considering EsM as a resource to achieve the strategic objectives, such as to make the company more appealing to the buyers within the financial sector or ensure that the business is capable of getting cash flowing (Xie et al., 2003). However, one has to keep in mind that experience does not necessarily imply that one knows a lot about accounting standards. This implies that such things as EsM may occur without being observed or with appropriate supervision. Agrawal and Chatterjee (2015) indicate that in a competitive environment, the managers who lack the training in accounting can use tricks to conceal poor performance or to match the market standards. The top management can also be too confident in their competence to deal with financial reports due to their overall experience. This increases the chances of them altering earnings to achieve non-monetary goals.

The statistics indicate that there is a poor association between environmental sustainability and pay management practices. This relationship is, however, not significant, and this raises the question as to how strong and conclusive the relationship may be. Environmentally conscious companies are regarded as more upright and more socially accountable; therefore, chances of being fraudulent in their accounting are minimal (Clarkson et al., 2011). Sustainable environmental practices are also integral to a larger scheme to ensure the name of a company, as well as adhere to good governance, is sustainable (Aguilera et al., 2021), which makes it less attractive or required to misrepresent profits. Nevertheless, research has indicated that the impact of environmental sustainability on EsM might be determined by a variety of external variables, including the kind of business, the company size, and the extent of corporate control (Velte, 2017). This could weaken the link between the two factors, which could mean that the relationship is statistically insignificant in certain groups or times. Zhang (2019) also states that placing environmental sustainability standards in place needs strong support from top management and the right kind of rules in place to have a clear effect on the quality of financial reporting, such as cutting down on EsM.

There was also a statistically significant negative link between how well top management performed their jobs and how they handled earnings. Increasing the efficiency and effectiveness of the TMT makes it less likely that they will manipulate earnings or use other unethical ways to manage earnings. This impact occurs because good top management can make better financial choices based on more information and has better control over internal processes. This makes financial reports clearer and reduces dishonesty (Alghemary et al., 2024). This connection supports the idea of CG, which states that good management works as a watchdog between consumers and the company, lowering the chance of illegal behavior, such as earnings manipulation (Fama & Jensen, 1983). In addition, how well management works shows how well they can use accounting methods that are in line with laws and standards. This makes financial reports more trustworthy to investors and other important people (Bwire, 2018). As a result, top management's success is a key factor in lowering EsM techniques. As a result, financial information requirements are raised, and companies become more transparent.

A 2SLS method was used to make sure the results were right and to look for endogeneity among the factors. The 2SLS model results back the main results of the first study. This added to the certainty of the findings and showed that there is a link between the TMT's traits, environmentalism, and EsM. People who write about finance and accounting consider 2SLS a safe way to handle endogeneity problems and make sure that numbers are stable (Wooldridge, 2016).

Table 4. OLS regression results

Variable	*Coef.*	*t*	*p > t*
TMS	5.808 **	2.34	0.02
TMSAC	-13.266**	-2.35	0.019
TMACX	0.229*	1.77	0.078
CES	-2.870	-0.34	0.736
LVG	-31.470**	-2.69	0.007
LGTS	-0.173	-0.04	0.967
LOSS	-18.433	-1.29	0.198
Big4	-21.317**	-2.33	0.02
_cons	5.412	0.17	0.865
Number of obs.	917		
Prob. > F	0.012		
R-squared	0.024		
Root MSE	143.690		

*Note: * p < 0.1; ** p < 0.05; *** p < 0.01.*

5. FURTHER INVESTIGATION

5.1. Result using two-stage least squares

The two-stage least squares technique is a more complex method of employing econometrics to correct endogeneity issues in a regression equation. Endogeneity occurs when an independent variable is related to a mistake variable. This makes this data erroneous and not necessarily identical. This issue may occur in those studies that examine the effectiveness of senior management and EsM. This may occur due to a lack of consideration of certain factors, reversal of their relationship, or even errors in measurements. 2SLS corrects this by including instrumental variables (IVs), which are related to the internal factors of explanations but not the error. This is a two-step process. To begin with, predictive instruments were applied to predict trouble variables. These values are then projected, and this explains the dependent variable (e.g., salary management). Under this approach, one is able to get precise and equitable estimates of the effectiveness of top management in managing earnings.

A useful aspect of 2SLS is that it can show direct relationships instead of just associations. This helps researchers and practitioners to understand how management traits affect earnings manipulation. This information is very important for improving company control and the quality of financial reports.

A number of new studies have used 2SLS to examine administration and earnings levels. Chen et al. (2006), for example, used 2SLS to show how board experience changes revenue management while considering endogeneity. Finally, the 2SLS analysis results in Table 5 confirm the first results, showing a strong and reliable link between the success of top management and EsM being negatively related.

Table 5. 2SLS was used in an endogeneity test

Variable	*Coef.*	*z*	*p > z*
TMS	5.808**	2.35	0.019
TMSAC	-13.27**	-2.37	0.018
TMACX	0.229*	1.78	0.076
CES	-2.870	-0.34	0.734
LVG	-31.470***	-2.71	0.007
LGTS	-0.173	-0.04	0.967
LOSS	-18.433	-1.3	0.195
Big4	-21.317**	-2.34	0.019
_cons	5.412	0.17	0.864
Number of obs.	917		
Wald chi2(8)	20.11		
Prob. > Chi2	0.01		
R-squared	0.024		
Root MSE	142.89		

*Note: * p < 0.1; ** p < 0.05; *** p < 0.01.*

5.2. Test the effectiveness of top management and earnings management

The link between senior management efficiency and EsM can be studied quantitatively using statistical analysis. This method measures how top leaders' traits and skills affect their ability to manipulate earnings. To do this kind of analysis, you need to gather quantitative data on management effectiveness indicators, such as their experience, accounting and financial knowledge, and the quality of their decisions, as well as measures of EsM, which are usually found through DA or real EsM proxies (Cheng et al., 2021). Statistical significance tests, as shown in Table 6, such as t-tests on correlations, are used to determine if the connections seen are important or if they could have happened by chance. Researchers may also incorporate control variables, such as firm size, industry sector, and regulatory environment, to isolate the effect of senior management characteristics and improve the robustness of the findings (Bwire, 2018; Escribá-Esteve et al., 2009).

Reasons why we should carry out such studies of this sort of statistical study are many. First, this approach finds causal or related but not merely descriptive relationships, which provide us with tangible evidence concerning the question of whether and how the success of upper management influences EsM (Al-Matari et al., 2024). Second, it demonstrates to the companies and lawmakers which areas of management (such as financial knowledge and team size) are most effective in deterring any earnings trickery. It is useful in hiring, training, and control (Ananzeh, 2024).

Additionally, statistical analysis assists in enhancing CG frameworks, which demonstrates the management characteristics that promote openness and responsibility in financial reports. Such information aids authorities and standard-setters who desire to establish mechanisms for preventing the opportunistic behavior of people (Zahra et al., 2007). As an academic endeavor, this paper contributes to the existing literature by either validating or discrediting theoretical conceptions of management behavior and financial disclosure originating in the agency theory, stewardship theory, and stakeholder theory (Eisenhardt, 1989; Jensen & Meckling, 1976). Lastly, the findings of this analysis would enable investors and other financial professionals to have a clearer picture of the risk of companies and make wiser decisions. The reason is that an understanding of the effect of management on the quality of earnings alters the perceived reliability of the financial statements among the people (Zhang, 2019). Finally, the systematic evidence on the impact of the quality of leadership on the integrity of financial reporting requires statistical research on the effectiveness of senior management and EsM. The implications of these discoveries for CG, market trust, and sustainable organization are very far-reaching. Lastly, the research shows a statistically significant negative correlation between senior management effectiveness and EsM, meaning that improvement in senior management effectiveness is correlated to lower earnings manipulation.

Table 6. Test of the effectiveness of top management and earnings management

Variable	*Coef.*	*t*	*p > t*
SCOREnew	-14.032*	-1.8	0.072
CES	-3.658	-0.5	0.617
LVG	-31.752	-1.45	0.147
LGTS	-0.034	-0.01	0.991
LOSS	-13.598	-1.16	0.246
Big4	-18.270*	-1.67	0.096
_cons	46.511**	1.94	0.053
Number of obs.	917		
Prob. > F	0.002		
R-squared	0.014		
Root MSE	144.18		

*Note: * p < 0.1; ** p < 0.05; *** p < 0.01.*

6. CONCLUSION

This paper demonstrates the complex relationship between the nature of individuals in the TMT, the environmental friendliness of the firm, and the EsM in the Saudi financial market between 2015 and 2021. The positive correlation between the TMT size and EsM is statistically significant. Therefore, the introduction of older management can be of help in enhancing EsM. Conversely, the negative relationship between accounting and financial knowledge of top management and EsM is statistically significant. This indicates that financial knowledge plays a professional and supervisory role in reducing earnings manipulations. It was also discovered that the overall experience of the management team correlated with the improvement of the pay management, but this was not a statistically significant outcome. Caring for the environment and earnings control are having bad association, though it is not significant. This needs to be studied more. The 2SLS approach has been applied to ensure that the findings were correct and to investigate the existence of auto-heterosis. The method proved that the findings were consistent and significantly different, and this fact made the discovery more reliable.

Assessing the connections between TMT features, environmental protection, and profits management in a new market such as Saudi Arabia, the study can add to the body of literature on CG and financial management. This study is a combination of financial, environmental, and managerial aspects to offer a new approach. This is one topic that has not received adequate attention from previous studies, especially in this field. To start with, the study shows that there is a relationship between the size of the TMT and its capability to handle profits. Second, the study shows the importance of having a strong financial and accounting background in TMTs in order to minimize the manipulation of profits. Third, although the correlation between the experience of senior management and improved salary management is not found to be statistically significant, our study indicates that there is a possibility of it being so. Fourth, EsM and environmental sustainability are not statistically significantly correlated in the study. Fifth, the study uses advanced statistical methods like clustered standard error correction and 2SLS to enhance the validity of the data and prove the hypothesis that one variable has caused another.

In reality, the report delivers effective strategic advice to CG organizations and boards of directors. As an example, it underlines that there is a need to alter the structure of the senior management team to make it more transparent and stop manipulating profits. In addition, the findings of the study can also be applied by the regulatory/supervisory bodies to formulate guidelines and policies that would encourage full and honest disclosure, and also establish sound checks and balances on the composition of TMTs to ensure that they possess the required expertise. This not only makes the financial markets more stable but also makes investments less risky as well.

This research has a number of limitations that must be mentioned. First, the sample is limited to those firms that are based in Saudi market which can restrict the extrapolation of the results to other institutional or regulatory setting. Second, the research is within a given number of years and thus the findings might be important to the economic conditions that existed in the sample years. Dissimilar time horizons would bring about dissimilar outcomes. Third, the research makes use of the OLS estimation method, which, despite being a popular method in accounting and finance studies, may not resolve the possible econometric problems, including endogeneity, dynamic impacts, or unobserved heterogeneity. The future research can also take into account other forms of estimation like panel GMM/fixed-effects models to improve the rigor.

This paper recommends that the relationship between EsM and environmental sustainability be further researched. Future research ought to focus on the businesses over prolonged durations of time past 2021, and in a wider range of economic sectors. Also, it is suggested that the reports of corporate social responsibility and certified environmental performance assessment must be incorporated as the definitive environmental and social indicators. Also, this study suggests both simple regression methods and more advanced quantitative economic processes. 2SLS and multilevel models were among them. Through these methods, the researchers can possibly solve the endogeneity bias and heteroscedasticity problem and arrive at more dependable and precise results about the connections between variables. Moreover, the application of analytical methods, which can combine both cross-sectional and longitudinal data, is better to enhance the reliability and validity of the results in describing the behavior of businesses. Lastly, it emphasizes the necessity to incorporate more financial markets, both geographically and organizationally, and more industrial sectors in future research in order to compare the way the qualities of TMTs and the sustainability of the environment influence EsM in many various contexts.

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