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The Influence of Corporate Governance on Technological Innovation Performance in Saudi Arabia

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Abstract

Corporate governance (CG) has become increasingly significant in many countries, including Saudi Arabia, particularly following regulatory reforms introduced in 2017. While it is commonly believed that effective CG can foster technological innovation, most existing evidence for this relationship is indirect. This study seeks to provide direct empirical evidence regarding the impact of CG on innovation among Saudi firms. Using panel data from 100 companies listed on the Saudi Tadawul exchange, the research employed descriptive statistics, correlation analysis, and multiple regression to identify potential predictors of innovation. The findings indicate that board independence and the presence of an audit committee are positively and significantly associated with R&D intensity and patent output, suggesting their importance in promoting technological innovation. In contrast, CEO duality was found to have a significant negative impact on innovation measures, while ownership concentration showed no significant effect. Overall, corporate governance factors were found to account for 37% of the variation in R&D intensity, highlighting their substantial role in determining innovation performance among Saudi firms. Despite these insights, the study acknowledges limitations such as a scarcity of prior literature directly addressing the relationship between CG and technological innovation.

Keywords: Corporate Governance, Innovation, Board variables, R&D intensity, Patents.

Introduction

In an era defined by rapid technological change and heightened global competition, corporate governance (CG) is increasingly recognised as a key driver of firm innovation capacity and sustainable performance. Effective CG structures, including transparent board composition, robust audit committees, and clear regulatory oversight, are believed to create an environment that not only ensures accountability and strategic alignment but also encourages research, development, and the adoption of innovative practices (Ma et al., 2024; Makpotche, Bouslah, & M'Zali, 2024). The nexus between CG and technological innovation is particularly significant for economies seeking to transition towards knowledge-based, diversified, and resilient economic models, such as Saudi Arabia under its Vision 2030 framework (Elfakharani, 2024; Kateb & Belgacem, 2024).

Globally, recent empirical studies underscore the multifaceted relationship between CG mechanisms and firm innovation output. It has been shown that various board characteristics—such as board size, the independence of directors, CEO duality, and executive incentives—can affect innovation intensity and the overall innovation trajectory of organisations (Ma et al., 2024; Mardini, 2025). In some contexts, technological innovation has been found to mediate the impact of governance variables on firm performance, reinforcing the pivotal role governance practices

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play in stimulating innovative activities (Ma et al., 2024; Chang & Wang, 2024). Additionally, enhanced governance practices have been associated with increased investment in green research and development, as well as improvements in environmental and technological performance (Makpotche, Bouslah, & M'Zali, 2024; Chang & Wang, 2024).

In Saudi Arabia, substantial CG reforms were enacted in 2017, including the introduction of the Saudi Corporate Governance Regulations (SRCGs) and the mandatory adoption of International Financial Reporting Standards (IFRS) (Kateb & Belgacem, 2024). These measures were aimed at enhancing the transparency, accountability, and operational efficiency of firms listed on the Tadawul Exchange, thereby supporting the country's broader goals for economic diversification and innovation-led growth (Elfakharani, 2024). Despite these efforts and the observable rise in patent filings and improved rankings in the Global Innovation Index (GII, 2025), questions remain as to whether strengthened governance frameworks have translated into tangible improvements in technological innovation across Saudi firms.

Prior studies focusing on the Saudi context have reported mixed outcomes. For instance, Almubarak and Aljughaiman (2024) found that board independence positively facilitates innovation in the financial sector, whereas an excessive board size may negatively impact fintech innovation. Similarly, Mardini (2025) reported positive effects from both board and audit committee independence on corporate innovation in GCC firms, while Alnor (2024) highlighted the importance of audit committees and environmental sustainability initiatives in driving business performance. However, Kateb and Belgacem (2024) observed that audit committee characteristics alone do not necessarily correlate with improved firm performance, suggesting the influence of context-specific factors and the potential for unintended consequences from regulatory compliance.

Despite a growing body of international research on the CG-innovation link, direct empirical studies examining this relationship within the context of Saudi Arabia remain limited and inconclusive (Mardini, 2025; Kateb & Belgacem, 2024). Given the broader economic and regulatory changes underway, there is a need for a more granular understanding of which governance mechanisms most strongly support innovation among Saudi firms, and how these effects manifest in terms of research and development (R&D) intensity, patent output, and the introduction of new products or processes.

To address this gap, the present study investigates the influence of key CG variables—including board independence, audit committee presence, CEO duality, and ownership concentration—on technological innovation performance among companies listed on the Tadawul Exchange. By deploying multivariate quantitative methods and focusing specifically on the post-reform period, this research aims to provide direct, context-specific evidence to inform policymakers, corporate leaders, and stakeholders on how best to align governance structures with innovation-driven economic development goals in Saudi Arabia.

Literature Review

Using data collected from 597 companies listed on the Chinese A-share, with a period of 5970 sample observations over 10 years from 2012 to 2021, Ma, Rahim, Panatik, and Li (2024) showed that equity balance degree, board size, and executive incentives had a positive impact on corporate performance. Technological innovation mediated the relationship between the independent variables (equity balance degree, board size, and executive incentives) and corporate performance. Focusing on only the listed Chinese firms may restrict the extension of

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these findings to other regulatory and socio-cultural contexts.

Based on a sample of 3,896 firms from 2002 to 2021, covering 45 countries worldwide and using Tobin's Q model, Makpotche, Bouslah, and M'Zali (2024) showed that CG enhanced investments in green R&D. A 1%-point increase in the corporate governance ratings led to an increase in green R&D expenses to the total asset ratio of about 0.77%. An increase in the score of each dimension (strategy, management and shareholder) of CG led to an increase in the probability of green product innovation. Green innovation was positively related to firm environmental performance in terms of emission reduction and resource use efficiency.

Utilising the Environment, Society, and Governance (ESG) ratings of publicly listed companies—first introduced by SynTao Green Finance—as an exogenous factor, the study by Chang and Wang (2024) examined China's A-share listed firms from 2011 to 2022. Employing a multi-period differences-in-differences model, the authors empirically assessed how ESG rating soft supervision influences corporate green technology innovation. The findings indicated that ESG rating events, functioning as a form of soft market regulation, significantly enhanced corporate green innovation efforts. Additionally, external environmental factors, intense market competition, and heightened capital market attention further contributed to fostering corporate green technology advancements.

Song, Xiu, Zhao, Tian, and Wang (2024) noted an inverted U-shaped relationship between intellectual property protection (IPP) and innovation performance in the Chinese market. The panel data of listed firms from 2012 to 2020 were analysed. Research and R&D intensity and the quality of information disclosure mediated this relationship.

From a survey of 264 senior executives of Yemeni pharmaceutical firms, Al-Hattami, Almaqtari, Abdullah, and Samed Al-Adwan (2024) observed that DAS effectiveness (bookkeeping system, DAS security, IFRS adoption, and budgeting system) and the success of DAS (system quality, information quality, and service quality) influenced CG.

Saudi Studies

Analysis of the data on a sample of 12 Saudi banks for the period 2014–2019 by Almubarak and Aljughaiman (2024) showed a significant and negative influence of board size on a bank's FinTech score. Independent members on the board brought more FinTech services (innovation development) to the bank, leading to enhanced CG performance.

The recent governance and accounting reforms in Saudi Arabia were aimed at fostering a vibrant financial sector with an advanced capital market aligned with Vision 2030. Kateb and Belgacem (2024) analysed a sample of 135 companies listed on Tadawul Exchange over four years, covering both pre- and post-2017. This period was selected because the Saudi Corporate Governance Regulations (SRCGs) and mandatory IFRS adoption were adopted in 2017. Audit committee size, experience, and meetings did not influence firm performance indicators. Compliance with the SRCGs prioritised meeting regulatory requirements, and it did not improve the effectiveness of audit committees. The Big 4 auditing firms had a positive and significant effect on Tobin's Q. Board meetings positively impacted Tobin's Q and negatively influenced ROE. Board independence negatively affected Tobin's Q only. The mandatory adoption of IFRS was negatively related to all three firm performance measures (Tobin's Q, ROA, ROE), possibly due to factors like transition costs, changes in accounting methods, unique national practices, and a shortage of skilled Saudi accountants.

In the studies of Alnor (2024) the data of 131 Saudi listed firms from 2015 to 2021 were analysed using econometric methods. The size and independence of audit committees and environmental sustainability affected business performance positively. Audit committee meetings negatively affected performance.

Elfakharani (2024) aimed to study the effect of Vision 2030 on Multi-National Corporations (MNCs) in Saudi Arabia. Legislative and regulatory changes, strategic changes, and effects on competitiveness and development were studied. Using thematic analysis of interviews with eight managers and executives, the author showed that organisations were fundamentally changing their operational strategies according to the changes in the regulatory environment. These legislative changes influence investment decisions. More funds are available for local initiatives and environmentally friendly technology. Some of the consequences for foreign businesses include maintaining a competitive edge and strategic flexibility while navigating a complex legal framework.

Mardini (2025) analysed 213 firms from the GCC countries (2018 to 2022) and found that a larger board size negatively affected corporate innovation. Greater board independence and audit committee independence, and the presence of foreign directors positively influenced innovation.

Research on CG influence on technological innovation in Saudi Arabia seems to be scarce

Methodology

Research Design

This study employed a quantitative research design to analyse the impact of corporate governance on technological innovation performance among publicly listed companies in Saudi Arabia. The study utilised a cross-sectional approach. The data were collected from annual reports and surveys on company executives. Quantitative methods are deductive processes, more objective and provide precise numerical information on the phenomenon being investigated (Ahmad, et al., 2019).

Data Collection

Sampling

A stratified random sampling method was employed to select 100 firms listed on the Saudi Stock Exchange (Tadawul) across key non-financial sectors (e.g., manufacturing, ICT, energy). The stratification was done at the sector level. Firms were included if they had disclosed relevant corporate governance and innovation data from 2021 to 2023.

Variables and Measurement

The following independent and dependent variables were measured.

Independent Variables (Corporate Governance Indicators):

- Board Size (number of directors)
- Board Independence (% of independent directors)
- Audit Committee Presence (binary: 1=Present, 0=Absent)
- CEO Duality (binary: 1=CEO is also board chair, 0=otherwise)

- Ownership Concentration (% shares held by top 5 shareholders)

Dependent Variable (Technological Innovation Performance):

- R&D Intensity (R&D expenditure/total sales, %)
- Number of patent applications per year
- Innovation Output (introduced new products/processes, binary: 1=Yes, 0=No)

Data Analysis

The data analysis process began with descriptive statistics to provide an initial understanding of the distribution, central tendency, and variation in the key variables. This included computing means, standard deviations, minima, and maxima for both independent variables (such as board size, board independence, audit committee presence, CEO duality, and ownership concentration) and dependent variables (R&D intensity, number of patent applications, and innovation output). These descriptive statistics allowed for a comprehensive review of the sample characteristics, offering insights into the general governance and innovation climate of Saudi listed firms.

Following this, Pearson's correlation analysis was conducted to evaluate linear relationships between each corporate governance indicator and the measures of technological innovation. The correlation coefficients (r) and corresponding significance levels (p -values) were calculated for all combinations of governance predictors and innovation outcomes. This provided preliminary evidence of associations—both positive and negative—between independent and dependent variables, and helped in identifying which governance factors warranted further scrutiny in multivariate analysis.

To rigorously test the predictive power of governance variables while controlling for potential confounders, multiple linear regression analysis was then implemented. The primary regression model used R&D intensity as the dependent variable, with board size, board independence, audit committee presence, CEO duality, and ownership concentration entered as independent variables. Firm size and sector were included as control variables to account for potential differences arising from company scale and industry context. Regression coefficients (B), standard errors (SE), standardized Beta values, t -statistics, and significance levels were all reported to facilitate an in-depth assessment of each factor's unique contribution to innovation performance. Model fit was evaluated using R^2 and F -statistics, providing an indication of the proportion of variance in R&D intensity that could be explained by the corporate governance model.

For the robustness of the analysis, all assumptions underlying the multiple regression technique, including normality, linearity, homoscedasticity, and absence of multicollinearity, were formally checked. Any potential outliers or influential data points were identified and assessed, ensuring the reliability and validity of the regression results.

The results obtained using these data analysis methods are presented below.

Results

Descriptive Statistics

Variable	Mean	SD	Min	Max
Board Size	8.75	2.35	5	15
Board Independence (%)	48.6	15.2	21	80
Audit Committee (0/1)	0.92	0.28	0	1
CEO Duality (0/1)	0.36	0.48	0	1
Ownership Concentration (%)	32.5	10.4	12	60
R&D Intensity (%)	2.15	1.12	0.1	5.7
Patent Applications	8.3	7.2	0	34
Innovation Output (0/1)	0.54	0.50	0	1

Table 1: Descriptive Statistics of Key Variables

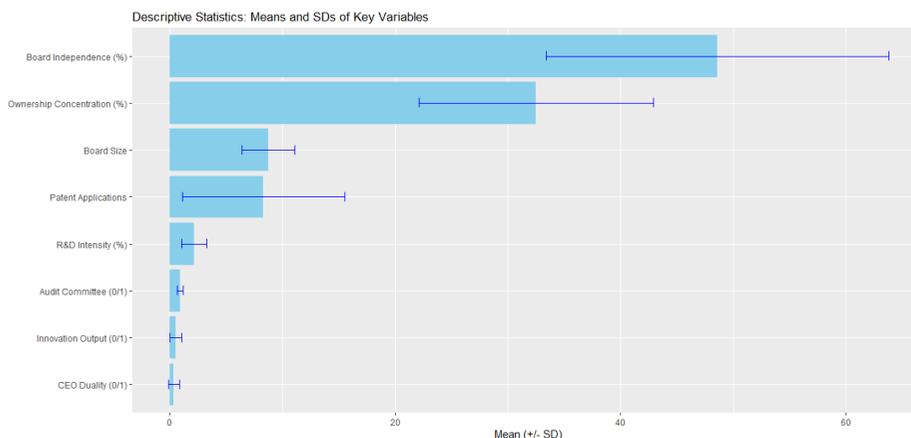


Figure 1: Descriptive Statistics of Key Variables

Board size varied between 5 and 15 members, with an average value of 8.75, lower than the halfway mark. Board independence varied between 21 and 80, with an average value of 48.6, lower than the halfway mark. On a range of 0 to 1, the audit committee scored 0.92, meaning most firms had audit committees. The mean value of CEO duality was 0.36 over a range of 0 and 1. Thus, in most companies, there was no CEO duality. Within the range of 12 to 60, ownership concentration was found only in 32.5% of the firms. R&D intensity, used as a measure of innovation, had a mean value of 2.15 with a range of 0.1 to 5.7, less than the halfway mark. Thus, innovation was absent or at a very low level in most firms. Within a range of 0 to 34, the average patent applications was only 8.3, indicating a low level of innovation. Over a range of 0 to 1, innovation output was 0.54, slightly higher than the halfway mark. Thus, there is a slight contradiction between innovation output and R&D intensity or patents.

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Variable	R&D Intensity	Patent Apps	Innovation Output
Board Size	0.18*	0.12	0.17*
Board Independence	0.36**	0.31**	0.29**
Audit Committee	0.25*	0.21*	0.20*
CEO Duality	-0.30**	-0.25**	-0.19*
Ownership Concentration	-0.11	-0.09	-0.17*

Table 2: Pearson Correlations (r) Between Key Variables

Note: *p < 0.05, **p < 0.01

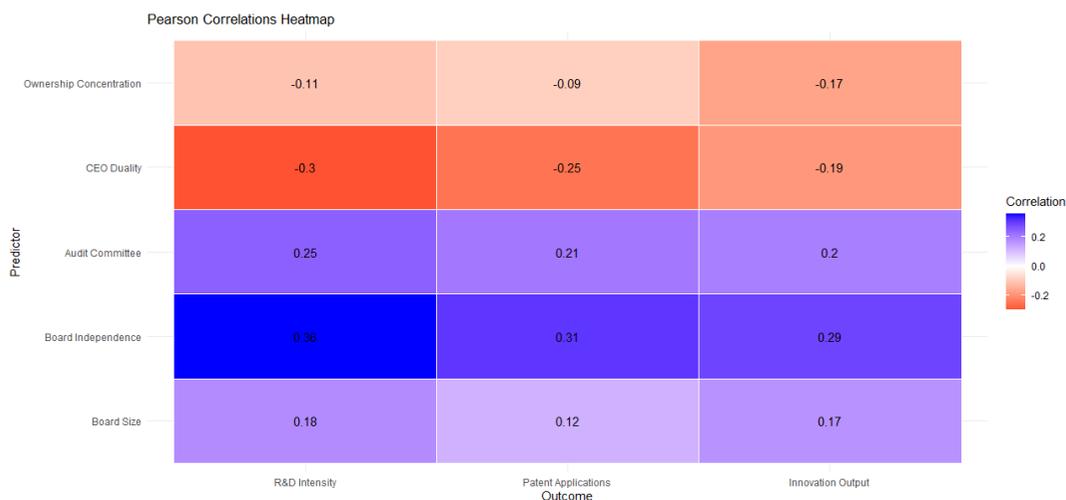


Figure 2: Pearson Correlations (r) Between Key Variables

The relationship of board independence with all innovation variables was highly significant at $p < 0.01$, the correlation coefficients being 0.36, 0.31 and 0.29. The relationship of CEO duality with R&D intensity (-0.30 , $p < 0.01$) was highly significant and was negative. The relationship between CEO duality and patent application was negative and highly significant, with $r = 0.25$, $p < 0.01$. The relationship of board size with patent applications and all relationships of ownership concentration with R&D intensity and patent applications were non-significant. These correlation coefficients ranged between 0.09 and 0.12. All other relationships were significant at the $p < 0.05$ level, their r values ranging from 0.17 to 0.25.

Regression Analysis

Predictor	B	SE	Beta	t	P
Board Independence	0.021	0.005	0.29	4.20	<.001
Audit Committee	0.431	0.172	0.17	2.51	0.014
CEO Duality	-0.319	0.131	-0.21	-2.44	0.017

Predictor	B	SE	Beta	t	P
Board Size	0.047	0.027	0.13	1.75	0.083
Ownership Concentration	-0.006	0.009	-0.07	-0.68	0.496
Firm Size (Control)	0.085	0.033	0.19	2.58	0.011

Table 3: Multiple Regression Results (Dependent Variable: R&D Intensity)

Model R² = 0.37, F (6,93) = 9.16, p < 0.001

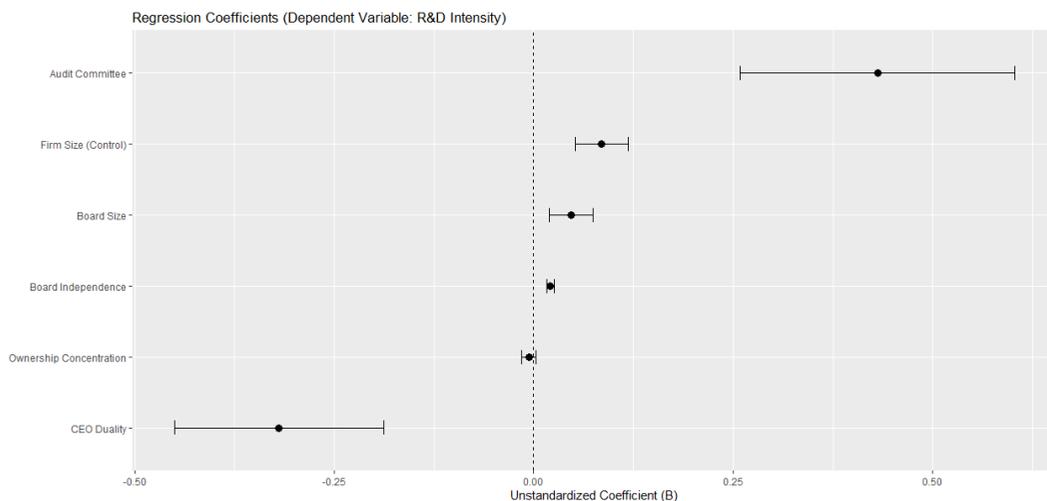


Figure 3: Regression Coefficients

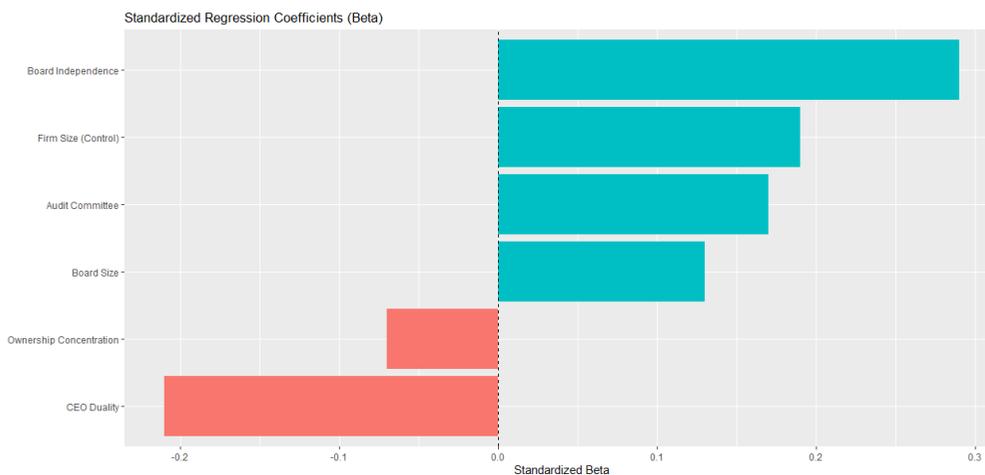


Figure 4: Standardised Regression Coefficients

The multiple regression analysis showed all factors except board size and ownership concentration emerging as significant predictors. Thus, the regression equation will be

$$\text{R\&D intensity} = (0.021 + 0.29 \text{ board independence}) + (0.431 + 0.17 \text{ audit committee}) - (0.319 - 0.21 \text{ CEO duality}) + (0.085 + 0.19 \text{ firm size}).$$

Based on the coefficients, the strongest positive predictor is the audit committee, and the only strong negative predictor is CEO duality. For every unit increase in R&D intensity, the audit committee needs to increase by 0.17 units. Since the mean value of the audit committee was closer to one, indicating the presence of audit committees in most firms, increasing it by 0.17 units will cross the presence of the audit committee's value. This is a difficult situation. On the other hand, CEO duality tends to pull down innovation, as a strong negative predictor. For each unit increase in R&D intensity, CEO duality needs to decrease by 0.21 units. The less than halfway mark of CEO duality in descriptive statistics restricts the scope for reducing CEO duality. All factors of CG together accounted for 37% variation in R&D intensity.

Summary of Key Findings

The key findings are:

1. The Board Independence and Audit Committee's presence showed a significant positive impact on R&D intensity and patent output.
2. CEO Duality negatively impacts innovation measures.
3. No significant effect was found for ownership concentration.
4. Corporate governance accounted for 37% of the variation in R&D intensity, indicating a substantial influence on technological innovation performance in Saudi firms

The findings of this study reveal a significant link between aspects of corporate governance and technological innovation performance among Saudi Arabian firms. Specifically, board independence and the presence of an audit committee were both found to have a notable positive impact on research and development (R&D) intensity as well as patent output, underscoring the crucial role these governance mechanisms play in fostering innovation. In contrast, the separation of the CEO and board chair roles proved beneficial, as CEO duality negatively impacted innovation measures. Meanwhile, ownership concentration did not demonstrate any significant effect on technological innovation across the sample. Collectively, the corporate governance factors assessed in this study accounted for 37% of the variation observed in R&D intensity among firms, highlighting the substantial influence that governance structures can exert on a company's innovation efforts. These results provide valuable empirical evidence for policymakers and corporate leaders aiming to enhance innovation through robust governance practices, while also pointing to the need for further research given the modest sample size and the generally limited literature on the direct relationship between corporate governance and innovation in the Saudi context.

Discussion & Conclusion

As was pointed out in the results of the descriptive statistics, the strong points were that most firms had audit committees and did not have CEO duality. The presence of audit committees is a favourable factor and CEO duality is a negative factor. While only 0.17 units are required for the presence of an audit committee to raise R&D intensity, 0.21 units of CEO duality decrease R&D intensity by one unit. Most of the sampled firms had audit committees, whereas only a few had CEO duality. So, relatively, the impact of CEO duality will be much lower than the impact of audit committees. Thus, there is good potential for enhancing innovation by these firms. This potential is also evident from the low mean scores for R&D intensity and patent applications despite slightly high innovation output. These findings may be indicative of innovations in activities unrelated to financial performance.

In the Global Innovation Index ranking, Saudi Arabia has been steadily improving its position from 66th in 2020 to 47th in 2024, 36th in innovation inputs and 66th in innovation outputs. Thus, innovation outputs do not match inputs. Patents are steadily increasing from about 2k in 2020 to 2.6k in 2022 (GII, 2025). This shows a high level of innovation in the country. However, the innovations are mainly related to digital transformation and technology development aligned with its Vision 2030.

The findings of this study needs to be positioned in this context. The mismatch between the results of this study and the GII trends reinforce the contention that the Saudi firms use innovations for non-performance variables.

There is evidence that technological innovation either directly impacts (Makpotche, Bouslah, & M'Zali, 2024; Chang & Wang, 2024) or mediates the relationship between CG variables like board size and performance (Ma et al., 2024).

A negative effect of board size on the innovation performance of Saudi banks was observed by AlmuBarak and Aljughaiman, (2024) and Mardinin (2025). In this study, board size positively influenced innovation variables. In the studies of Kateb & Belgacem, (2024), only the positive effect of CG variables on performance was reported. Global firms in Saudi Arabia promoting local innovations by allotting more funds was reported by Elfakharani, (2024).

Thus, there are many inconsistencies between the findings of other studies and this study. Since Saudi studies also report such findings, the contextual differences may not be able to explain them.

Limitations of this Study

There was scarce literature directly dealing with the influence of CG on technological innovation in any country. Hence, in this study, the findings were interpreted mainly based on internal evidence.

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