

# **THE MEDIATING EFFECT OF INNOVATION ON THE RELATIONSHIP BETWEEN CORPORATE GOVERNANCE AND FIRM PERFORMANCE: EVIDENCE FROM DEVELOPED AND DEVELOPING COUNTRIES**

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## **ABSTRACT**

*Prior studies have shown that innovation has a mediating effect on the relationship between corporate governance and firm performance. This study compares this mediating effect in developed and developing countries using agency theory and signaling theory. A panel sample of 2,688 firms in developing and developed countries is analysed for the period of 2002–2017. The empirical findings demonstrate that corporate innovation fully mediates the relationship between corporate governance and firm performance in developed countries. However, innovation partially mediates the relationship between corporate governance and firm performance in developing countries. This could be because of different socioeconomic factors and capabilities of innovators involved in corporate governance structure. The study has both theoretical and policy implications and provides insights for policy makers for identifying the influence of innovation on firm value and evaluating the importance of corporate governance.*

**Keywords:** corporate governance, developed and developing countries, firm performance, innovation, mediating effect

## **INTRODUCTION**

Every organisation in the service and manufacturing sectors or any other grouping wants to ascertain how they can achieve enhanced profits and ensure sustainability. This goal becomes even more imperative in the current highly competitive market. One potential strategy to improve profitability is through effective corporate governance (Adedeji et al., 2020; Jamil et al., 2021). Prior studies mention that corporate governance can improve firm performance (Bhatt & Bhatt, 2017; Pillai & Al-Malkawi, 2018). Companies with good governance can ensure investors' safety, protecting them from corporate scandals (Bhatt & Bhatt, 2017). Firms that follow corporate governance codes tend to reduce agency conflict and information asymmetry between agents and principals, and can then reduce agency costs (Huu Nguyen et al., 2020). Corporate governance is a tool to boost investors' confidence and the financial health of firms (Mishra & Mohanty, 2014). From investors' perspective, firms with good corporate governance are attractive and have higher market capitalisation which positively impacts firm performance (Widiatmoko et al., 2020). Conversely, it has been shown in the literature that without a strong governance system, many problems occur and that a weak governance system is the main reason for the failure of firms or financial crises (Udin et al., 2017; Yang et al., 2017). The literature demonstrates that there is a direct correlation between corporate governance and firm performance (Ciftci et al., 2019). Corporate governance is the internal driver that can enhance the performance of firms. There are also external drivers that can potentially enhance firm performance. In the contemporary environment, a potentially significant external driver is adopting innovation and technology to reduce risks, increase returns, and enhance overall performance (Lee et al., 2019). Many scholars suggest that innovative activities could help firms and organisations to improve their work and achieve their objectives in a shorter period (Gunday et al., 2011; Teece, 2010).

Corporate governance structure and its implications for firm performance vary considerably between developed and developing countries. Board size is one area which illustrates this difference. According to Rashid (2008), in developing countries, a larger board improves outcomes for shareholders, while the converse is true for developed financial markets. Another significant point of difference is ownership structure. The literature suggests that in developing countries, corporate governance is limited and creates difficulties. Families tend to exert considerable control over businesses, shareholders are often not engaged, there may be insufficient legislative control, and expertise may be lacking (Khan et al., 2013; Mahmood et al., 2018; Ullah & Rahman, 2015). This pattern of family control and

flimsy corporate governance can be seen in developing countries such as those in South Asia. The dominance of family ownership may result in carelessness about shareholder benefits (Bae et al., 2018; Khan et al., 2013; Muttakin et al., 2018).

In addition, the literature also notes differences between corporates in developed and developing countries in relation to disclosure. In developed countries, disclosure of information, especially in relation to corporate social responsibility (CSR), is used to enhance corporate status and public esteem (Momin & Parker, 2013). Disclosure of CSR information is also important to satisfy the requirements of different stakeholders such as regulators, creditors, investors, and environmentalists. However, in developing countries the influences on corporate disclosure are different (Alnabsha et al., 2018). In developing countries, influential external interests determine CSR disclosure such as international buyers, foreign investors, or the views of the international media (Ali et al., 2017).

Furthermore, the literature has also established that both good governance and innovation promote improved performance in many firms. Firms make more investments on innovative activities during the initial stage rather than during the mature stage (Shahzad et al., 2022). Mature firms prefer to maintain assets for enlargement compared to their counterparts, so they prefer to invest in growth-oriented innovation projects (Richardson, 2006). However, McGahan and Silverman (2001) argued that innovation investments were more substantial in mature firms than emerging firms. Although these arguments are found in the studies investigating at which stage a firm adopts more innovative technology, the results are various among developed and developing countries (Audretsch et al., 2021; Tariq et al., 2019). This is particularly the case, when corporate governance is involved in strategic plans (Bianchini et al., 2018; Iyengar & Sundararajan, 2020; Jia et al., 2019). Less attention has been paid to how corporate governance affects the impact of innovative factors on firm performance (Gooderham et al., 2011), particularly to the relationship between corporate governance and innovation of firms in developed and developing countries. It has been shown that companies in developed countries who incorporate environmentally responsible practices into their primary business plans are more likely to obtain financial resources from green financial markets than those in developing countries (Manrique & Martí-Ballester, 2017). Accessing these financial benefits, in turn, enables firms to initiate innovations to improve firm performance. Furthermore, better quality public governance improves the capacity of corporate governance to reduce risks associated with innovation (Jia et al., 2019). By contrast, in developing countries, while globalisation has influenced corporate governance standards, these standards have not been applied to innovative practices (Khanna et al., 2006).

There is extant research that considers corporate governance in different countries (Bae et al., 2018; Iqbal et al., 2019; Pillai & Al-Malkawi, 2018), but there is still a need for a more comprehensive investigation of the difference between developed and developing markets (Panda & Leepsa, 2017). Likewise, a few studies argue that innovation has a mediating role in the relationship between corporate governance and organisational performance. In these cases, individual countries were examined, as in the work of Khan et al. (2019) and Umrani et al. (2017). However, there is still a gap in terms of looking at the differences between developed and developing countries, to ascertain how corporate innovation influences the relationship between corporate governance and organisational performance.

To address these identified gaps, this paper examines the mediating role of innovation on corporate governance and firm performance across developed and developing countries. The hypothesis of the mediating role of innovation is based on two theories, agency theory and signaling theory. While the relationship between corporate governance and firm performance is investigated based on agency theory, the relationship between corporate governance and innovation is examined with reference to signaling theory (Xia et al., 2022). It has been shown in the research that corporate governance structures relay different messages about innovation to the market and various stakeholders (Bae et al., 2018). If board members support innovation, they can demonstrate the potential importance of this in more detail. For example, a corporate innovation plan can be demonstrated through research and development (R&D) which is scaled according to expenses (Fernández-Sastre & Montalvo-Quizhpi, 2019). When collecting data from Compustat, this study double checks on how the measured innovation, namely the R&D expenses, is evaluated. From the database, there are no International Financial Reporting Standards (IFRS) adoption differences across the 17 countries' data, so the measurement used in this study is consistent for all the countries in the sample. Furthermore, according to Shah et al. (2013), there are no differences in the value relevance of R&D expenses in the pre- and post-IFRS periods. All these prove that the measurement of R&D expenses as a proxy for corporate innovation in the research sample is consistent over time.

The current study aims to contribute to the research literature in several ways. Firstly, the study can assist decision makers, analysts, policy makers, practitioners, and shareholders in both developed and developing countries to understand the different impacts of corporate governance and firm performance through consideration of the role of corporate innovation. Secondly, this study offers an academic contribution by demonstrating how differences in corporate governance structures impact on the influence of innovation on a firm's value.

## **THEORETICAL BACKGROUND AND HYPOTHESIS FORMULATION**

### **Agency Theory**

Agency theory depends on the agency relationship between shareholders and the management of companies. Shareholders are the owners of the company; they elect directors to act on behalf of the shareholders. The director's aim is to represent the owners and work on their behalf. On occasions, directors may, knowingly or unknowingly, make decisions which are not beneficial to the interests of the shareholders. When the owners and managers do not work effectively together, conflict may arise, and firm performance may vary based on their choices. Conflicts that arise can affect firm performance adversely. Agency theory is based on the relationship between an agent and the principal shareholders. The agent works on behalf of the principal shareholders. Problems arise when the interests of the two parties diverge, and the agent does not act for the principal shareholders' benefit. These conflicts arise due to miscommunication or other factors that lead to financial losses (Liew et al., 2015, 2017, 2021, 2022; Liew & Devi, 2020, 2022). Corporate governance changes the rules of agency theory to introduce motivation strategies that motivate the agent to work for the best interest of shareholders and resolve conflicts.

Regarding agency conflict in firms listed in developed and developing countries, it has been shown that remuneration packages and board independence are not effective tools for governing owner managers in some developing countries (Yusuf et al., 2018). Compared with developed countries, firms listed in emerging markets face some problems relating to information asymmetry which can lead to stock volatility (Kumar & Tsetsekos, 1999; Pillai & Al-Malkawi, 2018). It has been suggested by some authors that there are relevant authorities who try to minimise problems such as monopolies, inadequate managerial market regulations, and imbalances affecting minority shareholders (Pillai & Al-Malkawi, 2018). Nevertheless, as different national cultural factors affect corporate governance practices (Humphries & Whelan, 2017), firms in developed countries do tend to have contract enforcement measures, dispersed and separate ownership, as well as better regulations and protection of minority shareholders' rights (Awasthi, 2017). Consequently, agency conflicts between stakeholders are minimised.

### **Signaling Theory**

This theory relates to the response of the stock market to information (Connelly et al., 2011). This response includes the presentation of the intellectual capital and innovation in an annual report in firms for signaling external investors about

intangible assets and development (Woudstra et al., 2017). Innovation disclosure can also inform external stakeholders about the company's competitive position (Widiatmoko et al., 2020) which could enhance firm performance (Chege et al., 2020). Additionally, board independence, board size, and women directors can enhance "environment," "social," and "governance" (ESG) voluntary disclosure (Lagasio & Cucari, 2019). Higher ESG scores can communicate the positive indicators to investors of the competitive advantage of enhancing corporate sustainability performance (Alsayegh et al., 2020).

While firms in developed and developing countries adopt innovation in different ways, the signals to investors can assume different forms. Supporting factors generating innovative activities are dependent on policies of capital markets and regulation as well as financial support to promote and value the innovative firms (Zhang et al., 2021). When there is a higher level of institutional ownership, firms tend to adopt innovative technology and green innovation to enhance firm performance in the long term (Shu et al., 2020). This depends on regulations and the nature of the region or country and how this affects innovative activities, which, in turn, influences firm performance (Burrus et al., 2018). For example, state ownership in the Chinese market plays an important role in R&D intensity in innovation (Yi et al., 2017). Moreover, the inefficiency of state ownership in transforming R&D input into innovation output decreases when industrial competition is high (Zhou et al., 2017).

### **Corporate Governance and Firm Performance**

Corporate governance involves a set of relationships between a company's management, its board, its shareholders, and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined (Yasser et al., 2011). All countries have their own official procedures according to their customs, political environment, religious beliefs, and social and economic backgrounds. Countries have their own set of corporate governance codes that protect the rights of stakeholders. Corporate governance is one way to deal with agency problems when conflict arises between owners and agents, resulting in variations in firm performance. Corporate governance changes the rules or introduces motivation strategies that motivate the agent to protect the interests of shareholders and resolve conflicts. Corporate performance is related to the number of agents on the board, board independence, the extent of gender diversity, and CEO duality (Bhagat & Bolton, 2008).

## **Board Size and Firm Performance**

The ideal board size depends on the size of the organisation and its diversification. The board of directors (BOD) manages the work of organisations, and all work is done under the supervision or guidance of the BOD. They resolve issues related to any transactions and any conflict that arises between parties. Under the supervision of an efficient BOD, a firm's performance can be enhanced. Some aspects of the relationship between a BOD and a firm's performance have been explored in the literature. Riaz et al. (2017) report that there is a significant relationship between board size and firm performance based on their study of 168 listed companies of the Lahore Stock Exchange (LSE). Yasser et al. (2011) explore the significant relationship between board size and firm performance through return on equity (ROE) and return on assets (ROA) in the 30 Pakistan listed firms used in the study. Nicholson and Kiel (2007) report that the BOD are the main resources of the organisations that are linked with the external environment or provide unique resources to the organisations. Prior studies indicate that there is an insignificant relationship between board size and firm performance for small sized firms (Chbib & Page, 2020). One plausible explanation is that with a large BOD, more problems arise due to communication gaps, coordination issues, and differences in interests. If these issues that are associated with a large board are resolved, then firm performance should improve.

## **Board Independence and Firm Performance**

The board of a firm consists of both executive and non-executive directors. The role of independent directors is to represent shareholders and resolve agency problems. Researchers report mixed results regarding the relationship between board independence and firm performance. It is not necessarily the presence of many independent directors that will enhance a firm's value, although this might bring about positive changes in a firm's performance. The positive impact of non-executive directors will vary according to contextual factors and different countries. Kakabadse et al. (2010) argue that in China, the system of non-executive directors is weak due to the greater involvement of dominating shareholders. Mohammad et al. (2016) indicated that in Malaysian companies, 33% of non-executive directors on the board is not enough for effective monitoring. McCabe and Nowak (2008) interviewed 30 directors of Australian listed companies and based on their findings, reported that the inclusion of more non-executive directors has a positive effect on a firm. More non-executive directors are a safeguard against management issues. A negative association between non-executive directors and firm performance could occur because of inefficient monitoring and the dominating role of managers (Haniffa et al., 2006).



## **Female Directorship and Firm Performance**

Another area of debate in the research literature is the topic of women's representation in business and the role of females on a board. More typically, board members are male. Bernile et al. (2018) and Yasser et al. (2015) contend that if there is diversity on the board, this brings in different ways of thinking and perspectives and correspondingly leads to greater creativity and more innovative ideas in the organisation. Yasser et al. (2015) also suggest that women may be better at understanding the market situation and make sounder decisions compared to men. The image of a firm is also improved when there is greater diversity among board members and can positively affect a firm's performance. In recent years, empirical studies on the effect of female directors strongly indicate that having more female directors may enhance the performance of the firm (Green & Homroy, 2018). The gender diversity literature points out some factors that positively associate with firm performance (Terjesen et al., 2016). A diverse board offers greater expertise in decision-making and more knowledge and information sharing that positively affects firm performance. Additionally, women are seen to be very realistic and keen observers of the market (Eagly, 2007; Gudjonsson et al., 2020).

## **CEO Duality and Firm Performance**

The chief executive officer (CEO) duality occurs when a single person performs both the role of CEO and chairman of the BOD (Krause et al., 2014). The role of the CEO is to operate a firm in an efficient way. A CEO needs to make an efficient plan and implement it to achieve the objectives of the firm. Yasser et al. (2015) conducted a study to examine the relationship between CEO and firm performance of Pakistani listed companies using data from 2007 to 2011 as a sample; for this purpose, the data were collected from Karachi Stock Exchange (KSE). The two theories that underpinned this study were agency theory and stewardship theory; the findings did not indicate a significant association between CEO duality and firm performance. Firms with CEO duality is unable to enhance performance as compared with firms without CEO duality. With CEO duality, decisions take time, particularly when monitoring activities need to be approved by the highest authority from both the management and governance team (Tuliao & Chen, 2017). Prior literature also explores how CEO duality can lead to firm failure. If the CEO and the chairman are separated, the chances of bankruptcy are fewer, a firm can raise capital, and shareholders show more confidence in the firm (Ehikioya, 2009; Fosberg, 2004; Yermack, 1996).



The United States firms prefer the duality of CEO and chairman, and regulators and investors prefer a duality structure. Many firms separate the duality role of CEO and chairman and they do so because of the requirement of the environment. Overall, there are different arguments related to CEO duality, some in favour of and some against CEO duality. Stewardship theory argues in favour of CEO duality while agency theory argues against CEO duality.

### **Corporate Governance and Innovation**

The literature examines the effect of corporate governance on innovation (Lu & Wang, 2018; Rejeb et al., 2019). The discussion in the literature concerns the relationship between managerial compensation, directors, ownership structure, and innovation (Chen & Jermias, 2014). The stance taken by scholars in this regard depends on their theoretical perspective. In the perspective underpinned by resource dependence theory, the board of directors not only provides resources to the organisation, but also performs monitoring functions (Haynes & Hillman, 2010). Independent boards focus on various areas of technology to improve innovation performance alongside existing strategies, without hindering the opportunity for breakthrough (Balsmeier et al., 2017). In contrast, the followers of agency theory illustrate that when a manager's interest and an owner's interest are not aligned, a manager's shortsighted approach to long-term investments can have a negative effect on innovation or firm value (Chen & Jermias, 2014). Likewise, if directors or managers do not have long-term shares or rewards in a firm, they tend to focus on the short-term performance-oriented goals and ignore innovations which are beneficial for the long-term value creation of a firm. Owing to a longer time horizon and uncertainty about results, the executive may feel hesitation while putting resources into strategically oriented innovative projects. Based on prior studies, the first hypothesis is developed as follows:

H1: Corporate governance is significantly associated with corporate innovation.

### **Innovation and Firm Performance**

In evaluating the success of innovation, researchers employ different methods. One measure of the success of innovation is firm performance (Reijonen & Komppula, 2007). This indicates that innovation has a direct effect on the outputs of innovation and the firm's performance. Similarly, it is argued that firms developing innovative strategies attain greater opportunities for growth and success in businesses as compared to those businesses who do not develop these kinds of strategies (Baldwin & Gellatly, 2003). Because of innovative strategies, productivity can be increased

in a firm and a firm can also attain competitive advantages (Anning-Dorson, 2018). Firms that engage in innovative activities tend to be highly profitable or demonstrate greater growth. Within the limitations of firm size, small young firms which are regularly involved in innovative activities can compete in the market or enjoy high profits (McKelvie et al., 2017). In addition, Liao et al. (2021) found that the effect of corporate innovation on firm performance is stronger in developing countries compared to developed economies. Furthermore, Manogna and Aswini Kumar (2021) argued that the relationship between corporate innovation and firm performance depends upon country specific factors such as economic conditions and the structure of the economy, innovation policies, industrial policies, R&D subsidies, intellectual property laws, and demand conditions. They further argued that all or some of these factors differ between developed and developing countries which implies that the relationship between corporate innovation and firm performance may differ between developed and developing countries. Pekovic et al. (2015) further found that the determinants of innovation performance differs between developed and developing countries and since innovation influences firm performance, their findings also imply that the influence of corporate innovation on firm performance differs between developed and developing economies. Gómez-Bolaños et al. (2022) further discovered that multinational enterprises (MNEs) from developed countries with stronger institutional quality are better able to absorb globally acquired knowledge and improve their innovation performance compared to MNEs from developing countries with weaker institutional quality. Since innovation influences firm performance, it is arguable that their findings also imply that the influence of firm innovation on firm performance in the context of MNEs differs between developed and developing economies.

Furthermore, Zhang and Ma (2021) found that corporate innovation mediates the relationship between corporate governance, i.e., environmental management and firm economic performance. In addition, Van Hiel et al. (2018) found that education widens the gap of the level of innovation between developed and developing economies which implies that firm performance differs as well between these two types of countries as a result of differences in the level of innovation. This may suggest that corporate governance which can be a result of the education of the corporate board can influence the level of innovation of the firm which in turn influences firm performance and this differs between developed and developing economies. Hence, the mediating effect of innovation on the relationship between corporate governance and firm performance may differ between developed and developing economies. In addition, prior studies also indicate that corporate governance has a significant relationship with corporate innovation. Firms can improve their value by adopting essential innovations. This can be achieved through the support of the corporate board who recognise the alignment between

their management purposes and the value added to principal shareholders. Based upon all the arguments, the following hypotheses are generated:

H2: Innovation is significantly associated with firm performance.

H3: Corporate innovation mediates the relationship between corporate governance and firm performance.

## EMPIRICAL STUDY

### Data Collection, Population, and Sampling

The nature of the data is panel data; panel data is a combination of time and cross data. The data was collected from the Compustat database over the period from 2002 to 2017. The population of the present study consists of developed regions (Austria, Belgium, China, Denmark, Finland, France, Germany, Great Britain, Hong Kong, Japan, Korea, Switzerland, and United States), and developing economies (Pakistan, India, Taiwan, and Turkey). This categorisation is based upon the classification developed by Nielsen (2011). Samples are selected based on the availability and completeness of R&D data. The present study used data from 17 countries: Austria, Belgium, China, Denmark, Finland, France, Germany, Great Britain, Hong Kong, Japan, Korea, Switzerland, United States are part of the developed regions; and Pakistan, India, Taiwan, Turkey are included in the developing economies. The total sample size of the study is 2,688 firms. The percentages of population and sample size for the countries involved are indicated in Table 1.

Table 1  
*Population and sample size of the study*

Country	Population	Samples	Percent
Austria	143	11	0.4
Belgium	156	12	0.44
China	1,290	97	3.61
Denmark	267	20	0.75
Finland	363	27	1.02
France	866	65	2.42
Germany	1,080	81	3.02

*(Continued on next page)*

Table 1: (Continued)

Country	Population	Samples	Percent
Great Britain	1,874	141	5.25
Hong Kong	145	11	0.41
India	717	54	2.01
Japan	4,860	366	13.61
Korea	1,249	94	3.5
Pakistan	1,695	128	4.75
Switzerland	624	47	1.75
Taiwan	1,542	116	4.32
Turkey	213	16	0.6
United States	18,633	1402	52.17
Total	35,717	2,688	100

## **Variables**

The dependent variable in this study is the firm performance measured by return on assets (ROA) presenting the ratio of earnings to total assets before interest and taxes. Prior studies used the same indicator to examine the association between corporate governance and firm performance as per Wu et al. (2020), Danoshana and Ravivathani (2019), and Maseda et al. (2015). ROA is one of the financial performance dimensions used in corporate governance studies (Azila-Gbettor et al., 2018). ROA shows the effects on performance of the board decisions on investments (Buallay et al., 2017). ROA reflects the efficiency of the firm in using its innovative resources to generate profits (Isidro & Sobral, 2015). Regarding the independent variables, four measures are used for measuring the effect of corporate governance. Board size (BS) is measured through the number of total members on the board. Board independence (BI) is the ratio of the number of independent directors to the number of all directors. CEO duality (CEOD) is measured as a dummy variable, zero value if CEO and chairman are the same and one if the CEO and chairman are separate. Female directorship (FD) is measured with a dummy variable, one if there are female directors on the board and zero otherwise.

In keeping with the work of Kao et al. (2019), the current study uses firm size (FS), financial leverage (LEV), and sales growth (SG) as control variables. Different characteristics of firms in developed and developing markets affect corporate government structure differently. Larger companies are likely to be more diversified, and thus might be subjected to higher agency and bureaucratic

costs (Choi et al., 2007). Small firms may also have trouble in minimising agency problems (Lopez-Gracia & Mestre-Barberá, 2015). However, some studies state that small companies are frequently managed and owned by only one person and thus do not face this issue (Lopez-Gracia & Mestre-Barberá, 2015). For this study, firm size is measured by the natural logarithm of total assets. In terms of LEV, agency conflicts become more serious when a company is in financial difficulty (Lopez-Gracia & Mestre-Barberá, 2015). A firm with a high LEV ratio is more vulnerable to business shocks, since it has less ability to repay debt (Kao et al., 2019). As LEV is individual firm leverage, external control and capital structure need to be monitored by creditors to protect interests. This study measures financial leverage by using total debt to total equity. Regarding firm growth, Clarkson et al. (2008) argue that profitable firms reveal their organisational legitimacy by complying with environmental regulations because they are better positioned to adopt them, while poorly performing firms may choose to limit disclosure or remain silent on the matter. Sales growth is measured by the ratio of current year sales minus previous year sales divided by previous year sales.

From an investor perspective, innovation as a firm’s long-term R&D investments could be a risk if it relates to long-term uncertain outcomes. This could generate high agency costs. Appropriate corporate governance mechanisms can affect the decision-making of managers and corporate R&D efforts. In addition, R&D efficiency is positively associated with ROA (Wu et al., 2020). In this study, innovation is used as a mediator. Corporate innovation is measured through the ratio of R&D expenses to sales. Table 2 presents the variables used in this study.

Table 2  
*Variables, measures, and abbreviations*

Abbreviation	Variables	Measures
L1	Lag 1	Lagged level 1 of the ROA
L2	Lag 2	Lagged level 2 of the ROA
R&D	Research and development	Research and development expenses to sales
CEOD	CEO duality	CEO duality is a dummy variable which take a value of zero if the CEO is also chairperson of the BOD and one otherwise.
BI	Board independence	The ratio of the number of independent directors to the number of all directors
BS	Board size	Number of board directors include chairperson and independent directors

*(Continued on next page)*

Table 2: (Continued)

Abbreviation	Variables	Measures
FD	Female directorship	Dummy variable one if there are female directors on the board and zero otherwise
FS	Firm size	Natural logarithm of total assets
LEV	Leverage	Total debt to total asset
SG	Sales growth	Ratio of current year sales minus previous year sales divided by previous year sales
ROA	Return on assets	Ratio of earnings before interest and taxes to total assets
INNO	Corporate innovation	Ratio of R&D expense to sales

### Data Analysis

Data analysis is a transforming process for obtaining useful information. Heteroskedasticity is checked by Breusch-Pagan LM test, autocorrelation is checked with Durbin-Watson H test, and multicollinearity is checked by a correlation matrix. Variance inflation factor (VIF) is the test of multicollinearity. We checked the VIF values; Table 5 shows all values are less than 5. This means there is no multicollinearity issue in the variables. Heteroskedasticity results are significant which means that heteroskedasticity issues exist (Gujarati & Sangeetha, 2007).

Table 5  
*Variance inflation factor*

Variable	VIF	1/VIF
R&D	1.03	0.970480
CEOD	1.01	0.987435
BI	1.01	0.985358
BS	1.00	0.996754
FD	1.00	0.999823
FS	1.05	0.949297
LEV	1.02	0.977023
SG	1.00	0.999867

The endogeneity issue is also checked for in this study. This study employs the technique of a two-step dynamic panel system estimation for analysis. To evaluate the mediation, a generalised method of moment (GMM) system estimation is used. The current study applies a two-step dynamic GMM estimation for the following reasons. Firstly, the present study uses dependent variables which are likely to be

measured as annual data, and it seems desirable to use a dynamic panel estimation to allow for this. Secondly, there is a possibility of unobserved heterogeneity with regressors, and GMM estimation is used to control such effects. The lagged dependent variable in the two step dynamic panel data system estimation controls some of the effect of omitted variables varying over time.

A GMM produces consistent parameters (Arellano & Bond, 1991; Blundell & Bond, 1998). Roodman (2009) mentions that Arellano-Bond estimators use a one and two step estimation. He notes that the two-step dynamic panel estimation of the GMM estimation of the standard error tends to be severely downward biased, therefore, the present study applied the two step GMM estimator to evaluate mediation across developed and developing countries over the period of 2002–2017.

Tests were employed to ascertain whether innovation mediates the relationship between corporate governance and firm performance. Empirically, the test is done by applying the two-step dynamic estimation model. Lagged values of dependent variables could control endogeneity issues. Regarding the mediation check, this study follows the work of Baron and Kenny (1986). To test the mediating model of innovation between corporate governance and firm performance, the following conditions must be fulfilled. The first condition is that the independent variable (corporate governance variables) must affect the mediator (innovation). The second condition is that the independent variable (corporate governance variables) must affect the dependent variable (ROA). The third condition is that the mediator (innovation) must affect the dependent variable (ROA). If these conditions are fulfilled, then the fourth condition can be considered. For the fourth model, if the independent variable (corporate governance variable) is significant in the presence of mediator (innovation), there is partial mediation. If the independent variable is insignificant in the presence of the mediator, there is full mediation.

$$\text{INNO}_{i,t} = \alpha + \beta \text{CG}_{i,t1} + \gamma \text{Z}_{i,t1} + \varepsilon_{i,t} \quad (1)$$

To test model 1, INNO is corporate innovation, corporate governance is the vector of the corporate governance variable (board size, board independence, CEO duality and female directorship) the dummy variables. Z is the vector of the control variables (leverage, firm size, and sales growth).

$$\text{ROA}_{i,t} = \alpha + \beta \text{CG}_{i,t1} + \gamma \text{Z}_{i,t1} + \varepsilon_{i,t} \quad (2)$$

To test model 2, ROA is a dependent variable measured as ratio of earnings to total assets before interest and taxes. Corporate governance is the vector of the corporate



governance variable (board size, board independence, CEO duality, and female directorship), CEO duality and female directorship are the dummy variables.  $Z$  is the vector of the control variables (leverage, firm size, and sales growth).

$$ROA_{i,t} = \alpha + \beta INNO_{i,t} + \gamma Z_{i,t} + \varepsilon_{i,t} \quad (3)$$

In model 3, to check the effect of corporate innovation on ROA, INNO is the research and development, measured as ratio of R and D expense to sales.  $Z$  is the vector of control variables (leverage, firm size, and sales growth).

$$ROA_{i,t} = \alpha + \beta CG_{i,t} + \delta INNO_{i,t} + \gamma Z_{i,t} + \varepsilon_{i,t} \quad (4)$$

To test model 4, where the dependent variable is ROA, other variables are defined as before.

### **Descriptive Statistics**

Table 3 reports the descriptive statistics. In this regard, the mean value of ROA is 4.339. The mean value of leverage is 0.307 which means 30% of firms' finance is through leverage. From the samples, most firms are large-sized firms. Where the mean value of CEO duality is 0.607, the CEO and chairperson are the same persons in the firms. The data shows 43% of the directors on the board are independent. Regarding board size, the average board number is nine while the mean value of female directors is 0.644. The data demonstrates that only 4.5% is spent on corporate innovation.

Table 3  
*Descriptive statistics*

Variable	Obs	Mean	Std. dev.	Min	Max
ROA	2,688	4.339	18.066	-386.21	794.396
R&D	2,688	0.045	0.122	-0.007	10.751
CEOD	2,688	0.607	0.488	0	1
BI	2,688	43.539	31.996	0	95.03
BS	2,688	9.912	2.84	3	27
FD	2,688	0.644	0.479	0	1
FS	2,688	16.561	5.663	0.01	100.91
LEV	2,688	0.307	0.314	0	13.379
SG	2,688	1.017	118.388	-1	21993.2

Table 4 reports on the correlation tests. R&D is positively correlated with corporate governance, which shows that with proper management and provision of resources to the organisation, firm performance would improve. This finding aligns with the study of Chen and Jermias (2014). Leverage is negatively correlated with ROA which means that when organisations used more financial leverage, it affects the firm value negatively. This outcome corresponds with that reported by Das et al. (2022). Size is positively correlated with ROA which shows that if firm size increases, then firm performance also improves. Board independence, women directors and board size are positively correlated with ROA, which shows that a more independent board enhances firm performance, the presence of females on the board increases a firm’s value and a large board size also increases a firm’s value. This result is consistent with the findings of Puni and Anlesinya (2020). CEO duality is negatively correlated with ROA, which shows that if the CEO and chairperson are the same person this would negatively affect the firm’s performance. This occurs when CEOs possess additional informal power (Wijethilake & Ekanayake, 2019).

Table 4  
Correlation matrix

	ROA	LEV	FS	RD	CEOD	BI	BS	FD
ROA	1							
LEV	-0.0674	1						
FS	0.0509	0.1139	1					
R&D	-0.3562	0.034	-0.1612	1				
CEOD	-0.0087	-0.0314	-0.0936	0.0117	1			
BI	0.0131	-0.0835	-0.0666	0.0337	0.0616	1		
BS	0.0018	-0.0367	-0.0311	0.0046	0.0243	0.0316	1	
FD	0.0056	-0.0019	-0.008	0.0011	-0.005	-0.0035	0.0048	1
SG	-0.0018	-0.0041	0.0002	0.0007	-0.0056	-0.0028	-0.0058	-0.0063

## EMPIRICAL FINDINGS AND DISCUSSION

### Impacts of Corporate Governance and Innovation on Firm Performance

Table 6 shows the GMM results for the different GMM models used in this research. For developing countries, regarding model 1, the relationship between corporate innovation and corporate governance, corporate governance has a significant relationship with corporate innovation in developing countries. These results are

aligned with previous studies. Firms with good corporate governance are more likely to have better innovative performance. Diverse board size and firms with CEO duality tend to invest in research and development.

For developing countries, regarding model 2, the relationship between firm performance and corporate governance, results show that CEO duality has a negative, yet significant association with firm performance ( $\beta = -1.29$ ,  $p = 0.01$ ). This finding is not aligned with the study of Wijethilake and Ekanayake (2019) which reports that CEO duality improves firm performance when board involvements are high. This could be because CEO duality exerts a negative effect on firm performance, particularly when the CEO is equipped with additional informal power. The higher the number of roles held by directors, the lower the firm's performance (Merendino & Melville, 2019). Board independence has a significant and positive association with firm performance, and the results are aligned with the study of Uribe-Bohorquez et al. (2018) who state that the greater the independence of the board is, the better the firm performance. The positive impact of independent directors on efficiency is greater when firms operate in countries with a greater extent of law and enforcement (Uribe-Bohorquez et al., 2018). However, increased board independence could weaken the CEO's power over the board and restrain corporate risk-taking resulting in less variability of firm performance (Bird et al., 2018).

The current study found that board size has a significant and positive association with firm performance. Large board size brings various ideas from different parties which can improve firm performance (Tulung & Ramdani, 2018). In contrast, lower levels of board size could lower the likelihood of a firm having external commitments in other companies, which can lead to positive results for firm performance (Bird et al., 2018). This finding highlight that the board of directors should be of an adequate size, but not too large, considering that a larger boardroom does not necessarily result in positive performance (Merendino & Melville, 2019).

Female directorship has a significant, yet negative association with firm performance which could imply that more females in a board result in a decrease in firm performance (Green & Homroy, 2018). According to Bennouri et al. (2018), female directorship variable captures certain behavioural attributes which they may bring to the board, then impacting firm performances. It is found that female directors who are foreigners, have business training, and with longer tenure significantly negatively correlate with all performance measures. Additionally, the education level of female directors and their chairperson position are negatively correlated with Tobin's Q. This is found particularly in the countries having issues about gender inequality (Low et al., 2015).

The result of model 3, the relationship between corporate innovation and firm performance shows corporate innovation negatively significantly associated with firm performance. This is not supported by Huang and Hou (2019) who report that increasing the level of R&D expense in a company can increase firm performance. Previous studies state that the production of fundamental research and applied research lead to better performance and enhance their competitiveness in the future (Tung & Binh, 2021).

For developing countries, for model 4, the relationship between corporate governance, corporate innovation and firm performance, the findings demonstrate that corporate governance and corporate innovation have a significant, yet negative relationship with firm performance. In the above models, the result of model 1, 2, and 3 is significant, the result of model 4 is also significant which means that there is partial mediation (Leung & Sharma, 2021), so it is argued that corporate innovation is a mediator between corporate governance and firm performance. Table 6 presents all the results for developing countries.

According to Table 6, corporate performance factors including CEO duality, board independence, and female directorship are negatively associated with firm performance through investing on innovation (Agarwal et al., 2016; Mubeen et al., 2020). This negative association could be generated from the corporate governance structure associating with investment in R&D. Corporate governance factors are found to have a negative association with firm performance due to adverse effects on corporate innovation. Conversely, a larger board size is positively correlated with corporate performance, attributed to its negative impact on corporate innovation. In developing countries, independence and large-sized could create an increase in ROA if the board has low investment on R&D. When the CEO and chairman is the same person or when the director of firm is female, the performance of firm is decreased, particularly when the board invests in high innovation (high R&D expenses).

Table 6  
*Two-step system dynamic panel estimation of developing countries*

Variable	Model 1	Model 2	Model 3	Model 4
L1	0.423*** (0.00)	0.627*** (0.00)	0.631*** (0.00)	0.625*** (8874.6)
L2	0.111*** (0.00)	-0.01*** (-297.60)	-0.00*** (-890.73)	-0.01*** (-285.93)
R&D			-7.85*** (-884.45)	-7.48*** (-158.90)

*(Continued on next page)*

Table 6: (Continued)

Variable	Model 1	Model 2	Model 3	Model 4
CEOD	0.000*** (552.60)	-1.29*** (-994.3)		-1.28*** (-972.44)
BI	0.000*** (2625.20)	0.018*** (976.15)		0.01*** (939.18)
BS	0.001*** (2080.52)	0.082*** (260.75)		0.08*** (293.67)
FD	0.000*** (390.52)	-1.01*** (-638.6)		-1.02*** (-573.70)
FS	0.000*** (1579.35)	-0.16*** (-2369.0)	-0.17*** (-9560.9)	-0.16*** (-2304.6)
LEV	0.000*** (152.46)	-0.45*** (-259.68)	-0.40*** (-819.81)	-0.45*** (-7.21)
SG	-0.00*** (-331.69)	0.085*** (434.26)	0.072*** (1152.9)	0.082*** (0.01)

Note: \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1% levels, respectively; numbers in parentheses denote standard deviation

For developed countries, regarding model 1, the relationship between corporate innovation and corporate governance, CEO duality has an insignificant association with corporate innovation. This indicates that CEO duality decreases the role of corporate innovation. We found board independence has an insignificant association implying the more independent the board is, the lower the level of corporate innovation. Board size and the number of female directors has an insignificant association with corporate innovation. We can conclude that overall, there is no significant relationship between corporate governance and corporate innovation.

For developed countries, regarding model 2, the relationship between firm performance and corporate governance, CEO duality has an insignificant association with firm performance. The findings show board independence, board size, and the number of female directors insignificantly associate with firm performance. Corporate governance of firms can be different depending on institutions, legal environment, and culture (Filatotchev et al., 2019). Innovative culture can impact innovation and corporate governance of firms across different countries (Farah et al., 2021; Khan et al., 2019).

For developed countries, regarding model 3 with respect to the relationship between corporate innovation and firm performance, corporate innovation has a significant, yet negative association with firm performance. The results imply that

increasing R&D expenses reduces firm performance. For model 4, the relationship between corporate governance, corporate innovation and firm performance, corporate governance variables have an insignificant relationship with firm performance. Corporate innovation has a significant, yet negative association with firm performance. Table 7 demonstrates these findings.

Table 7  
*Two-step system dynamic panel estimation of developed countries*

Variable	Model 1	Model 2	Model 3	Model 4
L1	2*** (24.43)	0.221*** (19.28)	0.205*** (19.29)	0.205*** (19.23)
L2	-0.037*** (-25.37)	0.047*** (8.61)	0.04*** (7.55)	0.04*** (7.59)
RD			-30.096*** (-11.21)	-29.919*** (-11.12)
CEOD	0 (0.12)	-0.017 (-0.1)		-0.015 (-0.09)
BI	0 (1.56)	0.001 (0.87)		0.001 (0.82)
BS	0 (0.55)	-0.017 (-0.56)		-0.028 (-0.92)
FD	0.001 (1.92)	-0.038 (-0.22)		-0.044 (-0.26)
FS	-0.04*** (-32.45)	-0.152 (-0.59)	-0.906*** (-3.61)	-0.911*** (-3.62)
LEV	0.044*** (5.97)	-7.239*** (-7.25)	-6.888*** (-7.18)	-6.928*** (-7.21)
SG	0 (0.010)	0 (0.07)	0 (0.02)	0 (0.01)

Note: \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1% levels, respectively; numbers in parentheses denote standard deviation

For the overall sample, combining firms in developing and developed countries, Table 8 sets out the results. Regarding model 1, the relationship between corporate innovation and corporate governance, CEO duality, board independence and board size are insignificantly associated with corporate innovation. The two-step system dynamic panel estimation shows the result of model 2 that CEO duality, the independence of the board, board size and the number of female directors has an insignificant association with firm performance. Therefore, there is no significant relationship between corporate governance and firm performance.

Regarding model 3 and 4 of the whole sample, the corporate governance variables have an insignificant relationship with firm performance. Corporate innovation has a significant, yet negative association with firm performance. The study concludes that corporate innovation is a mediator between corporate governance and firm performance, however the impacts are different between developing and developed countries. Table 8 demonstrates these findings.

Table 8  
*Two-step system dynamic panel estimation of overall sample*

Variable	Model 1	Model 2	Model 3	Model 4
L1	0.111*** (38.77)	0.23*** (20.320)	0.217*** (20.64)	0.216*** (20.57)
L2	0.017*** (14.04)	0.04*** (7.31)	0.038*** (7.27)	0.038*** (7.3)
RD			-29.9*** (-11.31)	-29.7*** (-11.19)
CEOD	0 (0.43)	-0.096 (-0.59)		-0.089 (-0.55)
BI	0 (1.38)	0.001 (0.62)		0.001 (0.56)
BS	0 (0.39)	-0.021 (-0.68)		-0.028 (-0.94)
FD	0.001 (1.78)	-0.013 (-0.08)		0.006 (0.04)
FS	-0.00*** (-7.07)	-0.23*** (-4.62)	-0.28*** (-5.25)	-0.28*** (-5.26)
LEV	0.006 (1.48)	-3.80*** (-4.66)	-3.38*** (-4.57)	-3.39*** (-4.58)
SG	0 (0.11)	0 (0.03)	0 (0.03)	0 (0.04)

Note: \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1% levels, respectively; numbers in parentheses denote standard deviation

### **Robustness Checks**

In the 17 countries analysed, firms that had minimal information were also left out of the analysis. This is the reason the number of companies per country differs during the period which is analysed (see Table 1). It is important to point out that the selected companies are the most representative ones of the corresponding stock exchange by market capitalisation.



This study ran GMM robustness tests for samples, excluding the United States and Japan, since both these countries comprise a substantial percentage of the sample data. Most of the sample data is from the United States. After reestimation of the robustness test, the results are consistent with prior results.

Table 9

*Robustness test by the United States in two-step system dynamic panel estimation of developed countries*

Variable	Model 1	Model 2	Model 3	Model 4
L1	0.02*** (42.01)	0.03*** (20.21)	0.352*** (25.69)	0.28*** (23.02)
L2	-0.052*** (-26.52)	0.052*** (11.25)	0.08*** (9.12)	0.48*** (9.85)
RD			-47.52*** (-25.02)	-0.46*** (-259.68)
CEOD	0.74 (0.13)	-0.27 (-1027.77)		-0.27 (-0.49)
BI	0.00 (0.68)	0.02 (0.11)		0.02 (0.97)
BS	0.01 (0.68)	0.09 (0.30)		0.08 (0.64)
FD	0.00 (0.07)	-0.01 (-0.23)		-0.85 (-0.65)
FS	-0.02*** (-79.94)	-0.16*** (-2829.14)	-0.17*** (-7861.61)	-0.17*** (2369.08)
LEV	-0.02*** (-7.78)	0.09*** (532.48)	0.07*** (1185.01)	0.09*** (434.26)
SG	0.59*** (40.02)	5.42*** (1125.32)	5.90*** (4240.97)	5.81*** (1169.80)

Note: \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1% levels, respectively; numbers in parentheses denote standard deviation

According to Table 9, regarding model 1, the relationship between corporate innovation and corporate governance, CEO duality, board independence and board size are insignificantly associated with corporate innovation. Model 2 shows that CEO duality, the independence of the board, board size, and the number of female directors has an insignificant association with firm performance. Therefore, there is no significant relationship between corporate governance and firm performance. Regarding model 3 and 4 of the whole sample, the corporate governance variables have an insignificant relationship with firm performance. Corporate innovation has

a significant, yet negative association with firm performance. Eventually, on the basis of above discussion, researchers found that results are consistent with those stated earlier.

The discussion of samples is presented in Table 10 interpretation, highlighting the prominent contribution of Japan in the samples. Consequently, it became imperative to assess the robustness of the results specifically for Japan. In line with this, the research employed a robustness test for Japan, revealing that the re-estimation of robustness test results aligns consistently with the previous findings. Regarding model 1, 2, 3, and 4, all results are aligned with the mainstream results.

Table 10  
*Robustness test by Japan in two-step system dynamic panel estimation of developed countries*

Variable	Model 1	Model 2	Model 3	Model 4
L1	0.08*** (25.02)	0.08*** (12.59)	0.259*** (19.69)	0.69*** (31.08)
L2	-0.069*** (-15.21)	0.06*** (15.21)	0.07*** (8.25)	0.96*** (69.58)
RD			-17.52*** (-39.12)	-0.89*** (0.652.52)
CEOD	0.29 (0.231)	-0.25 (0.85)		-0.78 (0.22)
BI	0.00 (0.49)	0.08 (0.58)		0.08 (0.45)
BS	0.02 (0.87)	0.07 (0.28)		0.06 (0.45)
FD	0.07 (0.14)	-0.01 (-0.08)		-0.96 (-0.27)
FS	-0.25*** (-25.84)	-0.14*** (-1852.01)	-0.52*** (-1452.04)	-0.15*** (-962.05)
LEV	-0.08*** (-8.23)	0.03*** (425.02)	0.58*** (1590.42)	0.02*** (225.30)
SG	0.41** (20.56)	6.52*** (459.85)	7.98*** (2581.85)	7.15*** (965.2)

*Note:* \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1% levels, respectively; numbers in parentheses denote standard deviation

The discussion of samples is presented in Table 11 along with interpretation, highlighting the significant contributions of Japan and the United States in the samples. Consequently, it was necessary to assess the robustness of the results specifically for the United States and Japan. In accordance with this, the research applied a robustness test for both Japan and the United States. Subsequently, the reestimation of the robustness test results was shown to be consistent with prior findings. Regarding model 1, 2, 3, and 4, all results are aligned with prior results.

Regarding model 1, the relationship between corporate innovation and corporate governance, CEO duality, board independence is insignificantly associated with corporate innovation. Model 2 that CEO duality, the independence of the board, and the number of female directors has an insignificant association with firm performance. Therefore, there is no significant relationship between corporate governance and firm performance. Regarding model 3 and 4 of the whole sample, the corporate governance variables have an insignificant relation with firm performance. Corporate innovation has a significant and negative association with firm performance. Overall as evidenced in the discussion above, researchers found that results are consistent before and after robustness checks.

Table 11  
*Robustness test by United States and Japan in two-step system dynamic panel estimation of developed countries*

Variable	Model 1	Model 2	Model 3	Model 4
L1	0.02*** (12.25)	0.01*** (32.54)	0.852*** (54.27)	0.85*** (57.21)
L2	-0.521*** (-28.54)	0.21*** (41.47)	0.15*** (25.19)	0.17*** (28.51)
RD			-58.45*** (221.52)	-17.52*** (-597.25)
CEOD	0.45 (0.41)	-1.59 (-0.96)		-1.52 (-0.85)
BI	0.00 (0.58)	0.08 (0.851)		0.07 (0.21)
BS	0.04 (0.85)	0.02*** (20.85)		0.02 (0.451)
FD	0.04 (0.57)	-0.04 (-0.27)		-1.85 (-0.54)
FS	-0.36*** (-28.56)	-0.18*** (-1523.41)	-0.85*** (-1265.21)	-0.69*** (-1145.21)

(Continued on next page)

Table 11: (Continued)

Variable	Model 1	Model 2	Model 3	Model 4
LEV	-0.28*** (-26.52)	0.08*** (258.32)	0.95*** (1125.2)	0.07*** (145.23)
SG	0.04 (0.52)	0.12 (0.84)	0.08 (0.55)	0.58 (0.45)

Note: \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1% levels, respectively; numbers in parentheses denote standard deviation

Language of commerce, accounting practices, legal traditions, availability of background firm information, geographic size, development of money/capital markets, and size of firms are different in developing and developed countries. In addition, each country has its unique ways of managing innovation and governance. Although management of corporate innovation with corporate governance is not the same across the world because of different accounting practices (Mulili & Wong, 2011), legal traditions, geographic size, money capital market and size of the firm, corporate innovation can, to some extent, impact the relationship between governance and firm performance. Regarding signaling theory, when a firm board is involved in and makes decisions about R&D projects, it could signal to the investors the potential of the firm to increase ROA. The assets of the firm are used effectively with innovation and new technology to increase corporate returns. This signal can be observed in developing and developed countries depending on the supporting environment of information disclosure and information transparency (Ali et al., 2017; Bhatia & Makkar, 2019; Buerthey & Pae, 2021).

## CONCLUSION

This study examines the mediating effect of corporate innovation on the relationship between corporate governance and firm performance across firms in developing and developed countries. The findings indicate that corporate governance factors are associated with both innovation and performance of firms in developing and developed countries, but in different ways. In developed countries, innovation fully mediates the relationship between corporate governance and firm performance. However, in developing countries, innovation partially mediates the relationship between corporate governance and firm performance. The study shows that in developed countries, board independence and female directorships do not have a significant direct impact on firm performance, yet it impacts firm performance via corporate innovation. In contrast, there is a significant direct relationship between these factors and the performance of firms in developing countries. From the empirical results, all generated hypotheses are supported.

In developing countries, corporate performance is associated with corporate governance through negative corporate innovation. Different factors of corporate governance generate different impact. CEO duality and female directorship corporate negatively associate with firm performance though negative corporate innovation. However, board size positively relates to corporate performance via negative corporate innovation.

### **Implementation and Recommendation**

This study contributes to previous literature as it indicates a significant difference in the mediating effects of corporate innovation between listed firms in developing and developed countries on the relationships between corporate governance factors and firm performance. It emphasises distinct supporting environments for generating innovative activities, products, and services in different countries, particularly between developed and developing countries. Corporate boards can transfer positive signals to investors by investing in innovation. Moreover, innovation could be measured by various indicators. While other studies evaluate innovation based on product and services offerings to the market (Kijkasiwat & Phuensane, 2020; Wellalage & Fernandez, 2019), as well as the International Organization for Standardization (ISO) (He & Shen, 2019), this study sheds light on corporate innovation demonstrated by R&D expenses (Huang & Hou, 2019; Lööf & Nabavi, 2016) in both developing and developed countries.

For corporate governance topics, many prior studies adopt stewardship theory, agency theory, stakeholder theory, and resource dependence theory (Kyere & Ausloos, 2021; Paniagua et al., 2018; Shi et al., 2017) to elaborate the direct relationship between governance factors and firm performance. However, to explain the mediating effects of innovation on this relationship, this study adopts signaling theory to elaborate innovation as a compounding factor affecting the relationship between corporate governance and firm performance. While signaling theory holds a prominent position in literature from a range of management disciplines, including strategic management, entrepreneurship, and human resource management (Connelly et al., 2011), this study contributes to finance literature by employing this theory from a financial perspective. While some studies do use signaling theory for a theoretical framework, there is limited comparison of listed firms in developing and developed countries (Bae et al., 2018; Li et al., 2017).

This study can be helpful for policy makers and management in identifying the influence of innovation on firm value, particularly the different elements of corporate governance structure that are significant in developed and developing countries. Additionally, it is useful for foreign and local investors to evaluate

innovation activities. In future research, scholars can consider other indicators such as trademarks, patents, and copyright as measures of corporate innovation. These indicators can show how firms can incorporate technology and innovation into their products or processes. Moreover, in exploring the causal relationship among corporate governance indicators, innovative factors, and firm performance (Sarpong-Danquah et al., 2018; Utama & Utama, 2019; Catalyst, 2004), further research could examine if corporate governance structure mediates or moderates the relationship between innovation and firm performance. Additionally, future studies could assess whether better performance in firms drives good corporate governance, or if high performance firms invest more on innovation which reduces the impact of management systems and internal conflicts. Signaling theory in tandem with other theories, for instance, social network theory, could be used to further explore these relationships.

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