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Article

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Moderating Role of Board Gender Diversity between Odd Board Composition and Audit Quality

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Abstract

This study investigates the relationship between odd board structure, board gender diversity, and audit quality in Pakistani firms. The data is collected from Pakistan Stock Exchange's KSE100 index companies from the year 2016 to 2020. The study employs regression models to analyze the impact of an odd board structure on audit quality, as measured by audit fees. Additionally, the moderating role of board gender diversity on this relationship is examined. The findings reveal that an odd board structure positively influences audit quality, indicating that firms with an odd number of directors pay higher audit fees. However, the study could not find a significant moderating role of board gender diversity to strengthen governance practices especially audit quality in the Pakistani context.

Keywords: Voting model, even board, odd board, gender diversity, corporate governance, agency theory, audit quality and Pakistan stock exchange.

1. Introduction

Corporate board voting efficiency plays a crucial role in the quality of board decisions and, consequently, in corporate governance and performance. Subjective evidence suggests that

the even-odd composition of a board can significantly impact its voting process. Odd boards have more tendency to produce higher Tobin's Q as compared to even boards (Yermack, 1996).

In the corporate board voting model, directors have both a performance preference and a conformity preference. Performance preference motivates directors to make decisions based on their information, while conformity preference encourages them to align with the majority. Odd boards are more effective in aggregating directors' information and the performance preference dominates as each director votes based on their information.

However, in even boards, the conformity preference dominates and leads directors to vote according to the anticipated net vote of others, disregarding their information. For instance, Del Global Technologies Corp., a medical device manufacturer, expanded its board from four to five members to enhance voting outcomes. Similarly, Enliven Corporation and Gleacher & Company, Inc. explicitly state in their corporate governance guidelines that having an odd number of directors is preferred.

Even boards are associated with weaker monitoring and increased agency problems. Deng et al. (2012) state that even boards demonstrate lower firm performance. Firms with even members of audit committees witnessed more likelihood of accounting irregularities (Gao & Huang, 2018). Having an odd number of directors is recommended to avoid voting ties and enhance decision-making efficiency. Additionally, concerns arise regarding the potential capture of the board by executives or controlling shareholders, compromising its ability to effectively fulfill its governance role (Shivdasani & Yermack, 1999).

Odd boards, which better aggregate directors' information, lead to higher Tobin's Q, improved operating performance, stronger CEO turnover-performance sensitivity, and higher CEO pay-performance sensitivity (Deng et al., 2012).

An odd-numbered board of commissioners facilitates smoother decision-making without voting ties and promotes a cohesive perspective, enhancing corporate value. Conversely, even-numbered boards can lead to ties and differing viewpoints, potentially impacting corporate value negatively (Islamudin et al., 2020). Even the numbers of directors lead to insufficient agency oversight and diminished firm value, fewer meetings, higher expenses, and lower market value of equity (David & Juliana, 2020).

Jensen and Meckling (1976) shed light on the agency relationship where the principal delegates decision power to agents in the contract. This contract produces agency problems because both want their benefit on the cost of others. The most appropriate way to manage agency problems in the corporate sector is adopting good corporate governance system. A good corporate governance system not only reduces the adverse behaviors of agents but also safeguards shareholders' wealth and interests (Hamdani, 2016).

This study is useful for corporate governors in Pakistan as it offers insights into the positive impact of odd board structure on audit quality. Furthermore, the study further highlights

the importance of considering board gender diversity as an element for improved decisionmaking leading to overall organizational performance. The findings carry significant implications for corporate governance practices in Pakistan, suggesting that adopting an odd board structure can enhance audit quality and audit related decisions. Further, paper's structure includes literature review, statistical methodology, results, and conclusion.

2. Literature Review

According to Larcker and Tayan (2015), corporate governance is a control mechanism implemented by organizations to prevent detrimental activities by management. The significance of these mechanisms has drawn the attention when globally renowned businesses such as Adelphia, WorldCom, Enron, and Parmalat lost stakeholder trust. Shareholders' interest, accountability, fairness, and transparency is being ensured with the help of good corporate governance system across the globe (Braunbeck, 2010). The Securities and Exchange Commission of Pakistan issued a code of corporate governance to ensure good corporate practices and to take care of stakeholders' interest (Code of Corporate Governance, 2019).

The audit fee is the cost organizations pay to auditors to test the accounting record being prepared according to GAAP (Soltani, 2007), a cost connected to statutory audit (Simunic, 1984). According to DeAngelo (1981) and Watts and Zimmerman (1983), an external audit is an arrangement between shareholders and management of audited firms as per agency theory guidelines.

According to Jensen and Meckling (1976), agency theory elaborates on agency relationships between shareholders and management where shareholders are the principal and management is an agent and acts on behalf of the principal by delegated power. But both characters want to maximize their benefits at the cost of others that defined as an agency problem. Good corporate governance practices are best tool that always helps to mitigate these agency problems via making sure of accountability, fairness and transparency in business organizations.

Based on the agency theory, audit fees positively influence audit quality (AQ). Corporations that pay higher audit fees tend to have higher AQ due to effective oversight by the board of directors over external auditors. Board members, bound by contractual obligations to shareholders, prioritize engaging audit firms that deliver high-quality audit reports, influencing stakeholders' investment and credit decisions. Numerous empirical studies have been undertaken to investigate the relationship between audit fees and audit quality. Companies that afford to pay higher audit fees often hire prestigious audit firms, as these audit firms possess greater professional resources and audit expertise.

Consequently, it is generally believed by the business community that higher audit fee is indicative of a commitment to obtaining a high quality audit services. This could be the reason that many researchers found positive relationship between audit fees and audit

quality (Krauß et al., 2015; Kuntari et al., 2017; Rahmina & Agoes, 2014; Wiguna et al., 2019).

There are some studies that have examined the relationship between board characteristics and audit fees. These studies use board characteristics as board size, independence, and gender diversity, and assume that these characteristics positively correlate with audit quality measured through audit fees (Kalia et al., 2023). Boards with an even number of directors in emerging markets suffer from inefficient decision-making resulting in increased agency problems (He & Luo, 2018).

Boards with an even number of directors exhibit insufficient corporate governance activities and contribute to higher agency problems, leading to decreased firm value as evidenced by fewer meetings, increased expenses, and lower market value of equity (David & Juliana, 2020). The board of commissioners' composition, whether odd or even, influences corporate value. Companies with odd boards of commissioners tend to have higher corporate value than those with even boards (Islamudin et al., 2020). An odd audit committee is less likely to experience financial restatements compared to an even audit committee (Gao & Huang, 2018). Odd boards outperform even boards in terms of voting efficiency, leading to higher Tobin's Q, operating performance, stronger CEO turnover-performance sensitivity, and higher CEO pay-performance sensitivity, according to empirical analysis (Deng et al., 2012). So, from the available literature on corporate boards, we can assume that

H₁: Odd board composition has positive relationship with audit quality.

Conflicts of interest between principals (e.g., shareholders) and agents (e.g., managers) are addressed in agency theory, as is the role of the corporate board in monitoring and resolving these conflicts (Fama & Jensen, 1983; Jensen & Meckling, 1976). Female directors have better monitoring abilities because they think independently, and board gender diversity improves managerial accountability by increasing board meeting attendance and CEO accountability (Adams & Ferreira, 2009; Adams et al., 2011). Female directors play the role of independent directors by improving board oversight (Adams & Ferreira, 2009). Gender diversity lowers firm agency costs (Jurkus et al., 2011), reduces the likelihood of mistakes and frauds in financial reporting (Wahid, 2019), female directors are less riskier than men directors (Faccio et al., 2016), improve firm performance (Adams & Ferreira, 2009; Lee & Thong, 2023). Female directors improve audit quality (Mustafa & Che-Ahmad, 2017), and gender diversity in audit firms increases audit quality (Menezes Montenegro & Bras, 2015). So, we can hypothesize that

H₂: Board gender diversity moderates the relationship between odd board composition and audit quality.

3. Methodology and Data

3.1 Data Source and Sample

The data for this study was collected from annual reports of firms listed on the KSE100 index of Pakistan Stock Exchange. The dataset covers five years from 2016 to 2020, allowing for an analysis of audit quality trends during this timeframe. The dataset is panel data, enabling regression analysis to explore the relationship between variables. The observation sample is 369, which is the final result of the evaluation of missing values. All required measures are taken to ensure reliability and validity. Description of variables is as follows:

Variable Name	Symbol	Description
Dependant Variable		
Audit Quality	Afee	Audit fee
Independent Variable		
Odd Board	OB	If the board is odd 1 otherwise 0.
Moderation		
Board Female Proportion	BFP	Board Female Proportion multiply with odd- board
Control Variables		
Big 4	B4	Big Four audit firms
Board Size	BS	Number of directors
Board Chairman Independence	BCInd	If the board chairman is an independent director 1 otherwise 0.
CEO Duality	CEOD	If CEO is also chairman 1 otherwise 0.
Board Female Proportion	BFP	The proportion of female directors on board.
The proportion of Nonexecutive Independent Directors	PNEInd	The proportion of non-executive independent directors.
Institutional Holding	InstHd	If institutions have more than 30% of total shareholding 1 otherwise 0.
Return on Assets	ROA	Net income divided by total assets.
Firm Size	FS	Log of total assets

3.2 Econometric Model

Audit Quality = $\beta 0 + \beta 1$ (Odd Board)i.t + $\beta 2$ (Board Size)i.t + $\beta 3$ (Board Chairman Independent)i.t + $\beta 4$ (CEOD)i.t + $\beta 5$ (Board Female Proportion)i.t + $\beta 6$ (Proportion of Non-Executive Independent Director)i.t + $\beta 7$ (Institutional Holding)i.t + $\beta 8$ (ROA)i.t + $\beta 9$ (Firm Size)i.t + industry + time + $\epsilon i.t.$(equation-1)

In equation 1, audit quality equals the intercept and coefficient multiplied by the variables. The names of variables in the equation can be easily understood.

Additionally, the equation incorporates industry-specific effects denoted as "industry" and time-specific effects represented by "time." The error term Ei.t captures unobserved factors and random variation specific to each firm and time.

Audit Quality = $\beta 0 + \beta 1$ (Odd Board)i.t + $\beta 2$ (Odd Board_BFP)i.t + $\beta 3$ (Board Size)i.t + $\beta 4$ (Board Chairman Independent)i.t + $\beta 5$ (CEOD)i.t + $\beta 6$ (Board Female Proportion)i.t + $\beta 7$ (Proportion of Non-Executive Independent Director)i.t + $\beta 8$ (Institutional Holding)i.t + $\beta 9$ (ROA)i.t + $\beta 10$ (Firm Size)i.t + industry + time + $\epsilon i.t.$(equation-2)

Equation 2 is an extension of Equation 1. An additional variable is the interaction term of the board's female director and Odd Board. This equation explains the moderating effect of board gender diversity on audit processes.

In summary, Equation 1 investigates the overall relationship between independent variables and audit quality, while Equation 2 extends the analysis by exploring the moderating effect of board female proportion on this relationship.

4. Data Analysis and Results

The empirical results section consists of results of descriptive statistics, correlation matrix, and regression analysis.

4.1 Descriptive Statistics

The audit quality variable (Afee) has a sample size of 369. On average, the audit fee is approximately 8.080, with a standard deviation of 1.123, indicating that the fees tend to vary around the mean by about 1.123 units. The minimum observed audit fee is 5.201, while the maximum is 10.840. Moving on to the independent variables, the odd board variable (OB) suggests that approximately 61% of the boards in the sample are odd-numbered.

The standard deviation of 0.488 indicates some variation in the proportion of odd boards, with a minimum value of 0 indicating the absence of odd boards in some cases and a maximum value of 1 indicating their presence. Regarding the Big 4 variable (B4), approximately 79% of the firms in the sample are audited by one of the "Big Four" audit firms.

Variable	Obs	Mean	Std. Dev.	Min	Max
Afee	369	8.080	1.123	5.201	10.840
ОВ	369	0.610	0.488	0	1
B4	369	0.791	0.407	0	1
BS	369	8.794	2.200	6	21
BCInd	369	0.065	0.247	0	1
CEOD	368	0.111	0.315	0	1
BFP	369	5.094	9.694	0	57.143
PNEInd	369	78.610	12.634	28.571	100
InstHd	367	60.377	49.110	0	78.620
ROA	368	18.604	57.266	-45.067	106.097
FS	369	16.580	2.000	7.301	20.195

Table 2: Descriptive Statistics

The standard deviation of 0.407 suggests some variability in the presence of the "Big Four" audit firms across the sample. The variable takes a minimum value of 0 when such firms are absent and a maximum value of 1 when they are present. The board size variable (BS) averages approximately 8.794 directors, with a standard deviation of 2.200.

This suggests that board sizes vary around the mean by about 2.200 units. The observed board sizes range from a minimum of 6 directors to a maximum of 21 directors. The board chairman independence variable (BCInd) indicates that, on average, about 6.5% of board chairpersons are independent directors. The standard deviation of 0.247 suggests some variation in the independence of board chairpersons across the sample. The variable takes a value of 0 when there is no independent chairman and 1 when there is.

The CEO duality variable (CEOD) shows that, on average, approximately 11.1% of firms have a CEO who also serves as the chairman. The standard deviation of 0.315 indicates some variability in CEO duality across the sample. The variable takes a value of 0 when there is no CEO duality and 1 when there is. Regarding the board female proportion variable (BFP), the mean of 5.094 suggests that, on average, there are 5.094 female directors on the board. However, the high standard deviation of 9.694 indicates significant variability in the proportion of female directors. The variable ranges from 0 to 57.143, representing the minimum and maximum proportions of female directors observed.

The proportion of non-executive independent director's variable (PNEInd) has an average of 78.610, indicating that, on average, approximately 78.610% of directors are non-

executive and independent. The standard deviation of 12.634 suggests some variability in this proportion across the sample, with a minimum of 28.571 and a maximum of 100. The institutional holding variable (InstHd) has an average of 60.377, suggesting that, on average, institutions hold approximately 60.377% of the total shareholding.

However, the high standard deviation of 49.110 indicates significant variability in institutional holdings across the sample—the variable ranges from 0 to 789.620, representing the minimum and maximum levels of institutional holding observed.

4.2 Correlation Matrix:

The correlation matrix explains the relationship and direction among variables as measured by a correlation coefficient ranging from 1 to -1. The coefficient explains the degree of strength between variables, and signs explain the direction between them. The correlation between audit fee and firm size is 0.616. This means that as the firm size increases, the audit process improves. The coefficient correlation between Odd Board and CEO Duality is 0.2114 and positive, which shows a weak relationship between them. It means that as the board composition is odd, the CEO duality in the organization happens. However, the relationship strength is weak because the value is far away from 1 and more near 0.

Big-4 and the independent nonexecutive director are 0.3265, which is again near 0 and far away from 1, which shows a weak positive association. This means that the proportion of independent nonexecutive directors improves when Big Four firms audit firms. The coefficient correlation value between board size and board female proportion is 0.2058, which is positive and weak. As the board size increases, the tendency for a higher female proportion improves gradually.

The relationship between board chairman independence and the proportion of nonexecutive independent directors is 0.2944, which is positive. It implies that when the board's chairman is independent, the number of independent nonexecutive directors improves. The association between CEO-Duality and Board Female Proportion is weak and negative, with a value of -0.1298. It implies that as CEO-Duality serves a firm, the tendency of female directors increases, but the connection is weak.

Return on assets (ROA) shows weak correlations with the other variables in the dataset, ranging from -0.0064 to 0.0871. These correlations indicate limited relationships between ROA and the other variables. The coefficients suggest no linear solid association between ROA and the variables under consideration. Firm Size (FS) exhibits a moderate positive correlation of 0.6161 with Audit Fee (Afee). This indicates that larger firms tend to have higher audit fees. The correlation coefficient suggests a moderate, positive linear relationship between the two variables. It is essential to understand that correlation does not mean causation. The correlation matrix explains the only relationship between variables but not the causal connection of variables.

Variables	Afee	0B	B4	BS	BCInd	CEOD	BFP	PNEInd	InstHd	ROA	FS
Afee	1.0000										
OB	0.0321*	1.0000									
B4	0.3184	-0.1647	1.0000								
BS	0.2152	-0.1610	0.1705	1.0000							
BCInd	-0.0212	-0.1044	0.0543	0.0848	1.0000						
CEOD	-0.0722	0.2114*	-0.1788	-0.1086	-0.0935	1.0000					
BFP	-0.3018***	0.0886	-0.1298	-0.1315	-0.0537	0.1451	1.0000				
PNEInd	0.1887	-0.1699	0.3265*	0.2944*	0.1539	-0.4383**	-0.1590	1.0000			
InstHd	0.1330	0.0032	0.2863*	0.0758	0.0550	-0.0152	-0.1488	0.0966	1.0000		
R0A	-0.0250	-0.0681	0.0871	0.0237	-0.0268	-0.0689	-0.0064	0.0804	0.0282	1.0000	
FS	0.6161***	0.0270	0.2058*	0.2121*	0.0959	0.0158	-0.2313***	0.1383	0.0696	-0.1471	1.0000
				* p<0.10	*** 20.0>q **	* p<0.01					

Table 3: Correlation Matrix

* p<0.10 ** p<0.05 *** p<0.01

Odd Board Composition, Audit Quality and Board Gender Diversity

4.3 Regression Results

Regression analysis is the most commonly used statistical technique for quantitatively assessing the model. Multiple control variables are used to evaluate the impact of odd board composition on audit quality measured by audit fee. Before analyzing the model, assumptions of linearity were tested via scatter plot to confirm the linear relationship between the independent and dependent variables. Multicollinearity is tested via the VIF technique. Furthermore, heteroscedasticity is evaluated, which helps to understand the absence of high correlation and constant variance of errors.

The beta coefficient for the independent variable Odd Board is 0.204 and significant at 1% in Model 1. This implies that organizations with an Odd Board tend to have higher audit quality. Companies with uneven board sizes are emphasized more for audit processes. It can be connotated that uneven corporate boards better facilitate decision-making, reduce the probability of voting ties, and improve the ability to challenge strategic management, resulting in better audit processes.

In Model-2, the introduction of another independent variable, the interaction term of the odd board and board female director (BFP_OB), tested audit quality. However, the beta coefficient for the interaction term or moderating effect is insignificant, but nature remains naturally optimistic. This suggests that the joint effect of having a higher proportion of female directors on an odd-sized board does not influence audit quality significantly. It is important to note that while this specific interaction term is insignificant, individual effects of the female proportion of the board and the odd board may still be present.

Examining the remaining independent variables in both models, none demonstrate statistically significant relationships with audit quality. Variables such as Big 4 (B4), Board Size (BS), Board Chairman Independence (BCInd), CEO Duality (CEOD), Board Female Proportion (BFP), Proportion of Nonexecutive Independent Directors (PNEInd), Institutional Holding (InstHd), and Return on Assets (ROA). Firm size (FS) does not have significant coefficients. This suggests that these variables substantially impact the context of the models used. The inclusion of year dummies and industry dummies in both models helps control for time and industry-specific effects that may influence audit quality. By including these dummy variables, we account for any systematic variations across different years and industries not explicitly captured by the independent variables.

R-squared values for both models are 36.6% and 36.9%, respectively, which means independent variables explain dependent variables in model testing. The remaining variations are due to other variables that need to be studied in this study.

The significant and positive coefficient for Odd Board (OB) in Model 1 suggests that having an odd-sized board is associated with higher audit quality. It supports the hypothesis that such boards facilitate decision-making and enhance the board's ability to challenge management. However, the non-significant coefficient for the interaction term (BFP_OB)

in Model-2 indicates that the joint effect of a higher proportion of female directors on an odd-sized board does not significantly influence audit quality, highlighting the need for further exploration into the nuanced dynamics of gender diversity and board composition in the context of audit processes.

Variables	Model-1	Model-2
	(Audit Quality)	(Audit Quality)
OB	0.204***	0.231***
	(3.144)	(3.455)
BFP_OB		-0.012
		(-1.643)
B4	0.033	0.033
	(0.289)	(0.292)
BS	0.003	-0.001
	(0.170)	(-0.063)
BCInd	0.172	0.145
	(1.223)	(1.026)
CEOD	0.092	0.072
	(0.963)	(0.743)
BFP	-0.003	0.006
	(-0.774)	(0.979)
PNEInd	0.003	0.003
	(0.866)	(0.888)
InstHd	-0.001	-0.001
	(-1.103)	(-1.177)
ROA	0.000	0.000
	(0.897)	(1.045)
FS	0.220***	0.224***
	(6.198)	(6.316)
Constant	3.805***	3.770***
	(5.600)	(5.575)
Observations	365	365
R-sq	0.366	0.369
Number of Ids	82	82
Year dummies	Yes	Yes
Industry	Yes	Yes
dummies		

Table 4: Effect of Odd Board on Audit Quality

4.4 Robustness

To ensure reliable results, robustness is vital to reaching an ultimate conclusion. Robustness is retesting the original results with the help of substitute methodologies and

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perspectives. This robustness testing can ensure the consistency of the outcomes. Two-Stage Least Squares is a commonly used statistical technique applied to significant regression results after addressing the endogeneity problem. It is a correlation between the independent variable and the error term of the dependent variable that leads to biased and unreliable outcomes.

VARIABLES	Model 1	Model 2
OB	0.285*	0.467**
	(1.830)	(2.456)
BFP_OB		-0.036***
		(-2.766)
	(4.049)	(3.533)
BS	0.035*	0.024
	(1.673)	(1.154)
BCInd	-0.366**	-0.417**
	(-2.033)	(-2.320)
CEOD	-0.145	-0.148
	(-0.931)	(-0.953)
BFP	-0.018***	0.010
	(-3.757)	(0.919)
PNEInd	0.002	0.003
	(0.418)	(0.848)
InstHd	0.000	0.000
	(0.401)	(0.346)
ROA	0.000	0.001
	(0.417)	(0.680)
FS	0.303***	0.321***
	(12.807)	(13.318)
Constant	2.138***	1.735***
	(4.489)	(3.422)
Observations	365	365
R-squared	0.460	0.464
Year dummies	Yes	Yes
Industry dummies	Yes	Yes

Table 5: Two-Stage Least Square (Effect of Odd Board on Audit Quality)

The higher industry average of the odd board shows a positive and significant effect on audit quality in Model 1. The beta coefficient is 0.285 (p<0.1). This means that organizations in Pakistan that have odd board structures and are positively associated with audit processes. Furthermore, Big-4, board size, board chairman independence, and firm size show a positive tendency toward audit quality. In the case of Model 2, the odd board

structure is positively associated with audit fees and is significant at 1%. On the other hand, the interaction term "BFP_OB" has a negative and significant effect on audit fees. It indicates that when an organization has board gender diversity, the audit fee might be reduced significantly.

The research study reveals that odd board structures improve audit quality in Pakistani contexts. The moderating effect of female board directors is also providing new insights that reduce audit fees. The findings match Pakistan's existing corporate governance practices providing empirical evidence for improving audit quality via incorporating odd board structure and inclusion of female directors.

5. Conclusion

The study discusses the role of odd board composition, the presence of female directors, and audit quality in Pakistani listed firms. The study's findings state that the relationship between the odd board and audit quality (measured through audit fee) is positive and significant. This suggests that having odd number of corporate directors on boards might be very helpful in improving audit quality by measuring audit fees. Along with this, the moderation effect of gender diversity was also tested, and it was found that moderation of gender diversity is insignificant but remains optimistic. This suggests that odd boards with diverse perspectives and understandings help improve audit quality treatment.

Likewise, another dimension of the study, the moderating effect of female directors on board, has an insignificant effect on the relationship between the odd board and audit quality. However, the significance of gender diversity cannot be denied. Upcoming research should consider this study and its model to support the researchers further. In short, this study provides empirical evidence for practitioners, legislators, and regulators who want to improve Pakistan's corporate governance mechanism and understand quality audits.

5.1 Theoretical Significance

The theoretical importance of this research originates from the application of agency theory. The study's outcome matches the concept and philosophy of agency theory, where odd boards, due to their unique characteristics, always serve shareholders' best interests through timely decision-making, indicating better accountability and monitoring in the corporate sector. This study empirically gives insights for scholars and corporate practitioners looking for improved governance mechanisms and audit quality.

5.2 Practical Significance

The study's conclusion emphasizes the importance of odd board structure and its implications for audit quality. Adopting odd board composition provides new insights and guidance for practitioners and legislators from Pakistan's perspective. Additionally, where no significant moderating effect of female directors was found, its importance for inclusive decision-making systems must be considered. This study provides evidence to strengthen

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corporate governance mechanisms to achieve intime decision making, transparency and accountability by incorporating the culture of gender diversity and the odd board. These findings can be helpful in addressing the challenges of the local business environment and paving the way towards economic prosperity through efficient corporate boards,

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