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The Influence of Female Representation in the Board of Directors on Corporate Competitive Advantage and Firm's Innovation Performance

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Abstract.
This research examines how the presence of women on corporate boards influences both competitive advantage and firms' innovation performance. The study is motivated by the heightened intensity of domestic business competition, the persistently low proportion of female board members, the researcher's interest in the cognitive contributions of women to innovation and competitiveness, and inconsistencies in prior empirical results. Using panel data from non-financial companies listed on the Indonesia Stock Exchange during 2017–2023, the analysis excludes financial service firms due to their unique characteristics and more stringent regulations. Applying purposive non-probability sampling, 1,504 firm-year observations were obtained. The conceptual framework is grounded in Upper Echelon Theory and Social Role Theory. Data were analyzed using STATA, incorporating path analysis and the Sobel test. The results indicate that both female board representation and innovation performance positively and significantly impact a firm's competitive advantage. However, innovation performance does not mediate the relationship between female board representation and competitive advantage. These findings provide practical implications for Indonesian policymakers, especially in designing gender quota regulations for board composition to promote gender equality in corporate governance. Although female representation remains limited, their leadership presence has a demonstrable positive effect on competitive advantage, highlighting its potential to support stronger and more sustainable business growth while enabling strategic adaptation to increasing competitive pressures.

Keywords: Women representation, competitive advantage, firm's innovation performance

INTRODUCTION

Competitive advantage serves as a crucial foundation for companies to sustain their existence and thrive in dynamic, competitive markets (Azeem et al., 2021). It is defined as the ability of a company, derived from its unique resources and characteristics, to outperform competitors within the same industry. Competitive advantage is not permanent; it is achieved through continuous innovation, which requires adaptability, flexibility, responsiveness, and ongoing renewal. The potential to achieve greater competitive advantage depends on the value, rarity, and inimitability of the firm's resources and capabilities. This potential can be maximized if the company is well-organized in managing its resources optimally (Barney, 1995; Dereli, 2015).

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The dynamic market structure and the emergence of innovative competitors have intensified inter-industry rivalry (Dereli, 2015), which directly influences a company's ability to maintain its competitive edge (Christensen et al., 2015; Wang & Gao, 2021). Companies must not only withstand aggressive competition but also proactively develop innovative strategies to create unique advantages (Anning-Dorson, 2018). In *Indonesia*, business competition intensity is measured using the *Business Competition Index* (*Indeks Persaingan Usaha*, or *IPU*) issued by the *Business Competition Supervisory Commission* (*Komisi Pengawas Persaingan Usaha*, or *KPPU*). This index ranges from 1.00 to 7.00, with higher scores indicating healthier and more dynamic competition. According to *KPPU* (2023), the *IPU* score increased to 4.91 in 2023 after dropping during the COVID-19 pandemic, signaling a highly competitive environment that compels companies to innovate and improve efficiency to maintain profitability.

The relationship between innovation and competitive advantage has been extensively analyzed (Anning-Dorson, 2018; Azeem et al., 2021; Distanont & Khongmalai, 2020; Leung & Sharma, 2021). These studies highlight that higher levels of innovation significantly enhance a company's ability to create superior value and achieve sustainable performance. Anning-Dorson (2018) emphasized that innovation positively impacts market positioning, while Detthamrong et al. (2017) noted that robust corporate governance structures support innovation through effective research and development (*R&D*) management. Therefore, corporate governance (Naciti, 2019) and innovation (Pradnya et al., 2024) are closely intertwined in building a sustainable competitive advantage.

Corporate governance diversity, especially gender diversity, plays a significant role in driving innovation and decision-making quality (Kalay, 2015). García Martín and Herrero (2018) argue that diverse boards provide broader perspectives, access to various skills, and better information flow. Female board representation, in particular, has been found to improve governance quality and competitive advantage (Ahmadi et al., 2018). Moreover, Francoeur et al. (2008) observed that gender diversity enhances communication, coordination, and creativity within boards.

Despite these benefits, the level of female representation on corporate boards in *Indonesia* remains relatively low compared to global averages. The *International Finance Corporation* (2020) reported that *Indonesia* ranks second among Asian countries with a board gender diversity rate of 15%. Companies with higher female representation demonstrate stronger *Return on Assets* (*ROA*) and *Return on Equity* (*ROE*), aligning with findings that gender-diverse boards foster greater investment in innovation (Chen et al., 2018). However, this rate is still below the global *MSCI ACWI Index* average of 21.1%, highlighting the need for stronger gender equality measures.

Globally, developed markets report higher female representation (32.9%) compared to emerging markets (17.1%) as of 2023 (MSCI, 2023). Cultural and social role expectations often create a "double burden" for women in Asian countries, limiting their representation (Süssmuth-Dyckerhoff et al., 2012; Low et al., 2015). Nonetheless, ongoing advocacy for gender equality and regulatory improvements have gradually increased female board participation

over recent years.

Several studies highlight that gender diversity positively impacts innovation, which in turn strengthens competitive advantage (Nadeem et al., 2020; Torchia et al., 2018). Female directors bring unique cognitive values, experiences, and perspectives that enrich decision-making processes, particularly in funding and *R&D* investment (Rossi et al., 2017). Empirical findings consistently demonstrate that organizations with female directors achieve better innovative performance and long-term sustainability (Chen et al., 2018; Reguera-Alvarado et al., 2017).

Conversely, some research presents contradictory findings. Studies by Singh et al. (2023) and Martinez-Jimenez et al. (2020) indicate that gender-diverse boards do not always have a significant impact on firm performance. Certain scholars argue that board composition and gender diversity might lead to riskier decision-making or might be less important compared to the competence of individual board members (Sila et al., 2016; Merendino & Melville, 2019). These mixed results create a research gap, suggesting the need for further analysis of how female board representation influences innovation and competitive advantage in different contexts.

This study aims to provide empirical evidence regarding the relationship between female board representation, firm innovation performance, and competitive advantage among companies listed on the *Indonesia Stock Exchange* (*IDX*), excluding financial service firms. Innovation performance is measured using intangible asset returns, following Duan et al. (2020), as opposed to traditional metrics like patent counts or *R&D* spending. Competitive advantage is assessed using market share, which effectively reflects a firm's market dominance and customer loyalty. The study's novelty lies in exploring the mediating role of innovation performance between gender diversity and competitive advantage, addressing inconsistencies in previous research findings.

MATERIALS AND METHODS

This research employs a structured framework to examine how women's representation on corporate boards influences competitive advantage through firm innovation performance. Using a quantitative associative approach, the study addresses inconsistencies in prior research by analyzing relationships between these variables. Secondary data was collected from *Indonesia Stock Exchange* (*IDX*) listings, focusing on three key variables: women's board representation (independent variable), competitive advantage (dependent variable), and innovation performance (intervening variable). These were measured using established metrics and analyzed through statistical methods to draw meaningful conclusions, with recommendations provided to address study limitations and guide future research.

The study utilizes panel data, combining time-series (2017–2023) and cross-sectional (*IDX*-listed companies) data for comprehensive analysis. Quantitative data, expressed in numerical form, was sourced from annual reports and financial statements, accessed via the *IDX* website, company websites, and the *Osiris* database. This approach ensures a robust dataset for evaluating board composition and its impact on innovation and competitiveness.

Non-participant observation was the primary data collection method, whereby researchers gathered annual reports without direct involvement in company operations, maintaining objectivity.

For data analysis, the study applies both descriptive and inferential statistics. Descriptive statistics summarize key variables—women's board representation, competitive advantage, and innovation performance—along with control variables like firm size, age, and industry sector. This analysis includes frequency distributions, mean, median, mode, standard deviation, and graphical representations to enhance data clarity. The *STATA* software facilitates this process through summary commands and descriptive statistical functions.

Inferential statistics will further explore causal relationships between variables, testing hypotheses derived from observed phenomena. By systematically analyzing panel data over a seven-year period, the study aims to provide empirical evidence on how gender diversity in leadership drives innovation and competitive edge. The findings will contribute to corporate governance discourse while offering practical insights for policymakers and businesses seeking to enhance performance through inclusive decision-making structures.

RESULTS AND DISCUSSION

Data Analysis and Hypothesis Testing

Panel Data Regression Model Selection

Before conducting the classical assumption test, a panel data regression model was first selected to determine the most efficient method, as follows:

Chow Test Results

The Chow test is intended to identify which of the two models, namely the Fixed Effect Model (FEM) or the Common Effect Model (CEM) is best suited for panel data estimation. If the ρ-value is > α (a significant level of 0.05), the most suitable model is CEM, while if the ρ-value is < α (significant level of 0.05), the most appropriate model is used is FEM.

The test results showed a Prob > F value of 0.00, which is less than 0.05. Therefore, it may be said that FEM is the best model to employ.

Hausman Test Results

The Hausman *test* is used to select the most appropriate model between FEM or REM *(Random Effect Model)*. If the ρ-value is > α (significant level of 0.05), the most suitable model is the *REM* while if the ρ-value value is < α (significant level of 0.05), the most appropriate model is used is *FEM*.

The test results showed a Prob value of > chi2 of 0.00, which is less than 0.05. Therefore, it may be said that FEM is the best model to employ.

Table 1. Estimated Results of Panel Data Model Selection

Information	Tested approach		Selected approach
Chow Test	*CEM*	*FEM*	*FEM*
Hausman Test	*FEM*	*REM*	*FEM*

Source: Data processed, 2025, Appendix 2 and Appendix 3

From the two test results, it shows that FEM is the chosen approach to estimate the regression of panel data. This leads to the conclusion that FEM is the most effective model technique for figuring out how women's representation affects a firm's competitive advantage and innovation performance.

Classical Assumption Test

The classical assumption test is a test that is carried out before conducting path analysis and Sobel test. Not all classical assumption tests are used in panel data regression (Basuki and Agus, 2016). FEM was determined to be the best model to employ based on the panel data regression model selection. Only the multicollinearity and heteroscedasticity tests are necessary because the FEM use the Ordinary Least Squares (OLS) method (Ekananda, 2016). In addition, the autocorrelation test was not performed in this study because the test is only relevant for time series data, where observations in year t can be influenced by the previous year (t-1). Meanwhile, in the panel data, variation between individuals or units is more dominant than the pattern of time change, so the autocorrelation test is not a priority in this analysis. The results of classical assumption tests are as follows:

1) Multicollinearity test

The multicollinearity test was used to ascertain whether or not there was a relationship between the independent variables in the regression model. This study's multicollinearity symptoms were determined by examining each variable's Variance Inflation Factor (VIF) value. The absence of multicollinearity symptoms is inferred if the VIF value is less than 10.

The correlation matrix for each of the study's variables is displayed in Appendix 4, and the multicollinearity test results are displayed in Appendix 5. The test results showed that the VIF value of female representation was 1.08, firm's innovation performance was 1.01, company size was 1.14, the age of the company was 1.22, the market-to-book ratio was 1.01, and the Covid-19 period was 1.00. All independent variables, including industrial sector variables, have a VIF value of less than 10. Therefore, it can be said that the regression model of this study does not exhibit any multicollinearity symptoms.

2) Heteroscedasticity Test

The heteroscedasticity test is used to ascertain whether the residuals of various observations in the regression model differ in variance. The results of the Breusch-Pagan Test and White's Test showed a heteroscedasticity problem (ρ-value < 0.05), which indicates that the variance of the error term is not constant. Therefore, to ensure the validity of statistical inference, regression model estimation is carried out using robust standard errors or White-corrected standard errors. In order to maintain the validity and accuracy of the process of deriving conclusions from the analysis's findings, this attempts to rectify the standard error calculation so that it is still valid in spite of heteroscedasticity.

Path Analysis

Path analysis in this study was conducted to determine the influence of women's representation on competitive advantage through intervening variables (firm's innovation performance) accompanied by control variables (company size, company age, market-to-book ratio, Covid-19 period, and industrial sector). The results of this research data processing using

the STATA program can be seen in Table 2 as follows:

Table 2. Regression Analysis Results

Variable	CA	IP	CA
	(1)	(2)	(3)
Independent Variables:			
Women's Representation	0,099***	-786,258	0,099***
	(5,35)	(-0.34)	(5,36)
Variable Intervention:			
Firm's Innovation Performance			0,000***
			(2,90)
Variable Control:			
Company Size	0,635***	651,389	0,634***
	(21,50)	(1,10)	(21,39)
Company Age	0,001***	-47,876	0,001***
	(4,73)	(-1,36)	(4,74)
Market-to-book Ratio	0,000	-20,837	0,000
	(1,24)	(-0,89)	(1,24)
Covid-19 *period*	-0,002	-1.451,633*	-0,002
	(-0,32)	(-1,68)	(-0,30)
Industry Sector:			
-Agriculture	-0,124***	-596,860	-0,124***
-Mining	-0,109***	-306,301	-0,109***
- Basic and Chemical Industries	-0,010	99,859	-0,010
- Consumer Goods Industry	-0,016	421,822	-0,016
- Property, Real Estate and Construction Building	-0,143***	-870,510	-0,143***
- Infrastructure, Utilities, and Transportation	-0,03	3.164,04	-0,031
- Trade, Services and Investment	-1,734***	-462,955	-0,058***
Constanta	-1,734	-17.711	-1,733
Number of Observations (n)	1.504	1.504	1.504
Prob>F	0,0000	0,4291	0,0000
R-*squared*	0,4253	0,0081	0.4254

Significance Level: *p < 0.1 **p < 0.05 ***p < 0.01

Source: Data processed, 2025, Appendix 6, Appendix 7, Appendix 8

This study uses 3 (three) regression structural equation models in accordance with Table 5.5. The first model in this study regresses independent variables and control variables to dependent variables. The second model in this study uses independent variables and control variables for intervening variables. While the third model uses independent variables, intervening variables, and control variables against dependent variables. Table 5.5 shows that the first and third models have R-Square with a difference of 0.4253 and 0.4254. The larger R-

Square value in the third regression model shows that 42.54 percent of the total variation in competitive advantage can be explained by the variation of the variables included in the regression structural model number 3 (three). The researcher selected regression structural model three to address the first and third hypotheses, as it provides a clearer explanation of the effects of each independent variable on the dependent variable than model one. The second hypothesis will be discussed using the results of the second regression structural model. Various industrial sectors are included in Table 5.5 because they serve as reference categories. This is done to avoid dummy variable traps, which can cause perfect collinearity.

Coefficient of Determination Test (R2)

The degree to which the independent variables in the regression model account for fluctuations in the dependent variables was evaluated using the coefficient of determination (R2) test. Stronger explanatory power of the independent variables is indicated by an R2 value nearer 1. As shown in Table 5.5, the R^2 for Model 2 is 0.0081, meaning that only 0.81% of the variation in the firm's innovation performance is explained by female representation, with the remaining 99.19% accounted for by factors outside the model. This low R^2 suggests that Model 2 has very limited explanatory power for the dependent variable (IP). In contrast, Model 3 yields an R^2 of 0.4254, indicating that 42.54% of the variation in competitive advantage is explained by female representation, firm's innovation performance, firm size, firm age, market-to-book ratio, the Covid-19 period, and industry sector, while the remaining 57.46% is influenced by other factors not included in the model.

Model Feasibility Test (F Test)

The F test in this study was conducted to determine the influence of women's representation, firm's innovation performance (along with the control variables of company size, company age, market-to-book ratio, Covid-19 period, and industrial sector) on competitive advantage. If the significance value (probability value or ρ-value) F is less than or equal to 0.05, then the independent variable (together with the control variable) has a simultaneous significant effect on the competitive advantage. On the other hand, if the significance value of F is greater than 0.05, then the independent variable (along with the control variable) does not have a simultaneous effect on competitive advantage. The F test on model 3 shows a significance value of 0.0000, which is less than 0.05. Thus, women's representation, firm's innovation performance (along with control variables of company size, company age, market-to-book ratio, Covid-19 period, and industrial sector) have a simultaneous significant effect on the company's competitive advantage.

Hypothesis Test (t-test)

To find out how each independent variable affected the partially bound variable, the t-test was used. Table 5.5 displays the findings of the t-test in this investigation. Model 2 shows a significance value of 0.737 for the independent variable of women's representation, which is higher than 0.1. The innovative performance of the company is therefore unaffected by the presence of women on the board of directors. Given that the results of the analysis showed that the overall representation of women did not have a significant effect on the company's innovation performance, the researcher then conducted a follow-up regression analysis. This

analysis focused on the highest level of female representation found, which is 43.55 percent in the trade, services, and investment sectors and 11.51 percent in the property, real estate and building construction sectors. The following are the regression results of the two sectors with the highest level of female representation:

Table 3. Results of Enterprise Sector Regression Analysis

Variable	IP
Representation of Women:	
Trade, Services, and Investment Sectors	2706,23
	(1,66)*
Constants	2040,63
Number of Observations (n)	464
Prob>F	0,164
R-*Squared*	0,106
Property, Real Estate and Building Construction Sector	-8242,16
	(-1,55)
Constants	-9733,50
Number of Observations (n)	175
Prob>F	0,678
R-*Squared*	0,076

*Significance Levels: *p < 0,1 **p < 0,05 ***p < 0,01*

Source: Data processed, 2025

Based on the regression results in Table 5.6, the two sectors exhibit different patterns. In the trade, services, and investment sector, female representation on the board of directors has a significance value of 0.098—below the 0.1 threshold—and a positive regression coefficient of 2,706.23. This indicates a significant positive effect of female board representation on firm innovation performance at the 90% confidence level. Conversely, in the property, real estate, and building construction sector, the significance value is 0.122, exceeding 0.1, suggesting that female representation on the board does not significantly affect innovation performance in this sector.

In Model 3, the women's representation variable records a significance value of 0.000, well below the 0.05 threshold, indicating a significant positive influence on competitive advantage among companies listed on IDX. The intervening variable firm innovation performance also shows a significant positive effect on competitive advantage, with a significance value of 0.004. Accordingly, both female board representation (X) and firm innovation performance (Z) significantly and positively impact competitive advantage at the 95% confidence level.

Table 3 indicates that the control variables firm size, firm age, and several industry sectors (agriculture, mining, property, real estate and building construction, trade, services, and investment) significantly influence competitive advantage at the 95% confidence level. In

contrast, in Model 2, the market-to-book ratio, the Covid-19 period, and certain industry sectors (basic and chemical industries, consumer goods, and infrastructure, utilities, and transportation) show no significant effect on competitive advantage at the same confidence level.

Firm size is employed as a control variable to capture company characteristics, as larger firms generally possess greater capacity and resources for R&D and innovation, whereas small and medium enterprises face greater constraints. This aligns with the findings of Akram et al. (2020) and Nadeem et al. (2020), which show that large firms exert a stronger influence on performance due to their superior positioning, stronger financial status, and greater resource availability. Meanwhile, the Covid-19 control variable reveals a significant negative effect on firm innovation performance at the 90% confidence level. This suggests that economic uncertainty and market disruptions during the pandemic reduced investment in innovation, while mobility restrictions and supply chain interruptions limited collaboration and access to innovation resources, ultimately hindering firms' innovative performance during the period.

Firm age is used as a control variable in terms of company characteristics. A longer company life describes a better reputation and higher credibility in the eyes of customers, business partners, and investors. The reputation and credibility built over time have become a strong foundation for the company to achieve and maintain a competitive advantage. A solid reputation allows the company to differentiate itself in a competitive market, attract loyal customers, and set a premium price according to the quality of the products produced. Meanwhile, high credibility facilitates access to vital resources and builds strategic partnerships that can strengthen the company's market position, create barriers to entry for new competitors, and overall, become a source of sustainable competitive advantage. This aligns with the findings of studies by Sarhan et al. (2019) which shows that the age of a company has a significant positive effect on market performance or long-term company value.

Sobel Test

Sobel test assesses the significance of the indirect effect of the independent variable (X) on the dependent variable (Y) through the mediating variable (M). The following presents the path analysis results applied in the Sobel Test to evaluate mediation effects in this study. The Sobel Test is expressed by the following equation and can be computed using Microsoft Excel:

Sab $= \sqrt{(b^2.Sa^2) + (a^2.Sb^2)}$.....(15)

Sab $= \sqrt{(0{,}00000011^2.2343{,}86^2) + (-786{,}25^2.0{,}0000000378^2)}$.....(16)

Sab $= 0{,}0002595$

Information:

Sab : *Indirect error standard*

a : Regression coefficient of women's representation of firm *'s innovation performance*

b : The *direct effect coefficient of firm's innovation performance* on *competitiveness advantage*

Sa : *Standard error* coefficient a

Sb : *Standard error* coefficient b

To assess the significance of the indirect effect, the t-value of the coefficient ab must be calculated using the following formula:

$t = \frac{ab}{Sab}$.....(17)

$t = \frac{(-786{,}25)\ (0{,}00000011)}{0{,}0002595}$.....(18)

$t = -0{,}3332$ .....(19)

$t\ tabel = 1{,}958$

The Sobel test results indicate that the calculated t-value (-0.3332) is less than the critical t-value (1.958), leading to the acceptance of H_0 and the rejection of H_a. This implies that firm innovation performance does not mediate the relationship between women's representation on the board of directors and competitive advantage.

Discussion

The Influence of Women's Representation on the Board of Directors on Competitive Advantage

The results of the study show that the representation of women on the board of directors measured as the proportion of the number of female directors to the total directors has a positive and significant effect on the company's competitive advantage as measured by market share metrics. A strong competitive advantage is reflected in the large market share controlled by the company. Success in adapting to changing market environments and competitive levels are the main challenges that affect competitive advantage, especially in strategic decision-making and increasing effectiveness (Ferreira et al., 2020). In line with the Upper Echelon Theory, the strategy and effectiveness of organizational performance reflect the values and cognitive base of executives who hold substantial positions in the organization. The board of directors, as part of the upper echelon, has demographic characteristics including gender (male and female) which according to this theoretical perspective also influences organizational strategic decisions (Moreno-Gómez et al., 2018).

Gender is considered in corporate strategic decision-making due to differences in the cognitive framework between women and men (Post and Byron, 2015), which are influenced by their experiences and the way they acquire knowledge. These differences shape the way they seek and interpret information, influence the decision-making process on the board with their mindset, and have an impact on performance that contributes to the company's competitive advantage. Cognitive frameworks reflect the way individuals understand and evaluate information, while values serve as guidelines in strategic decision-making. The role of women who take care of the household gives greater influence and control for women in the decision to purchase household equipment and necessities. This experience shapes women's cognitive frameworks and provides them with a unique perspective on consumer needs and

preferences, which can enrich the board's insights in understanding and responding to market demands.

Experience in dealing with stereotypes and perceived gaps also encourages women to be more likely to become measurable risk-takers (Mukarram et al., 2018) as a form of validation of their performance. The difference in terms of risk perception has significant implications for strategic decision-making. Measured risk-taking strikes a balance between risk and opportunity, allowing for the creation of a business strategy that is more flexible and responsive to market changes. This attitude encourages more strategic decisions based on calculation and more careful planning (Brighetti and Lucarelli, 2015; Liu and Zhu, 2024), which ultimately provides the ability for companies to create and strengthen competitive advantage through rapid market share expansion and adaptive to consumer dynamics and preferences.

In leadership positions, women bring diverse perspectives through a mindset formed from experience and knowledge gained (Post and Byron, 2015; Torchia et al., 2018). This diversity affects strategic decision-making processes such as market expansion, identification of previously under-accounted business opportunities, risk mitigation to increase efficiency, and building strategic alliances and partnerships that ultimately increase and strengthen the company's competitive advantage. Moreover, women's presence on the board of directors not only enhances the company's public image but also conveys a positive signal regarding its commitment to gender equality and women's rights. The empirical results of this study align with prior research (Arena et al., 2015; Green & Homroy, 2018; Isidro & Sobral, 2015; Kılıç & Kuzey, 2016; Moreno-Gómez et al., 2018; Naciti, 2019; Reguera-Alvarado et al., 2017; Suherman et al., 2023; Terjesen et al., 2016; Triana & Asri, 2017; Willows & van der Linde, 2016), which consistently found that female representation positively influences a firm's ability to strengthen and achieve greater competitive advantage.

The Influence of Women's Representation on the Board of Directors on the Firm's Innovation Performance

The results of the study based on Table 5.5 show that the representation of women on the board of directors measured as the proportion of the number of female directors to the total directors has no effect on the firm's innovation performance as measured by the intangible return on assets metric. The results of this study show a contradiction with the hypothesis argument prediction based on Social Role Theory. The theory emphasizes that social expectations shape gender roles and cause women to be expected to adapt more flexibly to various social roles in order to meet existing expectations. Openness to experience and flexibility are assumed to make women more adaptive to change, which in turn gives them greater opportunities to develop cognitive abilities and creativity.

The discrepancy between the study's findings and the initial hypothesis led the researcher to conduct further analysis to explore why women's representation showed no effect on firm innovation performance. The analysis focused on two sectors with relatively higher female representation based on observational data trade, services, and investment (43.55%) and property, real estate, and building construction (11.51%). Regression results reveal that, in the trade, services, and investment sector, female board representation has a

significant positive effect on firm innovation performance, with a significance value of 0.098 and a 90% confidence level (Table 5.6). In contrast, in the property, real estate, and building construction sector, the significance value is 0.122 above the 0.1 threshold indicating no significant effect in this sector (Table 5.6).

Women who occupy positions on the board of directors often come from non-traditional career paths, such as marketing, public relations, and law. A study by Brammer et al. (2007) in the UK showed that the proportion of female directors tended to be higher in companies that interact directly with end consumers, such as the retail and service industries. The work environment in the trade and services sector, which is service- and communication-oriented, tends to provide a more inclusive space for women's participation compared to the industrial sector that is structurally and culturally more masculine (Arena et al., 2015). These findings reflect that the need for empathy, communication skills, and understanding of consumer preferences is driving increased gender inclusion in the trade, services, and investment sectors. In addition, companies in this sector are required to have access to external resources related to market dynamics and changing consumer behavior. Therefore, women's expertise in the fields of strategic communication, marketing, and public relations management is an important asset for companies that are directly oriented to consumers (Brammer et al., 2007).

Powell and Butterfield (1994), as cited in Green and Homroy (2018), contend that discriminatory practices impede the career progression of equally qualified women from attaining positions on corporate boards. Similarly, Kagzi and Guha (2018) argue that the underrepresentation of women on boards restricts their ability to influence overall board decisions. This situation helps explain why low female representation does not significantly affect firm innovation performance. Consistently, Martinez-Jimenez et al. (2020) found in the Spanish context that a low proportion of women on boards fails to achieve a critical mass, thereby limiting their impact on a company's innovation performance. Based on the findings of Asch (1961) in Konrad et al. (2008), group attitudes towards individuals with differing opinions changed significantly when the number of minority individuals who voiced these opinions increased to three. Under these conditions, the response in the form of ridicule and insults from the majority group tends to shift to a more serious and respectful attitude towards different opinions.

The low representation of women, especially in countries that have a traditional culture that is very challenging in nature, such as patriarchal culture, causes the existence of women to only be part of tokenism (Singh et al., 2023). Low representation limits women's ability to influence board decisions, particularly strategic decisions related to firm-wide innovation (Kagzi & Guha, 2018). Although the regression model indicates a positive and statistically significant relationship between women's representation (WR) and firm innovation performance (IP) in the trade, services, and investment sectors, the very low R^2 value (0.1064) suggests that the model explains only a small portion of the variation in innovation performance, implying that numerous other factors outside the model contribute to this variation.

The Influence of Firm's Innovation Performance on Competitive Advantage

As shown in Table 5.5, firm innovation performance measured by the intangible asset return metric has a positive and significant effect on competitive advantage, as indicated by the market share metric. This result aligns with the concept of competitive advantage, which holds that it fundamentally stems from the value a company creates for its customers that exceeds the cost of producing its offerings. Such value is determined by what customers are willing to pay, with superior value achieved either by offering comparable benefits at a lower price than competitors or by providing unique benefits that more than justify a higher price.

The utilization of internal resources and the exploitation of external opportunities through innovation are key factors in creating a sustainable competitive advantage for the company. Along with increasing demand and changing consumer preferences, companies are required to continue to adapt to market dynamics to maintain their competitiveness. In industrial competition, the development of strategic positions and differentiation of products or services are a must for companies in offering unique value to the market. Therefore, innovation not only serves as a response to changes in the business environment, but also as a key strategic decision that determines the sustainability and growth of a company.

The correlation between the concept of competitive advantage and innovation has a close and positive relationship, where the improvement of a company's innovation performance directly contributes to strengthening its competitiveness. Successful innovation allows companies to create products or services that are unique, have significant added value, and are difficult to replicate by competitors. This not only increases differentiation in the market, but also gives companies a sustainable competitive advantage in the face of increasingly complex and competitive industry dynamics, in this study competitive advantage refers to the comparison of the company's net profit with the total net profit of similar industries.

Innovation not only serves as an adaptation strategy to changing business environments, but also as a fundamental element in the formation of a sustainable competitive advantage, which ultimately ensures the company's long-term growth. The empirical findings in this study are supported findings by (Anning-Dorson, 2018; Azeem et al., 2021; Distanont and Khongmalai, 2020; Ferreira et al., 2020; Kalmuk and Acar, 2015; Meldawati et al., 2023) which found that firm's innovation performance has a positive influence on the company's competitive advantage.

The Influence of Women's Representation on the Board of Directors on Competitive Advantage Through the Firm's Innovation Performance

The results of the study based on the Sobel test showed that firm's innovation performance did not play a mediator in the relationship between women's representation on the board of directors and competitive advantage. These findings indicate that women's representation does affect the company's competitive advantage according to the results of the first hypothesis test, but without having to go through the firm's innovation performance variable. The interpretation of the absence of this mediation effect leads to several important considerations that are the focus of the researcher, in addition to the results of the analysis of

the second hypothesis above. First, women's representation has an influence in terms of increasing the legitimacy and reputation of companies in the eyes of external stakeholders, such as investors who focus on ESG (Environmental, Social, and Governance) or consumers who are increasingly aware of gender equality issues (Bravo et al., 2015; Reguera-Alvarado et al., 2017). Improving a company's reputation can directly contribute to a company's competitive advantage without having to go through a series of measurable innovation processes (Vijaya et al., 2021).

The presence of women on the board of directors contributes to diversifying perspectives through cognitive values formed based on experience and knowledge so as to produce a more strategic alternative to board meetings (Post and Byron, 2015; Torchia et al., 2018). The diversity of perspectives brought by female board members can encourage more comprehensive discussions, reduce groupthink, facilitate more holistic risk assessments to enhance the board's capabilities in solving complex problems (Adams, 2016), and increasing the competitive advantage of firms in a competitive environment (Green and Homroy (2018). Improving the quality of these decisions can directly increase operational efficiency, more optimal resource allocation, and more effective marketing strategies and lead to competitive advantage without always manifesting as new product or process innovations.

Women leaders present an improvement in the quality of corporate governance (Ahmadi et al., 2018), where the quality of good governance contributes to competitive advantage and long-term value creation (Madhani, 2014). Women's leadership styles that are closely related to transformational leadership contribute significantly to improving the quality of corporate governance and the company's competitive advantage (Wu et al., 2021). The transformational leadership style focuses on motivation and positive change in the organization, so as to encourage the creation of a work environment that is more conducive to increased employee engagement through the creation of a clear vision and the strengthening of internal and external relationships of the company. A conducive work environment facilitates the formation of effective communication and harmonious relationships between employees and management, which ultimately strengthens coordination, policy compliance, and operational efficiency. Thus, the transformational leadership style applied by women contributes to the development of the company's competitive advantage in the long term through improving the quality of better corporate governance.

CONCLUSIONS

This study's findings reveal several key insights: (1) Women's representation on boards significantly enhances competitive advantage, aligning with *Upper Echelon Theory* by introducing diverse cognitive perspectives that improve strategic decision-making; (2) While no overall impact was found on innovation performance, sector-specific analysis showed positive effects in the trade, services, and investment sectors, with tokenism and low representation limiting broader influence; (3) Innovation performance itself significantly boosts competitive advantage, serving as a crucial driver of sustainable growth and market

adaptation; (4) Innovation does not mediate the gender diversity–advantage relationship, suggesting women directors contribute more through governance improvements, operational efficiency, and leadership styles rather than direct innovation, enhancing competitive advantage via legitimacy, diversified perspectives, and optimized resource allocation rather than through product or process innovations.

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