

The impact of the education of president commissioners on the relationship between female members of boards of directors and firm performance

O impacto da educação dos comissários presidentes na relação entre as mulheres no conselho de administração e o desempenho da empresa

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Abstract: This study aims to analyze the influence of female members of boards of directors (FBOD) on firm performance (FP). The next objective is to examine whether the president commissioner's (EPC) educational background moderates the influence of FBOD on FP. Using the resource dependence theory (RDT) and resource-based view (RBV) approaches, this study views the educational background of the president commissioner as a catalyst for enhancing the effectiveness of the female board of directors (FBOD). The data analysis technique employed involves panel data regression analysis. The first key result of the study is that FBOD had a positive effect on FP with TQ and ROA proxies, whereas the second key result is that EPC was found to strengthen the influence of FBOD on FP. The limitation of this study is that the research sample used involves all sectors of companies listed on the Indonesia Stock Exchange from 2019 to 2022. The results of this study can be used as a reference for shareholders to elect the president commissioners, who will oversee the company's strategy and ensure good corporate governance, with attention to the level of education (EDULEV) and educational background (EDUBACK). This study is the first to highlight the role of EPC in moderating the influence of FBOD on FP. The relevance of this study is even stronger considering the context of Indonesia, which has begun to encourage gender diversity at the board level, even though it has not formally implemented mandatory quotas.

Keywords: Female board of directors; Education background; Firm performance; Level of education.

Resumo: Este estudo tem como objetivo analisar a influência do conselho de administração feminino (FBOD) no desempenho da empresa (PF). O próximo objetivo é examinar se a formação educacional do comissário presidente (EPC) modera a influência do FBOD no PF. Usando as abordagens da Teoria da Dependência de Recursos (RDT) e da Visão Baseada em Recursos (RBV), este estudo vê a formação educacional do comissário presidente como um catalisador no aumento da eficácia do conselho de administração feminino para que aumente o aumento da eficácia do conselho de administração feminino para que ele aumente. A técnica de análise de dados empregada envolve análise de regressão de dados em painel. O primeiro resultado importante do estudo é que o conselho de administração feminino (FBOD) teve um efeito positivo no PF com proxies TQ e ROA, enquanto o segundo resultado principal é que o EPC fortaleceu a influência do FBOD no PF. A limitação deste estudo é que a amostra de pesquisa utilizada envolve todos os setores de empresas listadas na Bolsa de Valores da Indonésia de 2019 a 2022. Os resultados deste estudo podem ser utilizados como referência pelos acionistas na eleição do presidente do conselho, que supervisionará a estratégia

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da empresa e garantirá a boa governança corporativa, com atenção ao nível de escolaridade (EDULEV) e ao histórico educacional (EDUBACK). Este estudo é o primeiro a destacar o papel da EPC na moderação da influência do FBOD no PF. A relevância deste estudo é ainda mais forte considerando o contexto da Indonésia, que começou a incentivar a diversidade de gênero no nível do conselho, embora não tenha implementado formalmente cotas obrigatórias.

Palavras-chave: Conselho de administração feminino; Formação educacional; Desempenho da empresa; Nível de educação.

1 Introduction

FP reflects a company's ability to manage its resources efficiently to achieve organizational goals (Ahadiat et al., 2023). Among the critical resources supporting FP is corporate governance. One of the important governance components in Indonesia is the contribution of FBOD members (Kaur & Singh, 2019). However, the proportion of FBOD in Indonesia remains relatively low compared to other ASEAN countries, despite a gradual increase since 2017 (UNDP, 2019; Primadhyta, 2022). The Indonesian Financial Services Authority (OJK) issued Regulation No. 33/POJK to address this.04/2014, encouraging gender diversity on company boards. Nonetheless, cultural norms—particularly the persistence of patriarchal values—continue to limit the representation of women in leadership roles (Riani et al., 2021).

The underrepresentation of women in strategic leadership positions makes the contribution of FBODs to corporate governance in Indonesia a subject of interest. According to the OJK, in 2022, female participation on the boards of publicly listed companies stood at 46% (Nurchayani, 2023)—still below parity. This study adopts the RDT to explain the strategic value of female board representation. Diversity in leadership contributes to a broader range of perspectives and fosters innovation, which is crucial in complex business environments (Carter & Shank, 2023). In this light, the contribution of FBODs is viewed not only as a matter of equity but also as a strategic asset that enhances board effectiveness.

RDT further suggests that FBOD members possess valuable knowledge and expertise to build effective external relationships (Chatterjee & Nag, 2023). They tend to be more creative (Oh & Song, 2023) and risk-averse (Setiawan & Gestanti, 2022), which can contribute positively to company productivity. While several studies confirm the positive impact of FBOD on FP (Chen et al., 2023; Hatane et al., 2023; Islam et al., 2023; Kramarić & Miletić, 2022), other research presents either a negative effect (Fariha et al., 2022; Farooq & Ahmad, 2023; Xie et al., 2023; Urquhart & Zhang, 2022) or no significant impact (Almarayeh, 2023; Dodd et al., 2023; Rahman & Chen, 2023). These inconsistencies suggest the existence of moderating variables that may influence the FBOD–FP relationship. Following Frazier et al. (2004), including moderating variables is crucial when research results are inconclusive. This study introduces the EPC educational background as a moderator in the FBOD–FP nexus. In Indonesia's two-tier governance system, the board of directors is responsible for day-to-day operations, while the board of commissioners supervises and provides strategic direction. Therefore, effective supervision is essential, and the competence of the president commissioner plays a vital role in achieving good corporate governance. This study employs the RBV to understand how the EPC functions as an internal strategic resource that may enhance the company's performance. According to RBV, internal resources—particularly rare and difficult to imitate—can contribute to sustainable competitive advantage (Barney, 1991). Therefore, a highly educated and capable president commissioner is a valuable governance asset Khan et al., 2024).

Educational attainment, such as a master's degree or doctorate, is often associated with broader knowledge, better decision-making abilities, and stronger reputational capital (Ismail et al., 2020). Prior studies on EPC and FP have shown mixed results—some showing a positive impact (Ali et al., 2023; Amadi et al., 2023; Hatane et al., 2023), others indicating a negative or insignificant effect (Khan et al., 2024; Razali et al., 2023). Given these inconsistencies, this study proposes that the EPC may moderate the FBOD–FP relationship through enhanced team coordination, strategic alignment, and decision-making effectiveness.

To the best of the authors' knowledge, this is the first study to examine the moderating role of EPC in the relationship between FBOD and FP. The first novelty of the research lies in identifying the EPC as a moderator. The second involves operationalizing EPC with two proxies: EDULEV and EDUBACK. The third novelty lies in applying a multi-theoretical framework, combining RDT and RBV to enrich the interpretation of the findings.

This research makes a theoretical contribution by integrating two major frameworks—RDT and RBV—which have rarely been applied simultaneously in studies of corporate governance in Indonesia. From a practical

perspective, the findings can offer valuable insights for regulators, such as the Financial Services Authority (OJK), in formulating data-driven affirmative action policies and supporting capacity-building initiatives for female leaders and corporate commissioners.

This study aims to provide a more comprehensive understanding of the factors that influence corporate performance in Indonesia by considering gender dynamics in leadership and the quality of strategic oversight. In promoting inclusive economic growth, the findings offer a more informed and evidence-based foundation for policymaking.

2 Theoretical basis and hypotheses development

2.1 Resource dependency theory (RDT)

The RDT posits that firms rely on external resources for survival and performance (Pfeffer & Salancik, 1978). Competent individuals—such as board members—are essential to effectively secure and manage these resources. Board diversity, including gender diversity, enhances access to diverse networks, external support, and strategic inputs (Carter & Shank, 2023).

In this study, FBOD members are considered strategic assets under RDT. They offer distinct knowledge, skills, and perspectives that can facilitate interactions with external stakeholders (Carter & Shank, 2023). FBODs are also associated with greater creativity (Oh & Song, 2023), risk aversion (Setiawan & Gestanti, 2022), and ethical orientation, collectively supporting better decision-making.

Empirical studies based on RDT have shown that greater board diversity is associated with improved FP due to better decision quality, stakeholder alignment, and resource acquisition (Nimer et al., 2023; Song et al., 2020). Therefore, FBOD can contribute to a company's ability to respond to environmental uncertainty and secure critical resources.

2.2 Resource-based view theory (RBV)

The RBV emphasizes that a firm's competitive advantage stems from internal resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). This study conceptualizes EPC as a valuable, rare, inimitable, and non-substitutable resource. A highly effective EPC can improve oversight quality, strategic decision-making, and firm competitiveness (Khan et al., 2024).

Two proxies are used to measure EPC: EDULEV: The formal level of education attained. Higher education levels are associated with broader knowledge and analytical ability, enabling more informed decisions (Ismail et al., 2020). EDUBACK: The academic discipline or specialization. A business, finance, or law background is considered advantageous for strategic oversight (Kusumastati et al., 2022). Under RBV, these educational attributes represent internal capabilities that may enhance the effectiveness of other governance elements, such as the FBOD.

2.3 Female members of boards of directors and firm performance

The board of directors plays a central role in managing a company, and gender diversity within this group—manifested as FBOD—can influence management quality (Tjahjadi et al., 2023). According to RDT, FBOD represents a strategic resource that adds diverse insights and decision-making approaches, contributing positively to FP (Castro et al., 2023; Sieweke et al., 2023). FBOD members are often seen as more empathetic, risk-conscious, and collaborative, making them valuable in navigating today's competitive environments (Pham & Lo, 2023). Women in leadership have been shown to improve communication, strengthen innovation management, and enhance corporate reputation (Setiawan & Gestanti, 2022). In particular, their communal character and customer-centric perspectives can increase customer satisfaction and sales growth. Accordingly, empirical evidence supports the positive effect of FBOD on FP (Amadi et al., 2023; Chen et al., 2023; Hosny & Elgharbawy, 2022; Dhifi & Zouari, 2022; Aggarwal et al., 2019; Khatib & Nour, 2021; Yarram & Adapa, 2023; Zarefar & Narsa, 2023). Based on this theoretical and empirical foundation, the first hypothesis is proposed:

H1: FBOD has a positive effect on FP

2.4 Female members of boards of directors, education of president commissioner, and firm performance

According to the RDT, gender diversity within a company's management represents a valuable resource that can strengthen organizational decision-making and competitive positioning. Suherman et al. (2023) assert that managerial knowledge—such as that of diverse boards—is critical in creating competitive advantage. In this context, FBOD is seen as a strategic resource capable of offering unique insights, facilitating problem-solving, and contributing to more effective decisions, thereby improving FP.

While a growing body of empirical research supports the positive impact of FBOD on FP (Curea et al., 2022; Naseem et al., 2020; Saha & Maji, 2022; Soewarno & Nugroho, 2021), other studies report either a negative effect (Fariha et al., 2022; Farooq & Ahmad, 2023) or no significant impact (Almarayeh, 2023; Dodd et al., 2023; Rahman & Chen, 2023). These conflicting results suggest the contribution of contextual or moderating factors that shape the nature of the FBOD–FP relationship.

In line with the RBV, EPC attributes may represent an internal capability that enhances FP. Prior studies have found that the educational level of board members reflects their intellectual capacity and managerial competency, leading to more effective oversight and supervision (Hatane et al., 2023). Higher educational qualifications are also associated with stronger analytical and reasoning skills, improving decision quality and effectively monitoring risk-taking behaviors (Dong et al., 2023; Khan et al., 2024; Tasheva et al., 2020).

Furthermore, RBV theory suggests that diversity in EDUBACK strengthens corporate leadership's problem-solving and strategic capabilities, particularly in highly dynamic and competitive environments (Ismail et al., 2020). However, empirical evidence on the role of education remains mixed. While some studies find a significant effect of the EPC on FP (Khan et al., 2024), others report no significant impact (Hatane et al., 2023; Hosny & Elgharbawy, 2022).

Given the inconclusive findings in prior literature regarding FBOD and EPC, this study proposes that EPC acts as a moderator that can influence the strength and direction of the FBOD–FP relationship. Consistent with RBV, an EPC with higher educational attainment is better positioned to enhance management supervision, thereby reinforcing the contribution of FBOD to FP (Ermawati & Soewarno, 2024). However, not all findings are aligned: other studies suggest that EPC may have a negative (Khan et al., 2024; Razali et al., 2023) or insignificant (Ermawati & Dianawati, 2024; Mgammal, 2022) impact on FP.

Despite these divergent outcomes, RBV highlights that valuable, rare, and difficult to imitate resources—such as the education and expertise of top leaders—can offer firms a sustainable advantage. The EDULEV may thus amplify the positive influence of FBOD on FP by improving coordination, communication, and strategic alignment within the board.

Similarly, EDUBACK, representing the field of study or specialization, may influence their ability to supervise and collaborate effectively with diverse board members. A finance, business, or accounting background has been associated with better governance and improved performance outcomes (Ahadiat et al., 2023; Hatane et al., 2023; Lee & Foong, 2023). An EPC with relevant expertise is therefore likely to strengthen the positive effect of FBOD on FP by integrating diverse perspectives and enhancing strategic cohesion.

By effectively managing and leveraging board diversity, a well-educated president commissioner can optimize the contributions of FBOD members to organizational performance. Based on these theoretical foundations and prior empirical findings, the following hypothesis is proposed:

H2: EPC positively moderates the relationship between FBOD and FP, such that the positive impact of FBOD on FP is stronger when the EPC has a relevant educational background

3 Methodology

3.1 Population, sample, and data source

This study's population comprises all companies listed on the **Indonesia Stock Exchange (IDX)** from 2019 to 2022. Based on the availability of relevant data required for the variables under study, a purposive sampling technique was employed. After applying the selection criteria, **874 firm-year observations** were obtained. The data used in this study are secondary data, sourced from the **annual reports** of publicly listed companies in Indonesia. These reports were accessed through company websites and the official IDX website.

3.2 Variable measurements

The study involves four categories of variables: the dependent variable FP, the independent variable FBOD, the moderating variable EPC, and several control variables. Table 1 summarizes the operational definitions and measurements of the variables.

Table 1. Variable Measurements

Variable	Code	Measurement
FP:		
Tobins'Q	TQ	The market value of the company divided by the book value of the company's assets
Return on Assets	ROA	Net profit divided by total assets
FBOD:		
Dummy Variable	DUMFBOD	1 if there are females on the board of directors, 0 if not
Proportion of Females on the Board of Directors	PROFBOD	The number of females on the board of directors divided by the total number of directors
Number of Female Members of the Board of Directors	NFBOD	Total number of female members on the board of directors
EPC:		
Education Level of President Commissioner	EDULEV	1 = Senior high school
		2 = Bachelor
		3 = Master
		4 = Doctorate
		5 = Professor
Educational Background of President Commissioner	EDUBACK	1 = Economics
		2 = Technique
		3 = Others
Control Variables:		
Number of Board of Directors	NBOD	Total number of board of directors
Number of Board of Independent Directors	NBOID	Total number of board of independent directors
Number of Audit Committee	NAC	Total number of audit committee
Family Ownership	FO	Total percentage of family share ownership divided by total shares
Firm Size	FS	Natural logarithm of total assets
Firm Age	FA	Long established company
Leverage	LEV	Total debt divided by total equity
Liquidity	LIQ	Current assets divided by current debt

3.3 Research design

Using an unbalanced panel dataset, this study employs Ordinary Least Squares (OLS) regression as the primary data analysis technique. Model 1 is specified to test Hypothesis 1, which examines the effect of FBOD on FP. Two proxies are used to represent FP: Tobin's Q (TQ), as adopted by Almarayeh (2023), and Return on Assets (ROA), following Castro et al. (2023). The main independent variable, FBOD, is measured using a dummy variable (DUMFBOD), which equals one if a company has at least one FBOD, and zero otherwise (Chen et al., 2023).

The specification of the regression model used to test Hypothesis 1 is presented in Equation 1:

$$FP_{i,t} = \hat{a}_0 + \hat{a}_1 FBOD_{i,t} + \sum_{i=1}^n \hat{a}_n CV_{it} + \hat{a}_{it} \quad (1)$$

Note: FP = firm performance; FBOD = female members of the board of directors; CV = control variables.

The second regression model is employed to test Hypothesis 2, which posits that the EPC moderates the relationship between FBOD and FP. As in the first model, FP is the dependent variable, measured using Tobin's Q (TQ) and Return on Assets (ROA). The independent variable, FBOD, is represented by a dummy variable (DUMFBOD), which equals 1 if there is at least one FBOD, and 0 otherwise. The moderating variable, EPC, is operationalized using two proxies: EDULEV: the education level of the president commissioner; EDUBACK: the educational background or field of study of the president commissioner. Moderation effects are captured through interaction terms between DUMFBOD and each EPC proxy: **DUMFBOD × EDULEV** and **DUMFBOD × EDUBACK**.

The regression model used to test the moderation hypothesis is specified in Equation 2:

$$FP_{i,t} = \hat{a}_0 + \hat{a}_1 FBOD_{i,t} + \hat{a}_2 EPC + \hat{a}_3 FBOD * EPC + \sum_{i=1}^n \hat{a}_n CV_{it} + \hat{a}_{it} \quad (2)$$

Note: FP = firm performance; FBOD = female members of boards of directors; EPC = education of the president commissioner; CV = control variables.

3.4 Diagnostic and robustness tests

Several diagnostic tests were conducted to ensure the reliability and validity of the panel data regression results. First, the heteroscedasticity assumption was tested using the Wald test, while autocorrelation was examined using the Wooldridge test. These tests are essential to detect and correct any potential biases in the regression estimates.

The Variance Inflation Factor (VIF) test was applied to detect multicollinearity. The multicollinearity assumption is considered satisfied when all VIF values are below 10, indicating no strong linear relationships exist among the independent variables.

Furthermore, a robustness analysis addressed potential endogeneity concerns related to the DUMFBOD variable. Two additional models were employed:

1. Heckman's Selection Model accounts for potential selection bias. Following prior studies (Li & Chen, 2018; Saha, 2023), the lagged proportion of FBOD was used as an instrumental variable.
2. Fixed Effects Model, which controls for unobserved heterogeneity across firms.

These methodological steps reinforce the robustness of the findings and enhance the validity of the statistical inferences drawn from the analysis.

4 Results and discussion

4.1 Descriptive statistics

Descriptive statistics for the dependent, independent, moderating, and control variables are presented in Tables 2 to 5, based on 874 firm-year observations from companies listed on the Indonesia Stock Exchange between 2019 and 2022. Table 2 presents the summary statistics for the dependent variables. Tobin's Q (TQ) ranged from 0.10 to 35.46, with a mean of 1.76, indicating variations in market valuation among firms. Meanwhile, Return on Assets (ROA) ranged from -54.43 to 57.86, with a mean of 3.95, suggesting that, on average, the sampled firms were profitable. Table 3 displays the distribution of the FBOD variable. Approximately 41.60% of the sampled firms had at least one FBOD, reflecting a moderately diverse board

composition across companies. Table 4 reports the EDUBACK. Most presidents and commissioners held a background in economics or business-related disciplines, accounting for 55.61% of the total sample. Table 5 summarizes EDULEV. 47.03% of the sample held a bachelor's degree, the dominant qualification.

Other control variables—including NBOD (number of board members), NFBOD (number of female board members), PROFBOD (proportion of FBOD), NBODI (board independence), NAC (number of audit committee members), NWAC (number of women on the audit committee), FO (foreign ownership), FA (firm age), FS (firm size), LEV (leverage), and LIQ (liquidity)—also demonstrated considerable variation, indicating the diversity of firm characteristics in the sample and warranting further empirical investigation.

Table 2. Descriptive Statistics.

Variable	N	Min.	Max.	Mean	Std. Dev
TQ	874	0.10	35.46	1.76	2.60
ROA	874	-54.43	57.86	3.95	11.80
NBOD	874	2.00	13.00	4.64	2.14
NFBOD	874	0.00	6.00	0.59	0.89
PROFBOD	874	0.00	0.67	0.12	0.17
NBODI	874	0.00	3.00	0.69	0.52
NAC	874	0.00	5.00	2.99	0.38
NWAC	874	0.00	3.00	0.61	0.75
FO	874	0.00	0.99	0.24	0.33
FA	874	4.00	105.00	39.93	18.79
FS	874	17.41	25.92	21.53	1.65
LEV	874	-0.91	1.00	0.50	0.27
LIQ	874	0.00	0.32	0.01	0.02

Table 3. Frequency of DUMFBOD.

DUMFBOD	N	Percentage
0	510	58.40
1	364	41.60
Total	874	100

Note: N = Number of samples; 1 = if the board of directors is female; 0 = if not

Table 4. Frequency of EDUBACK.

EDUBACK	N	Percentage
1	486	55.61
2	161	18.42
3	227	25.97
Total	874	100

Note: N = Number of samples; 1 = Economics; 2 = Technique; 3 = Others.

Table 5. Frequency of EDULEV.

EDULEV	N	Percentage
1	142	16.25
2	411	47.03
3	285	32.61
4	34	3.89
5	2	0.23
Total	874	100

Note: N = Number of samples; 1 = Senior high school; 2 = Bachelor; 3 = Master; 4 = Doctorate; 5 = Professor.

4.2 Heteroscedasticity test, correlation analysis, multicollinearity

Several diagnostic tests were conducted to ensure the validity of the panel regression results. First, heteroscedasticity was tested using the Modified Wald Test for group-wise heteroscedasticity in the fixed effects model. The results yielded a chi-square value of 317.66 with a probability of 0.5670, indicating the absence of heteroscedasticity in the model. Second, the Wooldridge Test was used to detect the presence of autocorrelation in the panel data. The test produced a result of $F(1,159) = 30.313$ with a p-value of 0.6124, suggesting that the model is free from autocorrelation issues. Third, the Variance Inflation Factor (VIF) was employed to examine multicollinearity. Generally, VIF values below 10 indicate no serious multicollinearity among independent variables. Based on the results presented in Table 6, all VIF values were below the critical threshold of 10. This confirms that there is no multicollinearity problem and that the independent variables are not strongly correlated.

These diagnostic tests collectively confirm the data's adequacy and the model assumptions' robustness for further regression analysis.

Table 6. Variance Influence Factors (VIF).

Variable	VIF
PROFBOD	4.96
NFBOD	4.50
DUMFBOD	4.21
NBOD	2.42
FS	1.70
EDULEV	1.34
EDUBACK	1.30
FA	1.16
LEV	1.10
FO	1.09
LIQ	1.07
NAC	1.06
NWAC	1.05
NBoDI	1.04

4.3 Multivariate analysis

4.3.1 Findings on female members of the board of directors and firm performance

The findings indicate that the contribution of FBOD, as proxied by DUMFBOD, consistently has a positive impact on FP, which TQ and ROA measure. These results remain robust across model specifications, including control variables and fixed effects. Therefore, the findings support the first hypothesis of this study. These findings support RDT. RDT shows that the contribution of FBOD is a company strategy to reduce environmental uncertainty by leveraging the firm's external resources and the enhancement of corporate legitimacy. FBOD can help firms access external resources—such as capital, information, legitimacy, or market opportunities—through the knowledge and expertise possessed by its members, thereby improving FP (Chatterjee & Nag, 2023).

Contrary to the findings of Oh & Song (2023), which provide evidence that FBOD has a neutral effect in the context of developed markets with distinct institutional characteristics, the results of this study show that FBOD positively affects FP in Indonesia, an emerging market. This difference is likely due to the patriarchal organizational culture in Indonesia, which limits gender inclusion in companies. However, government regulations driven by the Financial Services Authority (OJK) aim to promote gender equality to improve corporate governance.

Other evidence has also shown that FBOD-led companies tend to be risk-averse and manage assets efficiently, besides being able to return assets 2.9 percent higher than the male board of directors (Setiawan & Gestanti, 2022). Consistent with RDT, FBOD tends to be risk-averse and manages assets efficiently. This behavior reflects a strategic response to resource constraints and stakeholder demands, where FBOD contributes unique added value to the firm. These findings are particularly relevant in the Indonesian context, where the contribution of FBOD remains rare but strategic. FBOD can enhance the firm's legitimacy in the eyes of foreign investors and policymakers, which aligns with the goal of RDT to manage organizational dependence on external parties that could threaten the firm's survival. FBOD contributes unique perspectives and knowledge that influence strategic decision-making. Increasing the contribution of FBOD in Indonesia carries significant implications—not merely as a matter of representation, but as a strategic means to access external resources through social networks and enhance corporate legitimacy. These findings empirically support previous research (Oh & Song, 2023; Razali et al., 2023; Suherman et al., 2023; Farooq & Ahmad, 2023).

Table 7. Regression Analysis Results.

Variable	(1) TQ	(2) TQ	(3) TQ	(4) ROA	(5) ROA	(6) ROA
Intercept	1.647*** (14.294)	5.817*** (3.958)	4.228 (1.598)	2.653*** (5.119)	-28.822*** (-4.681)	-48.212*** (-5.241)
DUMFBOD	0.278** (1.558)	0.151** (0.820)	0.118** (0.669)	3.110*** (3.873)	1.769** (2.297)	1.496** (2.267)
NBOD		0.141*** (2.657)	0.049*** (0.571)		0.371* (1.668)	0.019 (0.099)
NBODI		0.115 (0.675)	0.085 (0.533)		1.721** (2.404)	0.949 (1.282)
NAC		-0.110 (-0.464)	0.139 (0.379)		0.284 (0.285)	-0.083 (-0.101)
NWAC		-0.203* (-1.709)	-0.076* (-0.588)		-0.726 (-1.458)	-0.994** (-2.101)
FO		-0.157 (-0.575)	-0.162 (-0.627)		0.468 (0.409)	0.999 (0.864)
FS		-0.236*** (-3.415)	-0.176*** (-1.829)		0.922*** (3.187)	1.445*** (5.358)
FA		0.016*** (3.160)	0.007 (0.830)		0.044** (2.139)	-0.039 (-1.285)
LEV		0.101 (0.291)	-0.034 (-0.073)		13.744*** (9.417)	14.809*** (4.520)
LIQ		3.137 (0.722)	0.863 (0.209)		12.655 (0.695)	-6.506 (-0.225)
Year effect			YES			YES
Industry effect			YES			YES
Adj.R2	0.268	0.772	0.858	0.156	0.695	0.671
N	874	874	874	874	874	874
F-stat	0.055	0.150	0.139	0.265	0.685	0.661

Note. *t* statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3.2 Findings on female members of boards of directors, education of president commissioner, and firm performance

The second hypothesis explains that EPC positively moderates the relationship between FBOD and FP. In this study, EPC is proxied by EDULEV and EDUBACK indicators. Meanwhile, FBOD is proxied using a dummy variable (DUMFBOD), and TQ and ROA measure FP. The results of the moderation analysis are presented in Table 8. The findings indicate that EPC, whether proxied by EDUBACK or EDULEV, moderates the effect of FBOD on FP, both in terms of TQ and ROA. Overall, these findings support the second hypothesis, namely that the EPC plays a significant role in strengthening the positive impact of FBOD on FP.

These findings align with the RBV theory, which posits that internal resources that are valuable, rare, inimitable, and non-substitutable (VRIN) can enhance FP (Barney, 1991). The EPC, represented by EDUBACK and EDULEV, serves as a VRIN-type internal resource that strengthens the effect of FBOD on FP. EDUBACK and EDULEV fulfill the VRIN criteria, as not all firms—especially in the Indonesian context—possess a president commissioner with a high and relevant educational background, making this resource difficult to replicate. As shown in Table 4, EPC predominantly comprises individuals with educational backgrounds in economics. The moderating effect of EDUBACK*FBOD suggests that a president commissioner with a background in economics or business can better enhance strategic oversight effectiveness (Kusumastati et al., 2022). Equipped with expertise, knowledge, and experience, the president commissioner can improve corporate oversight, enhancing FP (Khan et al., 2024). It is consistent with the RBV perspective, which asserts that combining internal firm resources can generate a competitive advantage that is difficult for competitors to imitate.

According to the RBV, a higher level of formal education attained by the president commissioner can support the firm in enhancing strategic oversight and achieving competitive advantage (Khan et al., 2024; Dong et al., 2023; Khan et al., 2024; Tasheva et al., 2020). A board of commissioners with at least a bachelor's degree can enable FBOD to improve FP (El-Khatib & Joy, 2021). Higher educational qualifications, such as master's and doctoral degrees, serve as strategic resources that provide the competence and capabilities needed for effective strategic oversight, thereby enhancing FP (Ismail et al., 2020). EDULEV, as an indicator of educational level, represents a strategic asset for improving corporate oversight and optimizing the role of FBOD in enhancing FP. As shown in Table 3, the EDULEV is dominated by those holding bachelor's degrees (47.03%) and master's degrees (32.61%), which supports the role of EDULEV in strengthening the influence of FBOD on FP.

The collaboration between EPC and FBOD is a highly relevant issue in Indonesia. Indonesia presents a unique case where the contribution of FBOD in publicly listed companies remains limited. It contrasts with developed countries that exhibit higher levels of gender diversity on corporate boards. In such a setting, the role of EPC as a strategic resource becomes crucial as an internal driver that can transform the role of FBOD by bringing innovative perspectives into strategic decision-making, thereby enhancing FP. The RBV underscores that collaboration among human resources within corporate governance practices is vital for achieving sustainable competitive advantage. These research findings confirm the RBV theory regarding unique resources and demonstrate that the combination of EPC as a supervisory system and FBOD as company management forms a strategic resource, particularly in emerging markets such as Indonesia. Such a combination remains rare and difficult to replicate.

Table 8. Regression Analysis Results with EDUBACK, EDULEV Moderation.

Variable	(1) TQ	(2) TQ	(3) TQ	(4) ROA	(5) ROA	(6) ROA
Intercept	-48.212*** (-5.241)	3.325 (1.194)	2.985 (1.146)	-28.822*** (-4.681)	-47.878*** (-5.270)	-49.357*** (-5.299)
DUMFBOD	1.496** (2.267)	0.692** (1.979)	1.392*** (2.846)	1.769** (2.297)	1.887** (1885)	4.484** (2.467)
EDUBACK		0.189 (1.507)			-0.487 (-0.879)	
C.DUMFBOD#C.EDUBACK		0.310* (1.897)			0.867* (1.207)	
EDULEV			0.34* (1.819)			0.614 (0.913)
C.DUMFBOD#C.EDULEV			0.559** (2.522)			1.334* (1.675)
NBOD	0.019 (0.099)	0.049 (0.571)	0.049 (0.571)	0.371* (1.668)	0.019 (0.099)	0.019 (0.099)
NBODI	0.949 (1.282)	0.128 (0.759)	0.082 (0.492)	1.721** (2.404)	0.895 (1.222)	0.907 (1.250)
NAC	-0.083 (-0.101)	0.154 (0.416)	0.110 (0.293)	0.284 (0.285)	-0.086 (-0.104)	-0.183 (-0.221)
NWAC	-0.994** (-2.101)	-0.075 (-0.572)	-0.080 (-0.628)	-0.726 (-1.458)	-0.992** (-2.089)	-1.017** (-2.139)

Note. *t* statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8. Continued...

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	TQ	TQ	TQ	ROA	ROA	ROA
FO	0.999 (0.864)	-0.144 (-0.556)	-0.128 (-0.510)	0.468 (0.409)	1.019 (0.894)	0.962 (0.839)
FS	1.445*** (5.358)	-0.141 (-1.621)	-0.133 (-1.574)	0.922*** (3.187)	1.468*** (6.108)	1.467*** (6.152)
FA	-0.039 (-1.285)	0.007 (0.818)	0.008 (0.866)	0.044** (2.139)	-0.038 (-1.251)	-0.038 (-1.253)
LEV	14.809*** (4.520)	-0.029 (-0.063)	-0.062 (-0.132)	13.744*** (9.417)	14.827*** (4.501)	14.758*** (4.507)
LIQ	-6.506 (-0.225)	0.720 (0.169)	1.081 (0.255)	12.655 (0.695)	-5.990 (-0.208)	-6.163 (-0.212)
Year effect	YES	YES	YES	YES	YES	YES
Industry effect	YES	YES	YES	YES	YES	YES
Adj.R2	0.858	0.890	0.856	0.671	0.668	0.673
N	874	874	874	874	874	874
F-stat	0.139	0.143	0.156	0.661	0.665	0.663

Note. t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01.

4.4 Additional analysis

4.4.1 Alternative Female Members of Boards of Directors (FBOD) Measurements

The main findings are presented in Tables 7 and 8, which test the direct and moderating effects of FBOD and EPC on FP, measured using Tobin's Q (TQ) and Return on Assets (ROA). To assess the robustness of these results, we conducted additional regression analyses using alternative measures of board diversity, namely PROFBOD and NFBOD. In the primary analysis, FBOD was measured using a dummy variable (DUMFBOD) to capture the contribution of at least one FBOD. To ensure the robustness of the findings, additional analyses were conducted using alternative proxies for FBOD. These included PROFBOD, the percentage of FBOD, NFBOD, and the total number of female board members.

Table 9 presents the regression results using these alternative measurements. Model 1 shows that PROFBOD has a significant positive effect on Tobin's Q (TQ) and that EDUBACK moderates this relationship positively. Model 2 confirms a similar effect for NFBOD on TQ, with EDUBACK also acting as a significant moderator. Model 3 shows that EDULEV moderates the effect of PROFBOD on TQ, while Model 4 demonstrates the same moderating role for EDULEV on the relationship between NFBOD and TQ.

Likewise, for the Return on Assets (ROA) proxy, Model 5 reveals that PROFBOD positively affects ROA, and EDUBACK significantly moderates this relationship. Model 6 shows that NFBOD also positively influences ROA, with EDUBACK as a moderator. Model 7 demonstrates that EDULEV moderates the effect of PROFBOD on ROA, and Model 8 confirms the moderating effect of EDULEV on the relationship between NFBOD and ROA.

Overall, the alternative specifications in Table 9 yield results consistent with the main findings in Tables 7 and 8, reinforcing the robustness and reliability of the study's conclusions.

Table 9. Effects of PROFBOD, NFBOD on FP.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	TQ	TQ	TQ	TQ	ROA	ROA	ROA	ROA
Intercept	-48.004*** (-5.204)	3.304*** (1.198)	3.017*** (1.139)	3.153*** (1.206)	-48.753*** (-5.320)	-47.705*** (-5.246)	-49.756*** (-5.280)	-48.515*** (-5.213)
EDUBACK	0.155 (1.090)	0.202* (1.766)			-0.394 (-0.775)	-0.181 (-0.365)		

Note. t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01.

Table 9. Continued...

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	TQ	TQ	TQ	TQ	ROA	ROA	ROA	ROA
EDULEV			0.274*	0.252			0.459	0.529
			(1.672)	(1.640)			(0.739)	(0.900)
PROFBOD	3.057**				0.223			
	(1.635)				(0.055)			
PROFBOD*EDUBACK	0.791**				1.874**			
	(1.202)				(0.917)			
NFBOD		0.490**				0.388**		
		(2.262)				(0.524)		
NFBOD* EDUBACK		0.257***				0.047**		
		(2.915)				(0.138)		
PROFBOD			3.457**				10.295**	
			(2.554)				(2.046)	
PROFBOD*EDULEV			1.372**				3.215**	
			(2.283)				(1.481)	
NFBOD				0.594**				2.301**
				(2.194)				(2.572)
NFBOD* EDULEV				0.254**				0.783**
				(2.374)				(2.131)
NBOD	0.142***	0.061	0.080	0.025	0.080	0.025	0.080	0.025
	(2.727)	(0.703)	(0.431)	(0.130)	(0.431)	(0.130)	(0.431)	(0.130)
NBODI	0.121	0.151	1.050	1.091	1.013	1.089	1.017	1.028
	(0.713)	(0.893)	(1.422)	(1.475)	(1.376)	(1.487)	(1.404)	(1.417)
NAC	-0.101	0.129	-0.055	-0.061	-0.026	-0.054	-0.087	-0.077
	(-0.427)	(0.347)	(-0.068)	(-0.074)	(-0.031)	(-0.066)	(-0.105)	(-0.093)
NWAC	-0.209*	-0.058	-0.979**	-0.952**	-0.976**	-0.944**	-0.978**	-0.959**
	(-1.762)	(-0.440)	(-2.060)	(-2.013)	(-2.036)	(-1.975)	(-2.045)	(-2.014)
FO	-0.170	-0.151	0.974	1.029	1.022	1.066	0.962	1.001
	(-0.621)	(-0.581)	(0.839)	(0.887)	(0.895)	(0.930)	(0.837)	(0.870)
FS	-0.230***	-0.136	1.428***	1.422***	1.502***	1.447***	1.492***	1.434***
	(-3.337)	(-1.593)	(5.312)	(5.263)	(6.262)	(5.979)	(6.265)	(5.976)
FA	0.016***	0.007	-0.039	-0.041	-0.038	-0.040	-0.039	-0.040
	(3.151)	(0.751)	(-1.266)	(-1.328)	(-1.226)	(-1.313)	(-1.264)	(-1.309)
LEV	0.089	-0.035	14.805***	14.794***	14.863***	14.766***	14.781***	14.683***
	(0.257)	(-0.075)	(4.514)	(4.513)	(4.488)	(4.491)	(4.505)	(4.485)
LIQ	3.127	0.810	-5.441	-5.074	-5.238	-5.214	-4.964	-4.832
	(0.721)	(0.195)	(-0.189)	(-0.176)	(-0.181)	(-0.180)	(-0.171)	(-0.166)
Year Effect	YES	YES	YES	YES	YES	YES	YES	YES
Industry Effect	YES	YES	YES	YES	YES	YES	YES	YES
Adj.R2	0.854	0.907	0.947	0.825	0.588	0.600	0.602	0.598
N	874	874	874	874	874	874	874	874
F-stat	0.156	0.144	0.130	0.135	0.616	0.629	0.617	0.625

Note. t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01.

4.5 Robustness analysis

Given the potential endogeneity of the key independent variable—FBOD, proxied by DUMFBOD—a robustness analysis was conducted to validate the consistency of the study’s findings. Two alternative estimation approaches were employed:

1. Heckman’s Selection Model, and
2. Fixed Effects Model.

The application of Heckman’s two-stage model requires the use of valid instrumental variables. Following prior studies (Li & Chen, 2018; Saha, 2023), this study employs the lagged value of the percentage of FBOD as an instrument.

Table 10 presents the Heckman selection model results. The Inverse Mills Ratio (IMR1) is statistically non-significant, indicating that selection bias is not a major concern. However, the interaction terms—DUMFBOD × EDUBACK and DUMFBOD × EDULEV—remain statistically significant for both performance proxies (TQ and ROA). These results reaffirm the main findings reported in Table 8, demonstrating that the educational characteristics of the president commissioner significantly moderate the impact of FBOD on FP.

The consistency of results across both the Heckman model and the main regression specifications provides strong empirical support for Hypothesis 1 and Hypothesis 2, thus enhancing the validity and reliability of the conclusions.

Table 10. Heckman Two-stage Regression Analysis Results.

	Heckman Two-stage Regression				
	(1)	(2)	(3)	(5)	(6)
	DUMFBOD	TQ	ROA	TQ	ROA
Intercept	-0.914 (-0.756)	5.872* (1.677)	-49.500*** (-4.799)	6.082* (1.738)	-49.164*** (-4.738)
DUMFBOD		0.873** (1.365)	1.184** (0.781)	1.333** (2.210)	4.067** (2.344)
LAGPROFBOD	5.332*** (14.161)				
DUMFBOD*EDUBACK		0.153*** (0.880)	0.375*** (0.688)		
IMR1		0.424 (1.138)	0.332 (0.458)	0.424 (1.139)	0.282 (0.395)
DUMFBOD *EDULEV				0.322** (2.159)	1.025*** (1.464)
NBOD	0.170*** (4.710)	0.093 (0.699)	-0.036 (-0.180)	0.098 (0.736)	-0.030 (-0.152)
NBODI	0.273** (2.081)	0.078 (0.425)	0.876 (1.110)	0.062 (0.344)	0.874 (1.117)
NAC	-0.075 (-0.521)	0.055 (0.126)	0.113 (0.139)	0.033 (0.075)	0.026 (0.032)
NWAC	0.093 (1.096)	-0.102 (-0.594)	-1.078** (-2.158)	-0.121 (-0.715)	-1.100** (-2.198)
FO	-0.037 (-0.188)	-0.294 (-0.907)	0.755 (0.607)	-0.370 (-1.120)	0.580 (0.455)
FS	-0.032 (-0.611)	-0.262* (-1.937)	1.372*** (4.784)	-0.266** (-1.973)	1.377*** (4.840)

Note. t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01.

Table 10. Continued...

	Heckman Two-stage Regression				
	(1)	(2)	(3)	(5)	(6)
	DUMFBOD	TQ	ROA	TQ	ROA
FA	0.001 (0.229)	0.005 (0.443)	-0.036 (-1.160)	0.006 (0.521)	-0.034 (-1.103)
LEV	-0.311 (-1.067)	0.173 (0.313)	15.050*** (4.134)	0.203 (0.362)	15.006*** (4.150)
LIQ	6.070* (1.863)	-1.569 (-0.507)	-7.809 (-0.564)	-1.476 (-0.479)	-7.809 (-0.563)
Adj.R2	0.261	0.801	0.699	0.836	0.705
N	788	874	874	874	874
F-stat	0.235	0.155	0.685	0.172	0.685

Note. t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01.

A fixed-effects model was employed to ensure the findings' robustness further. The results, as presented in Table 11, are consistent with the main regression analysis. Specifically, the fixed-effects estimation confirms the positive and significant impact of FBOD on FP and the moderating role of the EPC.

These consistent results across model specifications provide additional empirical support for Hypothesis 1 and Hypothesis 2, reinforcing the reliability of the study's conclusions.

Table 11. Fixed Effects.

	Fixed Effects			
	(1)	(2)	(3)	(4)
	TQ	ROA	TQ	ROA
Intercept	0.239 (0.230)	-28.784*** (-3.830)	5.775** (2.180)	30.313*** (4.130)
DUMFBOD	0.616* (1.700)	1.608** (0.870)	1.230** (1.780)	3.619*** (3.850)
EDUBACK	0.333* (1.750)	1.073** (2.200)		
DUMFBOD*EDUBACK	0.549** (2.180)	0.723** (0.720)		
EDULEV			0.642*** (3.040)	1.462*** (3.140)
DUMFBOD*EDULEV			0.710** (2.720)	1.803*** (4.410)
NBOD	0.120** (2.030)	0.065 (0.610)	0.278** (2.640)	0.084 (0.670)
NBODI	0.167 (1.100)	1.466 (1.280)	0.083 (0.690)	1.469 (1.380)
NAC	-0.270 (-0.650)	0.701 (0.630)	0.214 (0.580)	0.609 (0.560)
NWAC	-0.118 (-0.700)	0.775*** (9.350)	0.210 (1.110)	0.826*** (7.690)

Note. t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01.

Table 11. Continued...

	Fixed Effects			
	(1)	(2)	(3)	(4)
	TQ	ROA	TQ	ROA
FO	-0.195 (-1.010)	0.946 (0.620)	0.179 (0.850)	0.821 (0.510)
FS	0.285*** (2.860)	0.956*** (5.290)	0.326** (2.820)	0.917*** (4.280)
FA	0.013** (2.150)	0.041** (2.180)	0.014** (2.460)	0.041** (2.070)
LEV	0.204 (0.550)	14.026*** (4.080)	0.239 (0.590)	13.978*** (4.040)
LIQ	1.282 (0.200)	2.488 (0.080)	1.450 (0.250)	2.629 (0.080)
Adj.R2	0.714	0.591	0.847	0.629
N	874	874	874	874
F-stat	4.113	8.867	5.851	5.430

Note. t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01.

5 Conclusion

5.1 Theoretical contributions

This study contributes theoretically to the development of RDT and RBV, especially in the context of developing countries. The first theoretical contribution is the expansion of the application of RDT. RDT can be shown through the role of FBOD in improving FP through increasing legitimacy and access to external resources in developing countries such as Indonesia, with unique patriarchal norms. Therefore, regulatory support from the Financial Services Authority is needed so that the role of FBOD can function effectively. However, previous research on RDT has emphasized the environment and access to external resources in developed countries. The role of RDT in creating institutional regulation through gender diversity in the board's direction is not only solely related to inter-organizations, but also functions as a strategic external resource.

The second theoretical contribution extends the application of RBV to the identification of EPC, shown through EDUBACK and EDULEV, as internal company resources that meet the criteria of valuable, rare, inimitable, and non-substitutable and play a role in increasing FP. Unlike previous studies that examine EPC and FBOD separately, this study shows that RBV offers collaboration between internal resources through EPC and FBOD, thereby improving corporate governance.

The third theoretical contribution reveals the theoretical tension between the assumptions of RDT and RBV. RDT suggests that external resource access (FBOD) is sufficient, while RBV requires internal resources (EPC) to enhance FP. This finding suggests that the two are interdependent. EPC (internal resource) can strengthen the influence of FBOD (external resource) in enhancing FP. RDT and RBV separately—risk ignoring how external and internal resources are interdependent. For example, FBOD (external) is ineffective without quality EPC monitoring (internal). Conversely, a strong EPC cannot compensate for weak board legitimacy in the eyes of the public or external investors. This study offers an original contribution by integrating two theoretical perspectives (RBV and RDT) in one empirical model to explain FP in developing countries. Unlike previous studies that analyze FBOD and EPC separately, this study highlights the synergistic relationship between internal and external resources and the importance of formal regulation as part of strategic resources.

The fourth theoretical contribution has important implications for institutions in other developing countries with weak governance regulations on gender quotas, patriarchal cultural norms, and unstable corporate governance. The integration of RBV and RDT in one conceptual framework offers a more realistic and contextual approach to understanding governance effectiveness, which can be used as a basis for further studies.

5.2 Managerial implications

This study provides several managerial insights relevant to corporate governance, especially within emerging markets: 1) Shareholders should consider the EPC when appointing board members, as these characteristics enhance the board's supervisory effectiveness and overall FP, 2). Boards should proactively promote gender diversity by increasing the participation of women in director roles, recognizing their strategic contribution to legitimacy, external resource access, and decision-making quality 3. Firms should view the interaction between EPC and FBOD as a strategic asset that enhances governance collaboration and performance, rather than treating board composition as a compliance exercise.

5.3 Limitation

This study has several limitations that open avenues for future research:

- The sample includes all sectors listed on the Indonesia Stock Exchange from 2017 to 2021. Future studies may consider segmenting the data by industry classification (IDX sectoral indices) to uncover sector-specific dynamics.
- EPC was measured solely through educational level and background. Future research could expand this by examining additional attributes, such as the reputation and origin of universities (domestic vs. international), professional certifications, or leadership experience.
- Finally, a longitudinal or case-based qualitative approach may provide deeper insights into how EPC and FBOD interact in boardroom dynamics and influence strategic decision-making over time.

Statement on Data Availability

Data used in the present study will be available on request, from the corresponding author.

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Nanik Ermawati: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. Izza Ashsifa: Data curation, Formal analysis, Writing – original draft, Writing – review & editing.