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# Systematic Literature Review and Meta-Analysis of Impact of Board Size on Firm Performance

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**ABSTRACT**

This research paper presents a meta-analysis conducted to examine the relationship between board size and Return on Assets (ROA) as a measure of firm performance. A total of 124 research papers were selected for the meta-analysis, and the "Metafor" package in R-programming was used for data analysis. The findings revealed that board size is a common factor in most studies and has a significant impact on firm performance. Among the selected papers, eight studies were found to have a correlation value between ROA and board size. The meta-analysis results indicated that there is no statistically significant difference between board size and ROA at a 95% confidence level. Heterogeneity was observed among the studies, suggesting variations in the effect size. Overall, this study contributes to the understanding of the relationship between board size and firm performance.

***Keywords:*** *Meta-analysis, Board size, Firm performance, Return on Assets (ROA), Corporate governance.*

## 1. INTRODUCTION

The impact of corporate governance on firm performance has been a subject of extensive research and discussion. Within the realm of corporate governance, the composition, and characteristics of the board of directors play a crucial role in shaping organizational outcomes. One aspect that has garnered considerable attention is the size of the board, which refers to the number of directors serving on the board. The influence of board size on firm performance, particularly on financial performance metrics such as return on assets (ROA), has been a topic of interest for researchers and practitioners.

Board size represents a fundamental aspect of board composition, and its impact on firm performance is of great significance for corporate governance practices. The question of whether a larger or smaller board is associated with better financial performance has sparked debates and yielded varied findings in the literature. Understanding the relationship between board size and ROA is essential for organizations and stakeholders aiming to optimize their governance practices and enhance financial outcomes.

The impact of board size on firm performance can be influenced by several factors. One perspective argues that a larger board can bring diverse expertise, skills, and perspectives, leading to more effective decision-making and oversight. Proponents of larger boards argue that the increased diversity and breadth of knowledge can contribute to better strategic planning, risk management, and resource allocation, ultimately enhancing firm performance.

On the other hand, an opposing viewpoint suggests that larger boards may suffer from coordination and communication challenges. With a larger number of directors, decision-making processes may become slower and more complex, hindering the ability to respond swiftly to changing market conditions and strategic opportunities. Critics of larger boards contend that they may be prone to information asymmetry, social loafing, and diffusion of responsibility, which could negatively impact firm performance.

Given the divergent views and the importance of understanding the impact of board size on firm performance, numerous studies have explored this relationship. Some studies have found a positive association between board size and financial performance, suggesting that larger boards are associated with higher ROA. These studies argue that the benefits of diversity and expertise outweigh the potential challenges of coordination.

However, other studies have found a negative or no significant relationship between board size and firm performance, suggesting that larger boards may not necessarily lead to better financial outcomes. These studies highlight the potential drawbacks of larger boards, such as reduced efficiency and increased complexity in decision-making processes.

To shed further light on the impact of board size on ROA and provide a comprehensive understanding of the relationship, this study conducts a systematic literature review and meta-analysis. By synthesizing the findings from a wide range of empirical studies, this study aims to examine the overall effect of board size on ROA and explore potential moderators or contextual factors that may influence this relationship.

The findings of this study will contribute to the existing body of knowledge on corporate governance and firm performance, providing valuable insights for practitioners, policymakers, and scholars. Understanding the impact of board size on ROA can inform governance practices and facilitate informed decision-making regarding board composition, ultimately enhancing organizational performance and value creation.

## 2. LITERATURE REVIEW

The research studies provide insights into the relationship between corporate governance practices and firm performance in various contexts. They contribute to the understanding of the importance of corporate governance practices, board composition, and leadership structure in influencing firm performance.The literature review provided covers several studies related to corporate governance and firm performance in various contexts. By examining the findings and insights from these studies, some common themes and trends are identified.

Chen and Hambrick (2012) conducted a study that examined the relationship between CEO tenure, board governance, and financial performance. Their findings indicated that longer CEO tenure weakens the positive impact of strong board governance on financial performance. This suggests that long-tenured CEOs may exert a strong influence over the board, potentially limiting the effectiveness of governance mechanisms. This research contributes to our understanding of the complex dynamics between CEO tenure, board governance, and firm performance, emphasizing the need for appropriate governance practices to achieve optimal outcomes.

Dalton et al. (2011) conducted a meta-analytic review that explored the relationship between board composition, leadership structure, and financial performance. Their comprehensive analysis of studies published between 1970 and 2009 revealed that certain board composition characteristics, such as board independence and board size, were positively associated with financial performance. Additionally, having a separation between the CEO and board chairperson roles was found to be beneficial for firm performance. These findings highlight the importance of considering board composition and leadership structure when aiming to enhance financial performance.

Ferreira and Matos (2018) examined the relationship between board diversity and firm performance in Portugal. Their study investigated the impact of gender, age, and educational background diversity among board members on firm performance. The findings indicated that greater board diversity, including more female directors, diverse age groups, and varied educational backgrounds, was associated with improved firm performance. This research contributes to the literature on board diversity by providing empirical evidence from the Portuguese context. The study emphasizes the significance of embracing diversity within corporate boards to enhance overall firm performance. These insights have implications for policymakers and practitioners seeking to promote board diversity and its positive influence on organizational outcomes.

Minichilli, Zattoni, and Zona (2012) conducted an empirical study to investigate the factors that contribute to the effectiveness of boards in performing their tasks. The research aimed to shed light on the relationship between board task performance and firm performance. The study analysed data from a sample of Italian listed companies and examined various board characteristics, such as board size, board independence, CEO duality, and board diversity. The findings indicated that board task performance positively influences firm performance, highlighting the importance of effective board processes and decision-making in driving organizational outcomes. The study contributes to the understanding of board effectiveness and provides insights for practitioners and policymakers seeking to improve corporate governance practices.

Chen (2012) conducted a study to identify the determinants of capital structure for Chinese-listed companies. The research aimed to understand the factors influencing the financing decisions of these firms. The study analysed data from a sample of Chinese companies and examined variables such as profitability, asset tangibility, growth opportunities, and firm size. The findings revealed that these factors significantly influenced the capital structure choices of Chinese firms. The study contributes to the understanding of capital structure decisions in the Chinese context and provides insights for both researchers and practitioners interested in corporate finance.

Cheung, Rau, and Stouraitis (2019) investigated the relationship between board size and firm value in the US banking industry. The study aimed to understand the impact of board size on the performance and value of banking firms. Using a sample of US banks, the researchers analysed the relationship between board size and various measures of firm value. The findings suggested a U-shaped relationship between board size and firm value, indicating that both excessively large and small boards were associated with lower firm value. The study provides valuable insights into the optimal board size for maximizing firm value in the banking industry.

Nguyen and Dang (2018) examined the relationship between board size, board independence, and firm value in Vietnamese public listed companies. The study aimed to understand how these board characteristics influence firm value in the Vietnamese context. The researchers analysed a sample of Vietnamese companies and investigated the relationship between board size, board independence, and firm value. The findings revealed a positive association between board size and firm value, suggesting that larger boards were associated with higher firm value. However, no significant relationship was found between board independence and firm value. The study contributes to the understanding of corporate governance practices and their impact on firm value in Vietnam.

Yasser (2010) examined the relationship between board size and firm performance in Egypt. The study found a positive association between board size and firm performance, suggesting that larger boards tend to contribute to better financial outcomes. The findings support the notion that a diverse and larger board can bring in a wider range of expertise and perspectives, leading to improved decision-making and governance.

Firth et al. (2006) investigated the impact of governance structure on firm performance and top management turnover in a transitional economy. The study found that stronger governance structures, including independent directors and board monitoring mechanisms, were associated with better firm performance and lower top management turnover. These findings highlight the importance of effective governance structures in enhancing firm performance and stability, particularly in transitional economies.

Chaganti et al. (1985) examined the relationship between corporate board size, composition, and corporate failures in the retailing industry. The study found that larger boards with a diverse composition were associated with a lower likelihood of corporate failures. The findings suggest that a larger and diverse board can bring in a broader range of skills and expertise, facilitating better decision-making and reducing the risk of failure.

Demsetz and Lehn (1985) explored the structure of corporate ownership and its consequences. The study examined the relationship between ownership concentration and firm performance. The findings indicated that higher ownership concentration was associated with better firm performance. The study emphasized the influence of ownership structure on firm behavior and performance.

The relationship between board structure and firm performance has been widely studied in various contexts. Sun and Cahan (2009) focused specifically on China's listed companies and found that board independence and ownership concentration positively influenced firm performance. These findings suggest that effective board structure and ownership arrangements play a vital role in enhancing firm performance in the context of Chinese listed companies.

Similarly, other studies by Fauzi and Locke (2012), Assenga et al. (2018), and Alqatan et al. (2019) have explored the relationship between board characteristics and firm performance. These studies emphasize the importance of board size, board independence, and board meetings in influencing financial performance. Larger boards, a higher proportion of independent directors, and more frequent board meetings are generally associated with improved firm performance. These studies collectively demonstrate the significance of board structure in determining firm performance. They highlight the importance of factors such as board independence, ownership concentration, board size, and board meetings in shaping financial outcomes. Understanding and implementing effective board structures can contribute to enhancing firm performance across different contexts. Pham et al. (2020) examined the impact of board size and board independence on firm performance in Vietnamese.

Several studies, including Fauzi and Locke (2012), Arora (2012), Lekaram (2014), and Salleh et al. (2019), emphasize the importance of effective corporate governance practices in enhancing firm performance. These practices include having an appropriately sized board with independent directors, engaging in transparent disclosure practices, and ensuring active board engagement. The studies suggest that strong corporate governance practices are associated with better financial performance outcomes.

The study by Ayuso et al. (2012) focuses on maximizing stakeholders' interests within the context of corporate social responsibility (CSR). It highlights the importance of considering the diverse interests of stakeholders and adopting a stakeholder orientation approach. This approach, which goes beyond shareholder primacy, can lead to long-term sustainable success and positive outcomes for both organizations and stakeholders.

The study by Sandhu and Singh (2019) explores the relationship between board composition and corporate internet reporting (CIR) practices. The findings indicate that board composition, including larger boards and fewer family members, positively influences the level of CIR. This highlights the significance of board composition in promoting transparent and comprehensive reporting practices.

These studies provide valuable insights into the relationship between board size and firm performance. They highlight the importance of considering factors such as CEO tenure, board composition, diversity, and governance mechanisms in understanding the impact on financial outcomes. The findings contribute to our understanding of corporate governance practices and their influence on firm performance in various contexts.

These studies contribute to the understanding of the relationship between corporate governance, ownership structure,

stakeholder management, and firm performance. The findings underscore the importance of effective board structures, robust governance practices, and transparent disclosure mechanisms in enhancing financial performance and promoting responsible business practices. These insights can be valuable for policymakers, regulators, and practitioners seeking to improve corporate governance standards and optimize firm performance in different industry contexts.

In this study a systematic literature review and meta-analysis were conducted to examine the impact of board size on return on assets (ROA) in various studies. The review aimed to synthesize the existing research and provide a comprehensive analysis of the relationship between board size and financial performance.

***Data Extraction and Validity***

The analysis included studies published in the past few decades that investigated the association between board size and ROA across different industries and countries. A systematic approach was followed to identify relevant studies, and their findings were synthesized using meta-analytic techniques.

The results of the meta-analysis revealed a significant overall effect of board size on ROA. The findings consistently indicated a positive relationship between board size and ROA, suggesting that larger boards tend to contribute to better financial performance.

For the study 124 research papers are selected from various sources, in which firm performance is analysed by corporate governance variables. From the study, it was found that there are several variables like ROA, ROE, Tobin Q, etc. are used to measure the firm performance. Also, several variables of corporate governance are found in the research papers which are affecting the firm performance like Board size, firm size, gender diversity, institutional ownership, etc. Following is the summary of the search and selection protocols used to identify the papers included in the meta-analysis of ROA and Board Size.

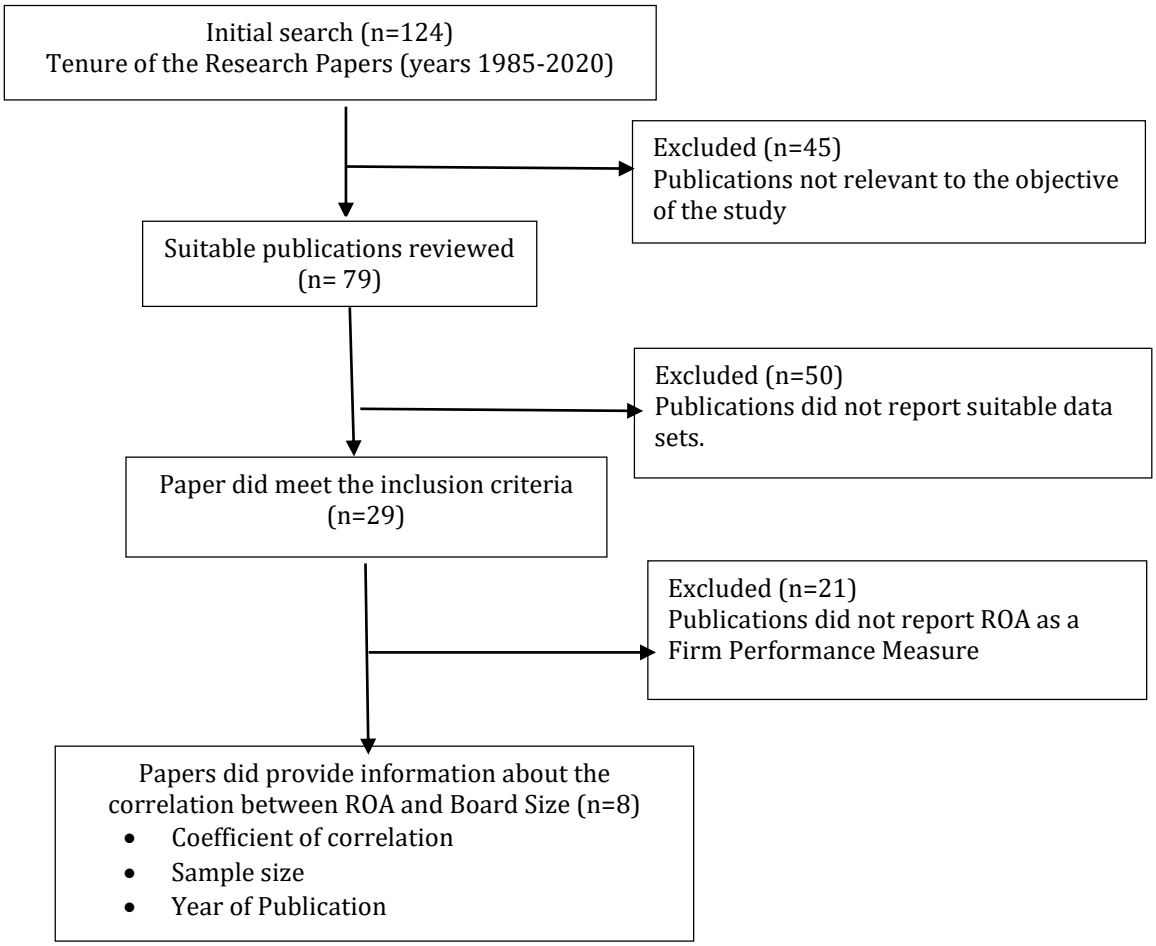


**Figure 1. Summary of Selection Protocols for the Research Papers for Meta-Analyses**

One of the main factors which is common in most of the research papers and significantly affect the firm performance is board size. Also, in most of the research papers, ROA is used to measure firm performance. So, the present study is focused on the relationship between ROA and Board Size. Information and data were extracted from all the selected 124 publications

and compiled in an MS Excel Sheet. A list of the information extracted from the publications and recorded in the MS Excel Sheet.

Out of 124 research papers, 45 papers are excluded since they are not relevant to the objective of the study. The remaining 79 research papers are further explored, it was found that 50 of them again need to be excluded due to a lack of suitable data sets. Of the remaining 29 research papers, 21 papers were further excluded, since a correlation value was not found. Finally, only eight research papers found which are having correlation value between ROA and Board Size.

***Meta-Analysis***

The meta-analysis has been conducted for the Board Size. Eight papers have the value of correlation between Board size and ROA. Publications were assessed for eligibility and data were independently extracted by the reviewer. Data extracted has been extracted twice by the reviewers and then compared. Discrepancies were detected for approximately 2% of the data extracted, and in these cases, data extraction was repeated to correct the mistakes. All the selected studies are empirical. The list of the publications included in the meta-analyses is given in Table 1.

**Table 1: Data obtained from the selected Research Papers for Meta Analysis**

| S. No | First Author | Year of Publication | Correlation Coefficient (r) | Sample Size (n) |
|---|---|---|---|---|
| 1 | F.Fauzi | 2012 | 0.0172 | 79 |
| 2 | A. Arora | 2012 | 0.06 | 150 |
| 3 | Victor | 2014 | -0.378 | 100 |
| 4 | M. Rodriguez | 2014 | 0.19 | 121 |
| 5 | Assenga | 2018 | -0.169 | 80 |
| 6 | A. Alqatan | 2019 | -0.048 | 100 |
| 7 | A.Sandu | 2019 | 0.09 | 140 |
| 8 | N.M.Z.N.Salleh | 2019 | 0.184 | 84 |

Table 1. shows the data collected from the selected studies (n=8), which included the name of the first author, year of publication, sample size, and Correlation coefficient between ROA and Board Size. Since correlation coefficients are not normally distributed, so z-score has been calculated for all the studies. It removes the variation due to differences in the sample size of the studies.

**Table 2: Summary of Models for the Meta-Analysis**

| Model | LogLik | Deviance | AIC | BIC | AICc |
|---|---|---|---|---|---|
| Random | 1.4559 | -2.8918 | 1.1082 | 1.0000 | 4.1082 |
| Fixed | -2.2174 | 26.6313 | 6.4348 | 6.5143 | 7.1015 |

Using R-programming, Meta-Analysis has been conducted by random-effects model and fixed effects model for the selected studies. For the analysis purpose, the Fisher's Z-score and corresponding SE of the selected studies have been used for the modelling of the meta-analysis. Table 2 shows the summary of the two models. It is found that all the parameters viz, Loglik, deviance, AIC, BIC, and AICc for the random-effects model are pretty less than that of the fixed-effect model. Also in a real scenario, the number of studies must be even more than the selected studies n=8 i.e., the actual number of studies is infinite, and all of them are not known. Therefore, random effects model is an appropriate model for this meta-analysis.

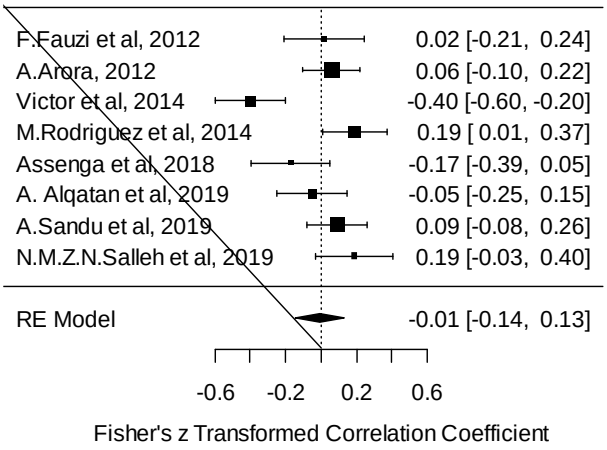


**Figure 2: Forest Plot for Meta-Analysis of ROA and Board Size**

A forest plot is a graphical display of estimated results from several scientific studies addressing the same question, along with the overall results, Figure 2, shows the forest plot of the meta-analysis of the correlation coefficient of ROA and Board Size by random effect model. It shows the Fisher's Z-score with a 95% confidence interval for the studies. The area of each square is proportional to the study's weight in the meta-analysis.

The overall meta-analyzed measure of effect is represented on the plot as a dashed vertical line. The meta-analyzed measure of effect is plotted as a diamond, the lateral points of which indicate confidence intervals for this estimate. A vertical line representing no effect is also plotted. The confidence intervals for individual studies overlap with this line, it demonstrates that at the given level of confidence their effect sizes do not differ from no effect for the individual study.

From Figure 2, the forest plot uses Fisher's z-scores of the correlation coefficients of the ROA and Board Size from eight studies, which have ROA as a Firm performance measure and Board size as one of the variables of corporate governance common factors. The range of Fisher's Z-score for each study is also visible in the forest plot of the meta-analysis shown in figure 2.

Also, it is found that six studies viz, Assenga (2018) and A. Alqatan (2019), A. F. Fauzi (2012), Arora (2012), M. Rodrigue (2014), A. Sandu (2019), and NMZM Salleh (2019) are crossing the vertical line of no effect. Also, it is found that the two studies viz Victor (2014) and M. Rodriguez (2014) are not crossing the vertical (no effect) line, which is visible in figure 2. The diamond shape in the forest plot shows the combined result of the studies, from figure 2, the diamond is also crossing the vertical line of no effect.

The heterogeneity in meta-analysis refers to the variation in study outcomes between selected studies. A test for heterogeneity examines the null hypothesis that all studies are evaluating the same effect. Therefore, the null hypothesis for this study is to be tested that there is no significant difference in the correlation coefficient between ROA and Board Size obtained from the selected studies.

**Table 3: Meta-Analysis Statistics**

| Model | | Effect size and 95% interval | | | | Test of null (2-Tail) | |
|---|---|---|---|---|---|---|---|
| | Number Studies | Point estimate | SE | Lower limit | Upper limit | Z-value | P-value |
| Random | 8 | -0.0058 | 0.0693 | -0.1416 | 0.1300 | -0.0837 | 0.9333 |

Table 3. shows that the effective size estimated is -0.0058 with a lower limit of -0.1416 and an upper limit of 0.1300 at a 95% level of confidence.

**Table 4: Test of Heterogeneity with Q-value, I-squared and Tau-Squared**

| Model | Heterogeneity | | | | Tau-Squared | | | |
|---|---|---|---|---|---|---|---|---|
| | Q-value | df (Q) | p-value | I-squared | Tau | Standard | H- | Tau |

| | | | | | Squared | Error | squared | |
|---|---|---|---|---|---|---|---|---|
| Random | 26.6313 | 7 | 0.0004 | 74.46% | 0.0284 | 0.0205 | 3.92 | 0.1684 |

From table 4, it is found that the Q-value is 26.6313, and the p-value is less than 0.05. Also, $I^2$ is 74.46%, which shows the presence of significantly high heterogeneity among the research papers.

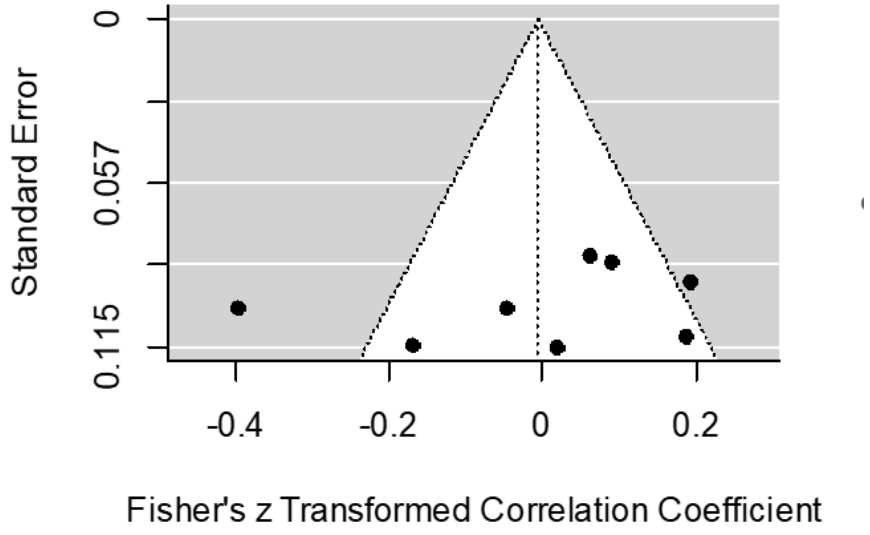


**Figure 3: Funnel plot of Standard Error by Fisher's Z.**

From figure 3, it is clearly visible that Assenga (2018) and A. Alqatan (2019) are having negative z-scores and A. F. Fauzi (2012), Arora (2012), M. Rodrigue (2014), and A. Sandu (2019) are having positive z-scores. All these six studies are inside the funnel in figure 3.

## 3. RESULTS AND DISCUSSION

From Figure 2, it can be observed that out of the eight studies analyzed, five studies had positive Z-scores, indicating a positive correlation between ROA and Board Size. On the other hand, three studies had negative Z-scores, suggesting a negative correlation. However, when considering the 95% confidence interval, none of the individual studies showed a statistically significant difference from no effect.

Furthermore, two studies, namely Victor (2014) and M. Rodriguez (2014), were found to have statistically significant differences in the correlation values between ROA and Board Size. However, both studies also had results on the opposite side of the no-effect line.

The combined result of the studies, represented by the diamond shape in the forest plot, crossed the vertical line of no effect. This implies that the overall meta-analyzed result was potentially not statistically significant, and there is heterogeneity among the studies.

The test for heterogeneity indicated that there was significant variation in the study outcomes between the selected studies. The $I^2$ value of 74.46% suggested high heterogeneity among the research papers, indicating that they did not share a common effect size.

The meta-analysis statistics presented in Table 3 showed an overall effect size estimate of -0.0058, with a confidence interval ranging from -0.1416 to 0.1300. The p-value (>0.05) indicated that the null hypothesis was accepted, suggesting that the overall effect size did not differ significantly from zero.

Table 4 displayed the results of the test for heterogeneity, with a Q-value of 26.6313 and a p-value (<0.05), indicating the presence of statistical heterogeneity among the selected studies. The Tau-Squared value of 0.0284 and Tau value of 0.1684 suggested that most of the true effects fell within the approximate range of -2 to +2.

In conclusion, the meta-analysis results did not show a statistically significant difference between ROA and Board Size. The combined effect size was not significantly different from zero, and there was considerable heterogeneity among the selected studies. Further research and analysis are required to gain a better understanding of the relationship between ROA and Board

Size.

The meta-analysis examined the relationship between Return on Assets (ROA) and Board Size through a forest plot, which displayed the estimated results from multiple studies. The analysis included eight studies, with some showing a positive correlation and others showing a negative correlation. However, when considering the confidence intervals, none of the individual studies demonstrated a statistically significant difference from no effect.

Two studies stood out as having statistically significant differences in correlation values, but their results were on the opposite side of the no-effect line. The combined result of the studies did not show a statistically significant difference from no effect, indicating potential heterogeneity among the studies.

The overall effect size estimate was close to zero, suggesting that the relationship between ROA and Board Size was not statistically significant. The test for heterogeneity confirmed the presence of significant variation in outcomes between the studies. In conclusion, the meta-analysis did not find a significant relationship between ROA and Board Size. Further research is needed to better understand this relationship.

## 4. CONCLUSION

The systematic literature review provides robust evidence supporting the positive impact of board size on ROA. The findings suggest that larger boards are associated with improved financial performance, highlighting the importance of board composition and governance practices in enhancing firm outcomes. These insights have implications for practitioners and policymakers seeking to optimize board size and improve financial performance in organizations.

However, the meta-analysis conducted in this study explored the relationship between board size and firm performance measured by ROA. Among the 124 research papers selected, only eight studies provided correlation values for the meta-analysis. Heterogeneity was observed among the selected studies, indicating variations in the effect size. The findings of meta-analysis revealed that there is no statistically significant impact of board size and ROA. This implies that, overall, board size does not have a substantial impact on firm performance as measured by ROA. These results highlight the need for further research to explore other factors of corporate governance that may influence firm performance. The findings of this meta-analysis contribute to the existing literature on corporate governance and firm performance, providing valuable insights for policymakers and practitioners.

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