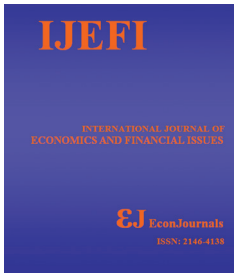

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The Influence of Educational Diversity on Shareholder Value Creation in South African Corporate Boards

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ABSTRACT

This study investigates the influence of board education diversity on shareholder value creation of South African non-financial companies listed on the JSE for the 10 years from 2013 until 2022. In this study, a quantitative quasi-experimental design was used. Data were collected from 2013 to 2022 from 101 non-financial companies listed on the JSE. The final sample consisted of 1010 company-year observations. The study measured board education level diversity using the proportion of board members with master's degrees, the proportion of board members with PhD and the Blau index for board education level diversity. On the other hand, the proxies of shareholder value creation included the standardised market value added, market-to-book ratio and Tobin's Q. A fixed effects panel data regression model was employed to estimate the influence of board members' education diversity measures on shareholder value creation measures. Based on linear models, the proportion of board members with master's degrees and the proportion of board members with PhDs negatively influence all shareholder value creation measures. In contrast, BI_BED positively impacts all shareholder value creation measures. Concerning curvilinear quadratic models, all board members' education diversity measures positively and negatively impact all shareholder value creation measures, highlighting an inverted U-shaped effect. This study advances the understanding of the double-edged sword effect of educational diversity on shareholder value creation in South African corporate boards.

Keywords: Corporate Governance, Educational Diversity, Shareholder Value Creation, Corporate Boards, Multi-theoretical Perspective, Curvilinear Quadratic Models
JEL Classification: C33, G32, M14, M41

1. INTRODUCTION

The board of directors coordinates the interests of shareholders and is widely acknowledged in corporate governance and finance literature (Ding et al., 2024). Board members are responsible for monitoring management, guaranteeing the implementation of coherent company decisions, and aligning the interests of agents and principals (Al-Dubai, 2023; Mardawi et al., 2023). The role of board members' education is significant in South Africa's corporate governance regulations. The King IV report on corporate governance in South Africa indicates that board structure and expertise are essential concerns that call for significant action to coordinate and collaborate efforts across stakeholders and shareholders. Diverse director skills can bring abundant knowledge and perspectives for deeper and more extensive discussions, which enables the board to perform its advisory function better (Liu and Cheng, 2024). Academics and practitioners have highlighted that balancing board directors' knowledge, skills, and expertise is vital for their ability to fulfil their governing roles (Sarto et al., 2019). Board education diversity may be a double-edged sword (Saha and Maji, 2022). Indeed, some studies highlight that board education diversity positively influences strategic decision-making and improves firm outcomes (Kok et al., 2021). Differently, other research documents show that board education diversity limits the firm's results as it increases the level of conflict, reduces information sharing, and hampers the effectiveness of the decision-making process (Sarto et al., 2019).

The study has made significant contributions in several areas. Firstly, the research advances the corporate governance research on educational diversity in the corporate boards and shareholder value creation. This is particularly important as most prior research has focused on developed countries, with limited attention to emerging markets. This paper focuses on educational diversity in corporate boards due to the silence regarding directors' education in corporate governance codes and policies worldwide. Secondly, the empirical evidence on the effects of board education diversity has been inconclusive, as it has predominantly focused on the positive aspects and overlooked the potential drawbacks, making board education diversity a "double-edged sword." Thirdly, previous studies have predominantly used linear models, leading to conflicting findings and potentially overestimating or underestimating the advantages of educational diversity in corporate boards. However, this research uses linear and curvilinear models to address these inconsistencies. Drawing from the board human capital framework, this research aims to fill these gaps by exploring the link between educational diversity and shareholder value creation in South African corporate boards.

The rest of this paper is organised as follows: Section 2: Literature Review. Section 3: Research Methodology. Section 4: Empirical Results and Discussions. Section 5: Conclusions. Section 6: Limitations and Recommendations for Future Research.

2. LITERATURE VIEW

2.1. Theoretical Literature View

A multi-theoretical perspective is required to fully appreciate corporate governance research on board members' diversity and shareholder value creation (Marashdeh et al., 2021:2). A multi-theoretical perspective to corporate governance research is advised because there is never one ideal theory that fully accounts for the phenomenon under study (Khoza et al., 2024:3). A single-theory approach is furthermore criticised as it is insufficient to explain study phenomena and account for hypothesised correlations adequately. This is especially true for corporate governance as a multi-faceted issue, spanning many areas, such as economics, finance, management, policy, ethics, sociology and psychology (Kwiecień, 2020). The dominant and most frequently used corporate governance theories include upper echelons, agency, resource dependency, resource-based view, human capital, social categorisation, and similarity attraction theories. These theories focus on the role of the governance mechanism in influencing the creation of company shareholder value (Shahrier et al., 2020).

2.1.1. Upper echelons theory

Hambrick and Mason (1984) introduced upper echelon theory (UET) to strategic management. The UET suggests that managers' background characteristics can partially predict organisational outcomes, strategic decisions, and performance levels (Hambrick and Mason, 1984). According to UET, corporate strategic moves reflect the top management's experience, values, and personalities, partially shaped by educational background (Tseng and Jian, 2016). Consequently, higher levels of education are associated with open-mindedness, the ability to process knowledge, and a willingness to embrace change, as suggested by the UET (Hambrick and Mason, 1984). The firm's performance may be influenced by the appointment of highly educated directors (Alalwani and Al Hadi, 2021).

2.1.2. Agency theory

As per agency theory, directors' human capital is a strategic tool for owners to differentiate their companies from competitors. Under this theory, a board is entrusted with a fiduciary responsibility to function as a guardian, protecting the interests of the shareholders (Leung and Sane, 2023). It is posited that educational diversity can enhance directors' ability to evaluate strategic decisions and curb managerial entrenchment behaviour (Ali et al., 2022). Consequently, a more qualified board has the potential to enhance company performance while reducing agency costs (AlAlwani and Al Hadi, 2021). Hence, directors with diverse backgrounds, experiences, and skill sets are more likely to pose critical questions rather than merely echoing management's perspectives. The presence of highly educated board members with exceptional domain expertise is better positioned to oversee management performance and address agency-related issues (Saggese et al., 2023).

2.1.3. Resource dependency theory

The resource dependency theory explores how external resources affect an organisation's behaviour (Pfeffer and Salancik, 2015). As a result, the theory provides a framework for understanding the board's role in providing crucial resources to the firm (Abang'a et al., 2022). The resource dependence theory provides the basis for the most convincing theoretical arguments for a business case for board diversity (Hernández-Atienza et al., 2024). It emphasises the importance of directors' skills, expertise, and abilities in adapting to the firm's external environment (Boadi and Osarfo, 2019). In other words, directors with a solid educational background are indispensable to their organisation because of their robust cognitive abilities, enabling them to generate effective solutions for complex decision-making scenarios (Mousa et al., 2023). According to the resource dependence theory, a board can constitute a strategic resource for the firm. Thus, a higher educational qualification, like a PhD, will be a strategic resource. Hence, the resource dependence theory provides more compelling arguments supporting positive outcomes from board education diversity.

2.1.4. Resource-based view theory

The resource-based view (RBV) theory posits that financial and intellectual capital can be used to categorise a broad range of organisational resources for value creation (Heriyanto, 2023). Barney (1991) introduced the VRIN framework, which assesses how much a company's tangible and intangible assets contribute to improved performance. VRIN represents Valuable, Rare, Inimitable, and Non-substitutable. The RBV theory underscores the importance of governance structure and board diversity as a resource that can enhance the firm's value. Therefore, board education level diversity possesses VRIN attributes that can aid firms in making strategic decisions and attaining a competitive advantage (Pinheiro et al., 2024). Consequently, diversity in educational attainment is critical for improving organisational performance and competitive advantages (Barney, 1991). Directors

with diverse educational backgrounds foster creativity and innovation in problem-solving and contribute to financial success (Khan et al., 2024).

2.1.5. Human capital theory

The human capital theory, initially proposed by Becker (1964), focuses on developing cognitive frameworks through investments in education, knowledge, and skills to benefit both the individual and the company (Agu, 2023). As human capital is a peculiar characteristic of an individual, others cannot replicate it, and thus, such capital brings a source of competitiveness to the firm. According to this theory, directors contribute unique human capital resources to the board (Saha and Maji, 2022). For instance, they bring diverse educational backgrounds, experiences, expertise, and abilities to the boardroom. As a result, the educational diversity of the board in terms of knowledge, education, abilities, and capacities predicts the company's performance (Saha and Maji, 2022).

2.1.6. Social categorisation theory

The social categorisation theory explores how individuals use age, gender, ethnicity, national origin, and educational achievement to classify themselves and others into social groups (Harjoto et al., 2019). This theory suggests that board members with diverse educational backgrounds may identify as in-group or out-group members (Ali et al., 2022). According to Ali et al. (2022), out-group members are viewed as insincere and less cooperative than their in-group counterparts, resulting in group bias (Guo et al., 2021). Consequently, limited communication may occur among board members with varying educational backgrounds. Hence, homogeneous teams should be more productive than diverse boards because of the mutual attraction shared among board members with similar education levels (Mubarka and Kammerlander, 2023). Unfortunately, the practice of categorising differences in educational attainment is not widespread.

2.1.7. Similarity attraction theory

The similarity-attraction theory proposes that individuals and groups prefer choosing members who resemble them regarding values, views, and personality traits (Byrne, 1971). As a result, a substantial body of diversity research is based on the principles of the similarity-attraction theory (Schäpers et al., 2021). The growing diversity in today's workplaces requires interaction with individuals with different appearances and ways of thinking (Kuwabara et al., 2023). This line of reasoning can be extended to the diversity of management boards, leading to the belief that people may favour companies whose board members share similar demographic characteristics (Schäpers et al., 2021). Consequently, the similarity-attraction theory suggests that diversity in educational backgrounds among board members may harm performance outcomes due to increased conflicts and reduced cohesiveness (Yadav and Lenka, 2023).

2.2. Conceptual Literature View

2.2.1. Educational diversity of board members

Education encompasses an individual's educational background and academic career, playing a crucial role in the labour market (Sidki et al., 2024). Education is instrumental in establishing formal competency and shaping thinking patterns and behaviours (Mukhibad et al., 2024). Moreover, educational attainment significantly influences an individual's career trajectory. According to the literature, education functions as a type of human capital that signals various characteristics of directors (Papadimitri et al., 2020). Specifically, the academic background of directors contributes to defining their expertise and knowledge (Radin et al., 2024). Directors with advanced education are more likely to leverage their cognitive abilities for innovation and creative decision-making (Andreas and Chang, 2024). For example, board members with doctoral degrees are crucial strategic assets for reputable organisations (Hatane et al., 2023). These leaders ensure the effective functioning of the board through their proficiency, integrity, and reliable judgment. With their professional skills and guidance, highly qualified board members can enhance the company's performance and competitive edge (Mousa et al., 2023).

The educational diversity of board members is a critical aspect of board diversity that significantly impacts a firm's strategic decisions (Gold et al., 2021). Board education level diversity refers to the diverse task-relevant skills, knowledge, and abilities that board members bring due to their varied educational backgrounds (Farooq et al., 2023; Yadav and Lenka, 2023). Board members with diverse academic backgrounds can provide multiple perspectives in the boardroom (Alshabibi, 2022). For example, various directorial skills can contribute knowledge and differing viewpoints, enabling the board to engage in more profound and extensive discussions and enhancing its advisory function (Andoh et al., 2023). Education-level diversity among board members can support managers in strategy formulation and assessment (Daniel-Vasconcelos et al., 2023). Therefore, a diverse range of educational backgrounds among board members can enable firms to assist in making strategic decisions and gaining a competitive advantage (Katmon et al., 2019). Furthermore, education-level diversity can enhance the value that boards bring to their professional interactions with external parties (Hosny and Elgharbawy, 2022).

2.2.2. Shareholder value creation

In recent years, there has been a growing focus on maximising shareholder value as the primary objective for companies. This approach gained widespread acceptance in the USA following the publication of "Creating Shareholder Value" by Rappaport in 1986 (Venugopal et al., 2018). Corporate governance mechanisms, such as the diversity of educational backgrounds among board members, can impact shareholder value creation. Over the past two decades, companies have increasingly acknowledged the significance of shareholder value and proactively taken steps to optimise shareholder wealth. Previous studies have produced results that either supported or challenged various measures for creating shareholder value (Hall, 2018). Various metrics, including traditional accounting-based and value-based management (VBM) measures, evaluate shareholder value (Singla and Prakash, 2023).

The traditional accounting-based measures are inward-looking and historically focused, serving as internal benchmarks for companies (Hatane et al., 2023). Examples of these measures include return on assets (ROA), return on equity (ROE), dividend per share (DPS), earnings per share (EPS), return on investment (ROI), and return on

capital employed (ROCE) (Mathangi and Vijaykarthigeyan, 2020). While these performance measures are undoubtedly valuable, they do have inherent limitations. Firstly, they rely on historical data and reflect short-term company performance (Singla and Prakash, 2023). Additionally, most accounting-based measures are backwards-looking, primarily influenced by accounting practices, and are focused on showcasing management's achievements (Faiteh and Mohammed, 2023). Moreover, traditional accounting-based measures only partially account for future events through depreciation and amortisation (Kok et al., 2021). However, profitability alone cannot accurately gauge a firm's performance (Singla and Prakash, 2023). Furthermore, traditional accounting-based measures are critiqued for their failure to consider risk, cash flows, time value of money, and the cost of capital (Makhija and Trivedi, 2021). They may impede the ability to promptly assess the company's efficiency and make informed management decisions (Vagonova et al., 2023). Consequently, the limitations of traditional accounting-based measures present an opportunity for value-based management (VBM) (Makhija and Trivedi, 2021).

The VBM is an integrative management approach designed to increase shareholder value (Mulla and Misra, 2021).). By concentrating on the primary drivers of value, VBM harmonises a company's overall goals, metrics, and incentive structures (Lueg et al., 2023). VBM measures consider risk, capital costs and the impact of inflation (Elgharbawy and Abdel-Kader, 2021). Examples of VBM measures include economic value added (EVA), market value added (MVA), market capitalisation (MCAP), market-to-book ratio (MTB), total shareholder return (TSR) and Tobin's Q(TBQ) (Mitan et al., 2021). The VBM has evolved into a helpful tool for settling agency conflicts, supporting shareholder activism against the opportunistic behaviour of managers, and guiding managers' decisions toward the main objective of maximising shareholder value (Wobst et al., 2023). The VBM measures can be integrated into reporting, evaluation, and decision-making processes, a common point of emphasis for VBM proponents (Firk et al., 2021). The empirical research on the value relevance of traditional accounting and VBM measures is broad but with controversial results (Makhija and Trivedi, 2021).

2.3. Empirical Literature View and Hypotheses Development

Although theoretical literature extends many assertions favouring board education level diversity on shareholder value creation, empirical studies provide a mixed view. For instance, Assenga et al. (2018) explored 80 firm-year observations of Tanzanian firms listed on the DSE from 2006 to 2013. The study measured board member education diversity using the proportion of board members with a PhD (P_PhD), while ROA and ROE function as proxies of shareholder value creation. The results of fixed effects model (FEM) and Two-Stage Least Squares (2SLS) regression show that P_PhD has an insignificant positive impact on ROA and ROE. Salehi and Zimon (2021) examined all companies listed on the Tehran Stock Exchange between 2012 and 2018. The study measures board education level diversity using the Blau index for board education level diversity (BI_BED). At the same time, the proxies of shareholder value creation include market value added (MVA) and sales growth (SG). The panel data regression results show that Bl_ BED has an insignificant positive impact on MVA and SG. The positive results are consistent with agency and resource dependency theories. Also, Saha and Maji (2022) investigated the top 100 listed Indian firms from 2014 to 2018. The board education level diversity includes BI_BED and Shannon index for board education diversity (SI_BED), while Market capitalisation (MCAP) and ROA represent shareholder value creation. The Three Stage Least Squares (3SLS) regression results reveal that BI_BED and SI_BED significantly impact MCAP and ROA.

In other studies, Bin Khidmat et al. (2020) explored 180 companies listed on SSE and 100 in Shenzhen from 2007 to 2016. The study measured board education diversity using the BI_BED and ROA, ROE, EPS, TBQ and stock return (SR) as proxies of shareholder value creation. The results of FEM and Generalised method of moments (GMM) reveal that BI_BED has a significant favourable influence on ROA and ROE while having an insignificant negative impact on EPS, TBQ and SR. Alfar et al. (2023) examined 14 non-financial companies listed on PSE from 2010 to 2020. On the other hand, P_ PhD and proportion directors with PhD squared (P_PhD^2) measure board education level diversity. On the other hand, ROA and earnings per share (EPS). The random effects model (REM) results reveal that P_ PhD has a significant positive impact on ROA and EPS, while P_ PhD^2 has significant negative ROA and EPS highlighting and inverted U-shaped effects. Moreover, Andoh et al. (2023) examined 16 non-financial firms listed on the Ghana Stock Exchange (GSE) from 2004 to 2016. The board education level diversity includes P_ PhD, while the proxies of shareholder value creation are ROA, ROE, and TBQ. The generalised least squares (GLS) results reveal that _ PhD significantly negatively impacts ROA ROE and TBQ.

In further studies, Agustia et al. (2022) investigated 256 non-financial firms on the Indonesia Stock Exchange from 2015 to 2019. The board education diversity was measured using BI_BED and TBQ as a proxy for shareholder value creation. The panel data regression results show that BED has a significant positive impact on TBQ. Biçer and Şit (2023) explored 51 companies listed on Borsa Istanbul from 2015 and 2019. The board education level diversity measures include P_M and P_ PhD, while shareholder value is measured by Firm value (FV). The GMM results reveal that P_M and P_ PhD have a significant positive impact on FV. Furthermore, Khan et al. (2024) investigated 188 non-financial firms listed in PSX) from 2009 to 2020. BI_BED measures board education level diversity, while ROA and TBQ are the proxies of shareholder value creation. The REM results show that BI_BED significantly impacts ROA and TBQ, which is consistent with the resource-based view theory. Table 1 shows significant studies linking board education level diversity and shareholder value creation.

To sum up, the theories and empirical data presented above suggest that there may be a link between board education diversity and company shareholder value creation. Nonetheless, the relationship's nature may be positive, negative, curvilinear, or unaffected. Thus, the following are the hypotheses for the

Table 1: Empirical studies of board education level diversity and shareholder value creation

Author (s) and Year	Sample and period	Board education diversity measure (s)	Shareholder value creation measure (s)	Theoretical lens	Estimation method	Key findings
Assenga et al. (2018).	80 firm-year observations of Tanzanian firms listed on the DSE from 2006 to 2013	P_PhD	ROA and ROE	Agency theory, resource dependency theory	FEM, 2SLS	P_PhD has an insignificant positive impact on ROA and ROE.
Bin Khidmat et al. (2020)	180 companies were listed on SSE and 100 on Shenzhen from 2007 to 2016.	BI_BED	ROA, ROE, EPS, TBQ, SR	Upper echelons theory, resource-based view theory	GMM	BI_BED has a significant positive impact on ROA and ROE while an insignificant negative impact on EPS, TBQ and SR
Salehi and Zimon (2021).	All companies were listed on the Tehran Stock Exchange between 2012 and 2018.	BI_BED	Market value added (MVA), sales growth (SG)	Agency theory and resource dependency theory	Regression model	Bl_ BED has no significant impact on MVA and SG.
Agustia et al. (2022)	256 non-financial firms on the Indonesia Stock Exchange from 2015 to 2019	BI_BED	TBQ	Upper echelons theory, Resource-based view theory	Regression model	BI_BED has a significant positive impact on TBQ.
Saha and Maji (2022).	Top 100 listed Indian firms from 2014 to 2018	BI_BED, Shannon index for board education diversity (SI_ BED)	Market capitalisation (MCAP), ROA	Human capital theory	3SLS model	BI_BED and SI_BED have significant positive impact on MCAP and ROA
Alfar et al. (2023)	14 non-financial companies listed on PSE from 2010 to 2020.	PhD, P_PhD^2	ROA, EPS	Human capital theory, agency theory, resource dependency theory,	REM	P_ PhD has a significant positive impact on ROA and EPS, while P_ PhD2 has significant negative ROA and EPS highlighting and inverted-shape effects.
Andoh et al. (2023)	16 non-financial firms listed on the Ghana Stock Exchange (GSE) from 2004-2016	P_ PhD	ROA, ROE, TBQ	Agency theory, resource dependency theory, signalling theory	GLS	P_ PhD has a significant negative impact on ROA ROE and TBQ.
Biçer and Şit (2023).	51 companies listed in Borsa Istanbul from 2015 to 2019.	P_M, P_ PhD	Firm value (FV)	Institution theory	GMM	P_M and P_ PhD have a significant positive impact on FV.
Khan et al. (2024)	188 non-financial firms listed in PSX) 2009–2020	BI_BED	ROA, TBQ	Resource-based view theory	REM	BI_BED has a significant positive impact on ROA and TBQ

current study about board education diversity and shareholder value creation:

H1a: The proportion of board members with master's degrees has a significant positive, negative or no effect on shareholder value creation of South African-listed non-financial companies on the JSE.

H1b: The proportion of board members with PhD degrees has a significant positive, negative or no effect on shareholder value creation of South African-listed non-financial companies on the JSE.

H1c: Blau index for board education diversity has a significant positive, negative or no effect on shareholder value creation of South African listed non-financial companies on the JSE.

H2a: The proportion of board members with master's degrees has a curvilinear U-shaped or inverted U-shaped effect on shareholder value creation of South African listed non-financial companies on the JSE.

H2b: The proportion of board members with PhD degrees has a curvilinear U-shaped or inverted U-shaped effect on the shareholder value creation measures of South African listed non-financial companies on the JSE.

H2c: The Blau index for board education diversity has a curvilinear U-shaped or inverted U-shaped effect on

shareholder value creation of South African listed non-financial companies on the JSE.

3. RESEARCH METHODOLOGY

This section includes the various data analytics approaches adopted in this research. This study adopted quantitative quasi-experimental research to examine the influence of board education level diversity on shareholder value creation of South African non-financial companies listed on the JSE for 10 years from 2013 to 2022. The research methodology section provides sample selection, data collection sources, variable measurements, and empirical model specifications.

3.1. Sample Selection

The dataset encompasses panel data spanning 10 years, from 2013 to 2022. The initial step for the researcher involves identifying non-financial companies listed on the JSE from the Who Owns Whom database. The study employs a purposive sampling technique to determine the sample size. Several reasons justify the utilisation of purposive sampling. Firstly, it can enhance the alignment of the sample with the research objectives, thereby strengthening the study's robustness and the credibility of its findings (Campbell et al., 2020). Purposive sampling methods differ from random sampling in that they ensure the inclusion of specific instances in the final research sample (Campbell et al., 2020). The criteria considered are:

i. The sample excludes non-financial companies with headquarters outside South Africa
ii. The sample excludes non-financial companies without JSE as the primary stock exchange
iii. The sample excludes non-financial companies with missing shareholder value and directors' education data.

Table 2 shows a summary of the sample selection process. Of the 186 non-financial companies listed on the JSE from 2013 to 2022, 30 were headquartered outside South Africa, and 55 had missing information. As a result, the final sample consisted of 101 non-financial companies.

To predict the minimal sample size of a target population and prevent sampling errors, the study used Slovin's formula (Alghamdi et al., 2024). Slovin's formula can be used to calculate the minimal sample size as follows:

$$n = \frac{N}{1+Ne^2} = \frac{156}{1+156(0,1)^2} = 60.9 \text{ or } 61 \text{ non-financial companies.}$$

Table 2: Sample selection process for hypotheses testing

Details	No. of companies
Total number of non-financial companies listed on the JSE from 2013 to 2022	186
Less companies with headquarters outside South Africa	30
South African non-financial companies	156
Less South African non-financial companies with missing data	55
Final sample	101
Company- year observations×10 years	1010

Where:
n is the number of members of the sample; N is the target population and is the error tolerance limit of 10%. The forecast minimum sample of 61 South African non-financial companies is below the sample of 101 non-financial companies. This can warrant generalisation of the results to all non-financial companies listed on the JSE.

The JSE-listed non-financial companies in the sample are classified based on the Industry Classification Benchmark (ICB) into the following industries: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Health Care, Consumer Services, Telecommunications, Utilities, and Technology. Table 3 shows a breakdown of the sample by industry. The industry with the highest number of companies is Industrials (31.7%), followed by Consumer Services (21.8%), Basic Materials (18.8%), Consumer Goods (10.9%), Technology (6.9%), Telecommunications (5.0%), and Health Care (5.0%). Notably, no companies from the Oil and Gas and Utilities industries were included in the sample.

3.2. Data Collection Sources

The data needed to test the research hypotheses was obtained from the OSIRIS database, integrated annual reports, and the Who Owns Whom (WOW) database. OSIRIS, a comprehensive financial database with over 310 million companies globally, was used to gather shareholder value creation data. The integrated annual reports served as the primary documents for collecting directors' profiles, including their names, qualifications, appointment dates, and, where available, termination or resignation dates. Directors' qualifications were classified into four groups: diploma and none (DIP), bachelor's degree (BD)/Chartered Accountant (CA), Master (M), and PhD. The study encountered challenges with the lack of disclosure of termination or resignation dates in most integrated annual reports, which led to using the WOW database. The WOW database provided extensive information on director profiles, including qualifications, appointment dates, and termination/resignation dates, spanning over 300 prominent African industries. Partially populated directors' demographic profiles are presented in Table 4, which includes director names and highest qualifications (QUAL) - categorised as diploma and below (DIP), bachelor's degree (BD), Master(M) and PhD, date of appointment (DA), and date of termination (DT).

3.3. Variable Measurements

The primary aim of this study is to investigate how the diversity of educational levels among board members impacts the creation

Table 3: Breakdown of the sample by industry

ICB code	Industry type (non-financial)	No. of companies	Percentage
J500	Oil and Gas	0	0.0
J510	Basic Materials	19	18.8
J520	Industrials	32	31.7
J530	Consumer Goods	11	10.9
J540	Health Care	5	5.0
J550	Consumer Services	22	21.8
J560	Telecommunications	5	5.0
J570	Utilities	0	0.0
J590	Technology	7	6.9
Total		101	100.0

Table 4: Directors' demographic profiles data collection sheet

Name of company e.g., Clicks Group Ltd											
Financial year ended: 31 August				2013				2022			
Directors	QUAL	DA	DT	DIP	BD	M	PhD	DIP	BD	M	PhD
D. Nurek	Dip Law	July- 96		1				1			
F. Abrahams	PhD	March- 08					1				1
N. Matlala	MSc	August- 10	January -17			1					
V. Ramsunder	MBL	April- 15	April-22							1	
M. Njeke	B.Compt (Hons) CA (SA)	March- 20			1				1		
S. Ntsaluba	B.Compt (Hons) CA (SA)	September- 21							1		

of shareholder value in South African non-financial companies listed on the JSE over a 10- year period from 2013 to 2022. The study encompasses three categories of variables: dependent, independent, and control.

3.3.1. Dependent variables

The dependent variables comprise shareholder value creation measures, namely standardised market value added (SMVA), market-to-book ratio (MTB), and Tobin's Q (TBQ). Market value added (MVA) represents the variation between a company's total market value and the capital investors contribute (Kristanti et al., 2022). Large publicly traded corporations commonly use MVA. The MVA value can be a benchmark for investors when considering specific shares. A positive MVA demonstrates that management has successfully created shareholder value (Al-Ali and Al-Shabeeb, 2024). Conversely, a negative MVA indicates that the company has failed to create shareholder value, as it has decreased shareholder capital value (Kaczmarek, 2024). SMVA is calculated as MVA divided by the invested capital at the beginning of the year. MTB is the ratio of a company's market value of equity at year-end to the book value of equity (Hall, 2024). MTB provides insight into whether a company is overvalued or undervalued in the market (Soschinski et al., 2024). TBQ is computed by dividing the sum of a firm's equity and debt market value by the replacement value of total assets (Danevska et al., 2023). This ratio is based on the premise that the combined market value of all companies in the stock market should equal their replacement cost (Bui et al., 2023). Therefore, when the value of TBQ exceeds one, firms are incentivised to invest, but they become unwilling to invest once the value of Q reaches one (Singla and Prakash, 2023). When TBQ is less than one, it reveals that firms cannot use their resources efficiently.

3.3.2. Independent variables

The study evaluates board education level diversity using three key variables. Firstly, it considers the proportion of board members with master's degrees using the ratio of board members holding a master's qualification to the total board size. Secondly, it examines the proportion of board members with PhD qualifications, calculated as the ratio of board members with a PhD qualification to the total board size. Lastly, the study employs the Blau index to measure education board diversity (BI) across four categories: diploma/certificate (DIP), bachelor's degree/honours degree/ Chartered Accountants (BD), Master's (M), and PhD. The BI is computed as $1-\sum_{i=1}^{k} P_i^2$ where P_i is the percentage of board members in each educational category and k is the total number of members in the group. The maximum value of BI indicates an equal proportion of members from each educational category in the group. The advantage of using BI is that it considers all the educational categories and the uniformity in the distribution of members among them (Maji and Sahi, 2022). The Blau index for board education diversity (BI_BED) formula is as follows:

$$BI\_BED_{i,t} = 1 - \left(\left(\frac{Tota\,board\,member\,with\,DIP_{i,t}}{Total\,board\,member_{i,t}}\right)^2 + \left(\frac{Total\,board\,memeber\,with\,BD_{i,t}}{Total\,board\,member_{i,t}}\right)^2 + \left(\frac{Total\,board\,member\,with\,M_{i,t}}{Total\,board\,member_{i,t}}\right)^2 + \left(\frac{Total\,board\,member\,with\,PhD_{i,t}}{Total\,board\,member_{i,t}}\right)^2\right)$$

3.3.3. Control variables

The study's analysis of the educational diversity among board members and its impact on company shareholder value creation considers four control variables: firm size, firm age, board size, and leverage. To address skewness, firm size is quantified using the natural logarithm of the book value of assets (Akram et al., 2020), while firm age(Ln FAGE) is represented by the natural logarithm of the years since incorporation (Khan et al., 2023). Board size (Ln BSIZE) is assessed using the natural logarithm of the number of board members (Biçer and Şit, 2023), and leverage(LEV) is defined as the total debt ratio divided by total assets (Saha and Maji, 2023).

3.4. Empirical Models Specification

The panel data regression models are used to examine the influence of the board education diversity measures on the company shareholder value creation. The empirical models used to evaluate hypotheses are as follows:

H1a to H1c: Board education level diversity and shareholder value creation measures (linear models).

$$SMVA_{i,t}/MTB_{i,t}/MTB_{i,t} = \beta_0 + \beta_1 P\_MD_{i,t} + \beta_2 P\_PhD_{i,t} + \beta_3 BI\_BED_{i,t} + \beta_4 LnFSIZE_{i,t} + \beta_5 LnAGE_{i,t} + \beta_6 LnBSIZE_{i,t} + \beta_7 LEV_{i,t} + \varepsilon_{i,t}$$

where:

SMVA is the standardised market value added, MTB is the market-to-book ratio, TBQ is Tobin's Q, P_M is the proportion of board

members with master's degrees, P_ PhD is the proportion of board members with PhD, BI_BED is the Blau index for board education level diversity, Ln FISIZE is the natural logarithm of firm size, Ln FAGE is the natural logarithm of firm age, Ln BSIZE natural logarithm of board size, LEV is leverage, β_1-β_3 are coefficients of independent variables, β_4-β_7 are coefficients of control variables, *i* is the company *t* is the year and ε is the error term.

H2a to H2c: Board educational diversity measures curvilinear quadratic effects on shareholder value creation measures. The curvilinear U-shaped or inverted U- shaped effects are evaluated by adding squared terms. For instance, the impact is a U-shape if $\beta1 < 0$ and $\beta2 > 0$ and an inverted U-shape if $\beta1 > 0$ and $\beta2 < 0$ (Liang et al., 2022). The curvilinear quadratic models appear as follows:

$$SMVA_{i,t}/MTB_{i,t}/TBQ_{i,t} = \beta_0 + \beta_1 P\_M_{i,t} + \beta_2 P\_M^2_{i,t} + \beta_3 P\_PhD_{i,t} + \beta_4 P\_PhD^2_{i,t} + \beta_5 BI\_BED_{i,t} + \beta_6 BI\_BED^2_{i,t} \beta_7 LnFSIZE_{i,t} + \beta_8 LnFAGE_{i,t} + \beta_9 BSIZE_{i,t} + \beta_{10} LEV_{i,t} + \varepsilon_{i,t}$$

where:
SMVA is the standardised market value added, MTB is the market-to-book ratio, TBQ is Tobin's Q, P_M is the proportion of board members with master's degrees, P_M^2 is the proportion of board members with master's degrees squared, P_ PhD is the proportion of board members with PhD, P_PhD^2 is the proportion of board members with PhD squared, BI_BED is the Blau index for board education level diversity, BI_BED^2 is the Blau index for board education level diversity squared, Ln FISIZE is the natural logarithm of firm size, Ln FAGE is the natural logarithm of firm age, Ln BSIZE is the natural logarithm of board size, LEV is leverage, β_1-β_7 are coefficients of independent variables, β_8-β_{11} are coefficients of control variables, *i* is the company, *t* is the year and ε is the error term.

4. EMPIRICAL RESULTS AND DISCUSSIONS

4.1. Descriptive Statistics

The summary statistics of the research variables are provided in Table 5. Table 5 shows all descriptive statistics from 2013 to 2022. The mean (Mean), standard deviation (SD), minimum (Min), and maximum (Max) of the chosen variables are included in the findings. The results show that SMVA has a mean value of 0.57, with a minimum value of -35.71 and a maximum value of 24.96. The MTB has a mean value of 1.39, with a minimum value of 0.00 and a maximum value of 20.62. TBQ has a mean value of −41.18 and a maximum value of 63.95. The proportion of board members with diplomas (P_DIP) has a mean value of 0.1, with a minimum value of 0.00 and a maximum value of 0.67. In contrast, the proportion of board members with bachelor's degrees (P_BD) has a mean value of 0.60 with a minimum value of 0.00 and a maximum value of 1.00. The proportion of board members with master (P_M) has a mean value of 0.243, a minimum value of 0.00, and a maximum value of 0.75. A study by Biçer and Şit (2023) for 51 companies listed on Borsa Istanbul from 2015 and 2019 reveals that P_M has a mean value of 0.49, minimum value of 0.00 and maximum value of 0.85 higher than 0.75 for non-financial companies listed on the JSE. On the other hand, the mean value of the proportion of board members with a PhD (P_ PhD) mean value is 0.06, with a minimum value of 0.00 and a maximum value of 0.57. However, a study by Andoh et al. (2023) for 16 non-financial companies listed on the Ghana Stock Exchange (GSE) from 2004 to 2016 found that P_PhD has a mean value of 0.10 higher than 0.06, with a minimum value of 0.00 and maximum value of 0.50 lower than 0.57. The Blau index for board education level diversity (BI_BED) has a mean value of 0.49, with a minimum value of 0.00 and a maximum value of 0.73. A minimum of 0.00 for BI_BED suggests that directors' educational backgrounds were similar. In another study, the findings of Saha and Maji (2022) for the top 100 listed Indian firms from 2014 to 2018 reveal that BI_BED has a mean value of 0.54, higher than 0.49, with a minimum value of 0.00 and a maximum value of 1.00 highlighting an even distribution of board education level diversity.

Table 5: Descriptive statistics

Variables	Obs	Mean	SD	Min	Max
Dependent variables					
SMVA	1010	0.57	2.88	−35.71	24.96
MTB	1010	1.39	2.19	0.00	20.62
TBQ	1010	1.24	3.68	−41.18	63.95
Independent variables					
P_DIP	1010	0.10	0.12	0.00	0.67
P_BD	1010	0.60	0.18	0.00	1.00
P_M	1010	0.24	0.16	0.00	0.75
P_ PhD	1010	0.06	0.09	0.00	0.57
BI_BED	1010	0.49	0.16	0.00	0.73
Control variables					
Ln FSIZE)	1010	15.57	1.88	8.86	19.98
FAGE (in years)	1010	54.88	32.87	10.00	136.00
Ln FAGE	1010	3.79	0.71	2.30	4.91
BSIZE (number)	1010	10.96	3.35	4,00	22.00
Ln BSIZE	1010	2.35	0.32	1.39	3.09
LEV	1010	0.78	2.85	0,00	40.49

4.2. Panel Data Regression Results

Hypotheses H1a to H1c predict that the proportion of board members with master's degrees (P_M), the proportion of board members with PhD degrees (P_ PhD), and the Blau index for board education level diversity (BI_BED) may have a significant positive, negative, or neutral impact on the shareholder value creation of non-financial companies listed on the JSE. The panel data linear regression results are presented in Table 6. The regression results show that P_M has a negative and significant impact on SMVA ($\beta = -3.867$, $P < 0.01$), MTB ($\beta = -3.200$, $P < 0.01$) and TBQ ($\beta = -3.246$, $P < 0.01$). P_ PhD has a negative and insignificant (n.s) impact on SMVA ($\beta = -2.499$, P = n.s) and TBQ ($\beta = -1.279$, P = n.s), while damaging and significant effects on MTB ($\beta = -3.200$, $P < 0.01$). BI_BED has a positive and significant impact on SMVA ($\beta = 3.637$, $P < 0.01$) and MTB ($\beta = 3.059$, $P < 0.01$), while a positive and insignificant impact on TBQ ($\beta = 1.907$, P = n.s). Concerning the control variables, Ln FSIZE) has a negative and significant impact on SMVA ($\beta = -0.915$, $P < 0.01$) and MTB ($\beta = -5.812$, $P < 0.01$) and TBQ ($\beta = -0.127$, P = n.s). Moreover, the results show that firm age (Ln FAGE) has a negative and significant impact on SMVA ($\beta = -0.915$, $P < 0.01$), MTB ($\beta = -5.879$, $P < 0.01$) and TBQ ($\beta = 3.623$ $P < 0.01$). Also, the results reveal that Ln BSIZE has

Table 6: Board education level diversity and shareholder value creation (Linear models)

Variables	(1)	(2)	(3)
	SMVA	MTB	TBQ
P_M	−3.867***	−3.200***	−3.246*
	(1.224)	(0.847)	(1.924)
P_ PhD	−2.499	−3.078**	−1.279
	(2.141)	(1.481)	(3.364)
BI_BED	3.637***	3.059***	1.907
	(1.170)	(0.809)	(1.837)
Ln FSIZE	−0.915***	−0.777***	−0.127
	(0.193)	(0.133)	(0.303)
Ln FAGE	−6.137***	−5.812***	−3.623***
	(0.729)	(0.504)	(1.145)
Ln BSIZE	0.615	0.424	0.386
	(0.549)	(0.379)	(0.862)
LEV	−0.0922	−0.0949**	−0.331***
	(0.0569)	(0.0394)	(0.0894)
Constant	36.00***	34.04***	16.22***
	(3.352)	(2.319)	(5.266)
Observations	1,010	1,010	1,010
R-squared	0.157	0.243	0.035
No. of companies	101	101	101

Standard errors in parentheses. ***P<0.01, **P<0.05, *P<0.1

an insignificant positive impact on SMVA (β = 0.61, P = n.s), MTB (β = 0.424, P = n.s) and TBQ (β = 0.386, P = n.s). Leverage (LEV) has a negative and significant impact on MTB (β = −0.0949, P < 0.05) and TBQ (β = −0.331, P < 0.01). In contrast, negative and insignificant impacts on SMVA (β = −0.0922, P = n.s).

In conclusion, comparing board education level diversity measures and control variables yields insight by examining the R-squared values. Model 2 for MTB demonstrates the highest R-squared value at 24.3%, followed by model 1 for SMVA at 14.5%, and model 3 for TBQ at 3.8%.

Hypotheses 2a to H.2c predict that the proportion of directors with master's degrees (P_M), the proportion of directors with PhD degrees (P_PhD), and the Blau index for board education level diversity (BI_BED) have curvilinear U-shaped or inverted U-shaped effects on shareholder value creation measures of non-financial companies listed on the JSE. P_M is evaluated with the proportion of directors with master's degrees squared (P_M^2). At the same time, P_ PhD is also evaluated in conjunction with the proportion of board members with PhD squared (P_PhD^2), and then BI_BED is tested with the Blau index for board education level diversity squared (BI_BED^2). The panel data quadratic regression results are presented in Table 7. The findings indicate that P_M significantly positively affects SMVA, while P_M^2 harms SMVA, suggesting partially inverted U-shaped effects. Additionally, P_M positively impacts MTB, while PM harms MTB, indicating an inverted U-shaped effect. Conversely, P_M has an insignificant negative impact on TBQ, while PM^2 has a negligible positive impact on TBQ, indicating inverted U-shaped effects. P_ PhD positively impacts SMVA, while P_PhD^2 has an insignificant negative impact on SMVA, suggesting an inverted U-shaped effect. P_ PhD positively impacts MTB, while P_PhD^2 harms MTB. P_ PhD positively impacts TBQ, while P_PhD^2 harms MTB. BI_BED has a positive impact on all shareholder value creation measures, while BI_BED^2 also has a positive effect on

Table 7: Board education diversity and shareholder value creation (Curvilinear quadratic models)

Variables	(1)	(2)	(3)
	SMVA	MTB	TBQ
P_M	−7.418**	−5.724**	−10.19*
	(3.527)	(2.441)	(5.542)
P_M^2	4.950	3.577	9.950
	(4.838)	(3.348)	(7.602)
P_ PhD	−4.265	−4.570	−5.094
	(4.068)	(2.815)	(6.392)
P_PhD^2	1.139	2.297	6.415
	(8.974)	(6.210)	(14.10)
BI_BED	1.443	2.426	1.217
	(2.757)	(1.908)	(4.332)
BI_BED^2	4.261	1.790	3.453
	(3.653)	(2.528)	(5.740)
Ln FSIZE	−0.911***	−0.772***	−0.113
	(0.193)	(0.134)	(0.303)
Ln FAGE	−6.066***	−5.780***	−3.546***
	(0.732)	(0.507)	(1.151)
Ln BSIZE	0.692	0.464	0.477
	(0.552)	(0.382)	(0.868)
LEV	−0.0924	−0.0947**	−0.330***
	(0.0570)	(0.0394)	(0.0895)
Constant	35.96***	33.96***	15.92***
	(3.361)	(2.326)	(5.281)
Observations	1,010	1,010	1,010
R-squared	0.159	0.245	0.037
No. of companies	101	101	101

Standard errors in parentheses, ***P<0.01, **P<0.05, *P<0.1

all shareholder value creation measures, highlighting an inverted U- relationship.

In Figure 1, the graph illustrates the curvilinear impact of P_M on shareholder value creation metrics. It demonstrates that P_M has an inverted U-shaped effect on all shareholder value creation metrics. These metrics reach a turning point when P_M constitutes 20% of the board size. Any increase in P_M beyond 20% of the board size could decrease shareholder value creation metrics.

Figure 2 illustrates the curvilinear effects of P_ PhD on measures of shareholder value creation. The impact of P_ PhD is characterised by an inverted U-shaped curve on shareholder value creation measures. SMVA and MTB peak when P_ PhD constitutes 10% of the board size, while TBQ maximises when their P_ PhD is almost non-existent.

In Figure 3, it is evident that BI_BED demonstrates curvilinear effects on shareholder value creation measures. An inverted U-shaped effect on all measures of shareholder value creation characterises it. SMVA and MTB reach their peak values when BI_BED falls within the range of 0.4-0.5. Meanwhile, TBQ achieves its maximum value when BI_BED ranges from 0.3 to 0.35, indicating a higher BI_BED requirement than SMVA and MTB.

In Table 8, we present a summary of the evaluated hypotheses. The table outlines the specific hypotheses, measures of board members' education diversity, expected signs of independent variable coefficients, significance (sig) categorised as yes or no,

Figure 1: Proportion of board members with masters' degrees curvilinear effects on shareholder value creation measures

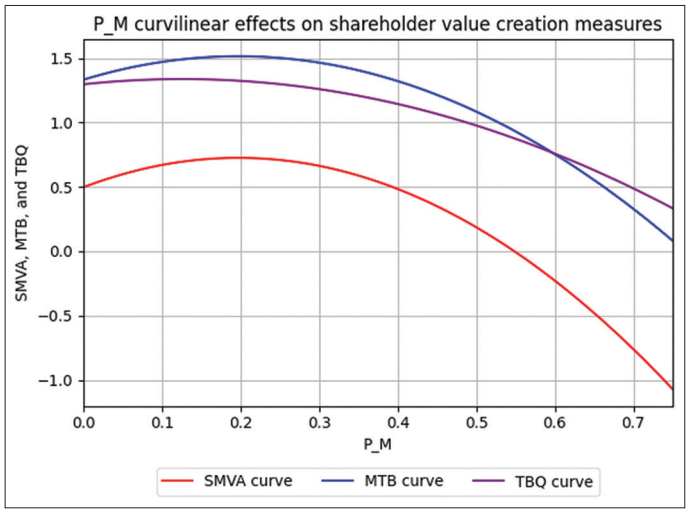
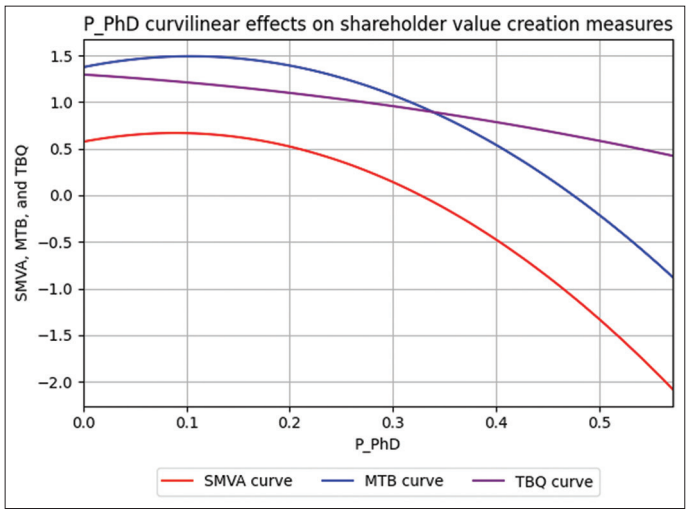


Figure 2: Proportion of board members with PhDs curvilinear effects on shareholder value creation measures



and shareholder value creation measures. In the context of linear models, P_M and P_PhD negatively influence all shareholder value creation measures. Conversely, BI_BED positively impacts all shareholder value creation measures, underscoring the importance of a diverse skill set in creating shareholder value for a company.

Examining curvilinear quadratic models, P_M and P_PhD positively impact all shareholder value creation measures. At the same time, P_M^2 and PhD^2 have a detrimental effect on all shareholder value creation measures, indicating an inverted U-shaped relationship. Furthermore, BI_BED positively impacts all shareholder value creation measures, and BI_BED^2 also shows a positive effect on all measures, suggesting an inverted U-shaped relationship.

4.3. Discussions of Panel Data Regression Results

Hypotheses H.1a to H.1c propose that P_ M and P_ PhD and BI_BED may have significant positive, negative, or no effect on creating shareholder value by non-financial companies listed on the JSE. The regression results indicate that P_M significantly

Figure 3: Blau index for board education level diversity curvilinear effects on shareholder value creation measures

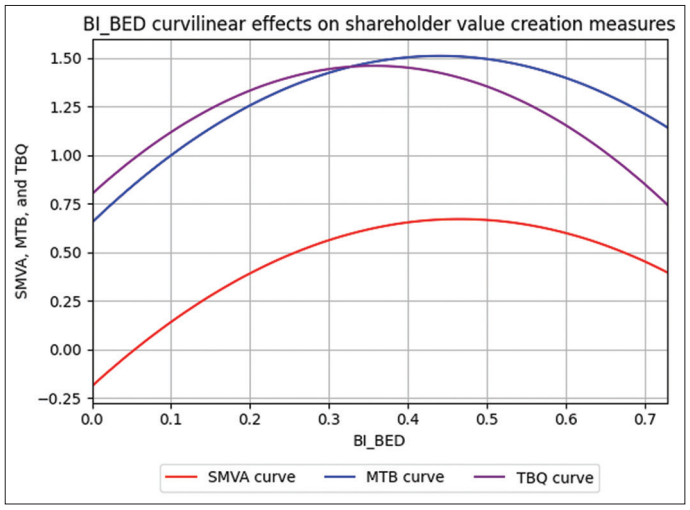


Table 8: Summary of hypotheses tested

	Shareholder value creation measures							
H	**BED measures**	**Expected signs**	**SMVA**		**MTB**		**TBQ**	
			Sign	**Sig.**	**Sign**	**Sig.**	**Sign**	**Sig.**
H1a	P_M	±	−	Yes	−	Yes	−	Yes
H1b	P_ PhD	±	−	No	−	Yes	−	No
H1c	BI_BED	±	+	Yes	+	Yes	+	No
H2a	P_M	±	−	Yes	−	Yes	−	Yes
	P_M^2	±	+	No	+	No	+	No
H2b	P_ PhD	±	−	No	−	No	−	No
	P_PhD^2	±	+	No	+	No	+	No
H2c	BI_BED	±	+	No	+	No	+	No
	BI_BED^2	±	+	No	+	No	+	No

and negatively impacts all measures of shareholder value creation (SMVA, MTB, and TBQ). P_ PhD shows an insignificant negative effect on SMVA and TBQ and a substantial adverse effect on MTB. On the other hand, BI_BED has a significant positive impact on both SMVA and MTB and an insignificant positive effect on TBQ. The negative results contradict the findings of Biçer and Şit (2023), who analysed 51 companies listed on the Borsa Istanbul from 2015 to 2019 and found that both P_M and P_ PhD significantly impact TBQ. However, negative results complement and extend the findings of Andoh et al. (2023) of 16 non-financial firms listed on the Ghana Stock Exchange (GSE) from 2004-2016 that P_ PhD has a significant negative impact on ROA ROE and TBQ. The positive results complement and extend the findings of Saha and Maji (2022) for the Top 100 listed Indian firms from 2014 to 2018, stating that BI_BED and SI_BED significantly impact MCAP and ROA. Also, Khan et al. (2024) examined 188 non-financial firms listed in PSX from 2009 to 2020 and found that BI_BED positively impacts ROA and TBQ. Drawing upon the results, the positive results are consistent with the upper echelon, agency, resource dependency, resource-based view and human capital theories. On the other hand, negative results lend support to social categorisation and similarity attraction theories.

Hypotheses H2a to H2c predict that P_M, P_ PhD, and BI_BED have curvilinear U-shaped or inverted U-shaped effects on non-financial companies' shareholder value creation measures listed

on the JSE. The regression results indicate that P_M and P_ PhD harm all shareholder value creation measures, while P_PM^2 and P_ PhD^2 positively influence these measures, suggesting a U-shaped effect. Conversely, BI_BED and BI_BED^2 positively influence all shareholder value creation measures. Further details can be seen in Figure 3, demonstrating that all shareholder value creation measures reach their maximum values when P_M accounts for 20% of the board size. Additionally, Figure 2 illustrates that SMVA and MTB reach their maximum values when P_ PhD is 10% of the board size, and TBQ reaches the inflection point when P_ PhD is close to zero percent. Figure 3 shows that all shareholder value creation measures attain maximum values when BI_BED reaches the 0.4 mark. The results complement and extend the findings of Alfar et al. (2023:12) for 14 non-financial companies listed on PSE for 2010-2020 that P_ PhD has a significant positive impact on ROA and EPS, while P_ PhD^2 has significant negative ROA and EPS highlighting an inverted U- shape effects. The research findings complement and build upon the mixed results found in previous studies. Considering this evidence, the board's education level can positively and negatively impact company shareholder value creation. The U-shaped or inverted U-shaped effects can be explained by integrating upper echelon, agency, resource dependency, resource-based view, and human capital and social categorisation theories (Salehi and Zimon, 2021; Alfar et al., 2023; Khan et al., 2024).

The comparison between previous studies and current research reveals some distinctions. Past studies primarily focused on the effects of P_M, P_PhD, and BI_BED on various accounting-based measures and one VBM measure, TBQ. In contrast, the current research investigated the impact of board education level diversity measures on multiple VBM measures, including SMVA, MTB, and TBQ. While previous studies mainly employed linear models to evaluate the influence of board education level diversity on shareholder value creation, the current research incorporated linear and curvilinear models. This approach considers board education level diversity as potentially having a dual effect on shareholder value creation.

5. CONCLUSION

This study investigates the influence of board education diversity on shareholder value creation of non-financial companies listed on the JSE for the 10 years from 2013 until 2022. Data were collected from 2013 to 2022 from 101 non-financial companies listed on the JSE. The final sample consisted of 1010 company-year observations. SMVA, MTB, and TBQ were proxies for company shareholder value creation. The board members' education diversity variables considered in this study included the proportion of board members with master's degrees (P_M), the proportion of board members with PhDs(P_PhD) and the Blau index for board education diversity (BI_BED).

The primary analysing method used in this study is the fixed effects model (FEM). The findings from the FEM indicate that P_M significantly and negatively impacts SMVA, MTB, and TBQ. Meanwhile, P_PhD shows an insignificant negative impact on SMVA and TBQ but significantly affects MTB. On the other hand, BI_BED has a notable positive impact on SMVA and MTB, while its impact on TBQ is not substantial. When considering curvilinear models, all board education level diversity measures display positive and negative impacts on shareholder value creation measures, demonstrating an inverted U-shaped effect. This study adds to the existing corporate governance literature on board education diversity and its implications for shareholder value creation. The evidence supports the upper echelon theory, agency theory, resource dependency theory, resource-based view, similarity attraction theory, and social identity theories in an emerging market context. The theoretical arguments drawn from these perspectives suggest that board education diversity can have varied effects on a company's shareholder value creation measures. Statistical analysis also aligns with the theoretical position that board education level diversity can have positive, negative, or no effect on shareholder value creation measures.

The results of our study have far-reaching implications for board members and corporate executives. Our findings suggest that the impact of board education level diversity on corporate outcomes can be positive and negative, depending on how this diversity is reflected. This underscores the need for regulatory reform to find the right balance in board education level diversity. A well-considered mix of board education level diversity can enhance a company's competitiveness and generate shareholder value, while an inappropriate mix can erode competitive advantage and diminish shareholder value. For example, we found that measures of shareholder value creation, such as SMVA, MTB, and TBQ, peak when the proportion of board members with master's degrees falls within 20-30% of the board size. Similarly, these measures reach a turning point when the proportion of board members with PhDs reaches about 10% of the board size. Additionally, all measures of shareholder value creation reach their maximum turning point when the board's educational diversity index falls within the range of 0.4-0.5. Overall, this study provides valuable information to companies and policymakers, guiding the importance of education in the boardroom and the potential benefits and costs of board education diversity. Therefore, identifying the optimal level of board education diversity may hinge on using appropriate metrics to assess a company's shareholder value creation.

6. LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study has certain limitations that open new avenues for future research. The first limitation is the sectors from which the companies are selected. This study has limited scope from non-financial sector companies, excluding financial sector companies on the JSE. The financial reports published by the companies may not represent reality and may be manipulated (profit manipulation). A common notion assumed in literature is that the performance impact of a board's human capital diversity is constant across all firms. The utilisation of the benefits of board members' education diversity may not be homogeneous across those working in a similar environment, as some companies perform significantly better than others (outperforming companies). In contrast, the

performance of some firms is very modest. Hence, it would be interesting to unveil empirically the impact of the board members' education diversity on outperforming and non-performing companies. Also, the quality and ranking of university board members studied are crucial factors contributing to individual performance. The authors could not control for such a variable due to data unavailability. The current study only included South African non-financial companies listed on the JSE, which has limited how far the findings may be applied to other countries. Future research might conduct a comparative analysis of the results for non-financial companies listed in Sub-Saharan Africa. The study primarily focuses on the education characteristics of the board of directors, and future studies could explore the education characteristics of board committees, such as the audit committee, that have a direct relationship with shareholder value protection. The current study uses a linear and curvilinear regression model to examine the impact of board members' diversity on shareholder value creation. Future research, though, might investigate the application of cubic regression models.

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