

EXPERTISE OF INDEPENDENT DIRECTOR AND CORPORATE INNOVATION PERFORMANCE OF THE NON-FINANCIAL FIRMS LISTED IN NAIROBI SECURITIES EXCHANGE: THE MODERATING ROLE OF TECHNOLOGY DIVERSITY STRATEGY.

Waley Jepkosgei Sharon

Department of Accounting and Finance, University of Eastern Africa, Baraton, Kenya

Email: sharonwalley@gmail.com

Abstract

Purpose – This study explores the moderating effect of technology diversity strategy (TDS) on the association between the expertise of independent directors (EID) and corporate innovation performance (CIP) in non-financial firms listed on the Nairobi Securities Exchange (NSE) in Kenya.

Design/Methodology – A total of 40 non-financial firms listed on the Nairobi Securities Exchange (NSE) were considered in the study. Inclusion and exclusion criteria were applied to select firms that were listed during the period 2010–2024.

Findings – The empirical results indicate that technology diversity strategy plays a significant moderating role in the nexus between independent directors' expertise and corporate innovation performance.

Practical Implications – Non-financial listed firms can boost innovation performance by combining diverse technology strategies with the strategic oversight of independent directors.

Originality/Value – By integrating corporate governance and technology strategy perspectives, this study offers a novel explanation of how technology diversity strategy shapes the nexus between independent directors' expertise and innovation outcomes, contributing empirical evidence from Kenyan listed firms, a context largely underexplored in prior research.

Keywords: Expertise of independent director, Corporate Innovation Performance, Technology Diversity Strategy.

Introduction

Non-financial firms listed on the Nairobi Securities Exchange are considered vital to economic development, playing a significant role in enhancing stock market performance and supporting broader economic growth (Muigai & Nasieku, 2021). The success of many of these firms is anchored on operational efficiency, which often results from additional investments in technological innovations that

enhance internal processes (Munyoroku, 2012). These firms are molded to embrace innovation through the adoption of new or significantly enhanced products, services, processes, marketing techniques, and organizational practices in business operations, workplace organization, or external interactions (Data, 2005). Scholars have argued that firms' involvement in innovation yields benefits regarding economies of scope, speed, space,

and heterogeneous knowledge-based views (Lin et al., 2006; Suzuki & Kodama, 2004), which ultimately drives significant growth in firm value. Amid dynamic market conditions and global competition, innovation has been acknowledged as a critical source of competitive advantage (Shapiro et al., 2015), offering firms opportunities while mitigating competitive pressures for long-term survival (Lodh et al., 2014). Equally, McAdam & Keogh (2004) contend that organizations embracing technological innovations gain a competitive edge over their rivals.

However, innovation is inherently complex, requiring firms to own strategic and specialized resources (Howells et al., 2003) and to engage in strategic, high-risk decisions over the long term, necessitating meticulous planning to ensure success (Aghion et al., 2009). Resource Dependence Theory posits that firms operate as open systems, relying on external environments to secure the critical resources needed for their operations (Hillman & Collins, 2009; Pfeffer, 1972). Consequently, insufficient resources generate uncertainty and elevate the risk associated with firms' innovative efforts. Put differently, firms are constrained in their ability to develop new technologies effectively when resources are inadequate (Dalziel et al., 2011).

Prior studies on corporate governance underscore that board members are vital external stakeholders who provide critical resources to support firms' innovation activities (Chen et al., 2014). Their diverse expertise and heterogeneous knowledge enable them to enhance firm innovation in various

ways (Wang, 2020). In particular, specialized knowledge held by independent directors are valued for their objective decision-making (Ashiq et al., 2022; Ashraf & Qian, 2021) and strong monitoring capacity (Stevenson & Radin, 2009), consistent with Agency theory. Boards serve not only as oversight mechanisms but also as sources of strategic decision-making support (Adams & Ferreira, 2007). In Kenya, non-financial firms are legally required to constitute boards of directors (Capital Markets Authority, 2002), and the Public Finance Management Act, 2015 mandates the inclusion of independent and expert directors. Agency theory emphasizes that such independent directors help align the interests of shareholders and managers through monitoring and incentives (Jensen & Meckling, 2019) while reducing information asymmetry by constructively challenging internal directors (Balasubramanian, 2012; Hamrouni & Uyar, 2023). Ultimately, the success of corporate innovation performance in non-financial firms depends on adopting technological diversity strategies that enhance research and development and operational efficiency (Almeida & Phene, 2004). Such strategies enable firms to exploit new revenue opportunities, improve customer satisfaction, and build efficient delivery systems that strengthen long-term firm value.

Problem Statement

The performance of corporate innovation has increasingly become a focus of academic and policy attention, given its essential contribution to firm profitability and long-term viability. (Lodh et al., 2014). In the context of non-

financial firms listed on the Nairobi Securities Exchange (NSE), innovation is vital as it drives new investments and creates growth opportunities (T. Miller & Del Carmen Triana, 2009), while fostering competitive strategies that improve profitability (Teece et al., 1997). However, since their listing, non-financial firms at the NSE have shown varied performance. While some, such as East African Breweries Limited and Safaricom, have consistently delivered strong results and increased shareholder value, others, including Mumias Sugar, Uchumi Supermarkets, Unga Group, and Eveready East Africa Limited, have recorded dismal outcomes and declining firm value (Aboka, 2018).

Despite the recognized importance of experienced independent directors in enhancing corporate innovation performance, existing literature presents mixed findings. Several studies report that experienced independent directors positively and significantly influence CIP, arguing that their intellectual capacity equips them to serve on boards effectively in both monitoring and advisory roles. Consequently, it is expected that expertise independent directors contribute to innovation through their diverse knowledge and skills (Chen et al., 2014). Similarly, professor-directors are thought to enrich boards by bringing diverse perspectives and novel ideas, thereby fostering innovative activities (Li et al., 2020). However, critics argue that professor-directors may be overly academic in their orientation and lack the practical business experience necessary for effective monitoring and advisory functions (Chen & Huang, 2009;

Chen, 2013). Moreover, information asymmetry may persist, as managers can become myopic even when governance structures are strong (Bobillo et al., 2018). These conflicting findings may arise from the growing effort to integrate theoretical insights with practical applications (Li et al., 2020) and from differences in firms' strategies and capabilities. According to Resource Dependence Theory, internal governance arrangements are shaped by a firm's strategic orientation and available resources (Pearce & Zahra, 1992).

While prior researchers have investigated the influence of independent directors on corporate innovation performance, most of this evidence is drawn from developed economies, with limited empirical focus on developing contexts such as Kenya and broader Africa (Choi et al., 2012; Fowowe, 2017). The institutional, regulatory, and market environments in African economies differ significantly from those in developed markets, particularly in terms of corporate governance structures, enforcement mechanisms, and access to innovation-related resources (Okiro, 2014). Consequently, the findings from developed settings may not be directly generalizable to firms operating in African contexts. In Kenya, non-financial firms listed on the Nairobi Securities Exchange face persistent challenges such as limited R&D investment, resource constraints, and weak board oversight, which can hinder the translation of board expertise into innovation outcomes (Muigai, & Nasieku, 2021). Moreover, there is scant evidence on how board characteristics, especially the role of

experienced independent directors, interact with firms' technology diversity strategies to influence innovation performance. This lack of context-specific empirical research creates an informative gap in understanding the governance innovation nexus in emerging markets.

In response to this research gap, the study investigates the moderating role of technology diversity strategy on the relationship between independent board members' expertise and corporate innovation performance among non-financial firms listed in Kenya, as expressed in the following null hypothesis.

H₀₁: Technology diversity strategy does not moderate the relationship between independent board members and corporate innovation performance.

Literature Review

Theoretical Perspectives

The theoretical foundation of this study is based on Resource Dependence Theory, with Agency Theory serving as a complementary framework. This study is grounded in RDT as advanced by Jeffrey Pfeffer (1972) in his seminal work *The External Control of Organizations: A Resource Dependence Perspective*. RDT posits that firms are open systems that depend on external environmental contingencies for survival and growth. It emphasizes that organizations must acquire critical resources from their external environment because they cannot generate all the resources they need internally. According to this view, the composition of the board of

directors is strategically designed to secure access to valuable resources and networks. Thus, the board serves as a crucial mechanism through which firms can access external resources and reduce risks associated with innovation-related decision-making (Pfeffer & Gerald R. Salancik, 1978).

Closely aligned with this perspective, the Resource-Based View argues that each firm possesses a unique set of internal resources and capabilities, which, when properly developed, can be transformed into dynamic competencies such as innovation. Without sufficient resources, it is difficult for firms to develop new technologies and products effectively. RDT further suggests that directors provide four key benefits to organizations: (i) information in the form of advice and counsel, (ii) access to communication channels linking the firm with its environment, (iii) preferential access to critical resources, and (iv) organizational legitimacy. Independent directors, in particular, are often well-positioned to contribute superior monitoring capabilities, facilitate R&D investment, and provide access to external resources needed for technological innovation. From this standpoint, independent board members act as boundary spanners who help firms acquire the resources required for innovation activities. This role becomes especially important for firms pursuing advanced technology diversity strategies, where resources must be distributed across multiple technological areas, often leading to internal competition among innovation projects. By leveraging the business expertise and professional knowledge of

independent directors, firms can navigate these challenges and enhance the effectiveness of their innovation decisions.

In addition, this study draws on Agency Theory, as advanced by Michael C. Jensen and William H. Meckling (1976) in their seminal paper *Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure*. Agency theory highlights the conflict of interest between principals (shareholders) and agents (managers), where managers may pursue self-serving objectives at the expense of shareholders. Jensen and Meckling argue that appointing professional, independent directors and adopting sound technology diversity strategies can mitigate agency conflicts by enhancing board oversight and curbing managerial opportunism. In this sense, the independence and expertise of directors, combined with an appropriate technology diversity strategy, strengthen the board's ability to monitor management effectively and safeguard shareholder interests. In line with these theoretical perspectives, this study contends that non-financial firms listed on the Nairobi Securities Exchange should consider appointing professional independent directors and implementing robust technology diversity strategies for two key reasons. First, prior accounting and governance research has shown that independent directors and technology diversity strategies are vital external resources that can enhance corporate innovation performance. Second, the business expertise and professional knowledge of independent board members can help firms manage the inherent challenges of innovation

decisions. Their valuable governance experience can improve firms' capacity to oversee diverse innovation projects and achieve desirable innovation outcomes.

Empirical Review

Expertise of Independent Directors on Corporate Innovation Performance

Independent directors are a critical component of the board of directors and play a significant role in a corporation's strategic decision-making processes. An independent director is generally defined as a board member who has no formal or material link to the firm (Mallette & Hogler, 1995). In emerging economies, the human and social capital possessed by independent board members, such as advanced industry expertise, strong monitoring capabilities, and extensive external networks, is especially important for fostering innovative activities. From the Resource Dependence Theory perspective, independent directors serve as vital external actors who can help firms secure the resources they need and thereby enhance their innovation performance. In recent years, many institutions have increasingly appointed professional independent directors as a strategic approach to strengthen governance and expand their organizational capacity (Stevenson & Radin, 2009).

The link between professional independent directors and corporate innovation performance has attracted substantial interest among scholars, practitioners, and policymakers. However, existing literature reveals mixed findings. Studies such as (Mallette & Hogler,

1995), which examined Chinese A-share listed companies, found that professional independent directors have a positive and significant effect on corporate innovation performance, with similar results reported by (Francis and Wu, 2015). On the contrary, some researchers, such as Bobillo et al. (2018), established a negative relationship between professional independent directors and corporate innovation performance, explaining that excessive control by the board of directors might negatively influence managerial behavior. Specifically, managers may stop viewing board members as providers of advice and instead begin to distrust them. In line with Agency Theory, managers might withhold information from outsiders or avoid investing in high-risk projects such as innovation, to protect their positions (Guldiken & Darendeli, 2016). This concern is further emphasized by Darendeli (2016), who noted that outside directors may lack the firm-specific knowledge necessary to effectively support innovation. Taken together, these contrasting findings suggest that the relationship between professional independent directors and corporate innovation performance remains inconclusive and warrants further investigation, particularly in developing countries where non-financial firms play a crucial role in socioeconomic development despite notable corporate governance and legal challenges.

Moderating Role of Technology Diversity Strategy

Scholars have increasingly focused on technological strategy diversification because of the growing recognition that technologies

are crucial sources of competitive advantage for firms (Vega-Vázquez, Cossío-Silva, & Martín-Ruiz, 2012). Technology diversity strategy refers to the breadth of technological knowledge embedded within a firm, often measured by examining the distribution of the firm's patents across different technology classes over time (Park, 1997).

Firms pursuing an advanced technology diversity strategy allocate their resources across multiple technological domains, which may lead to internal resource competition among innovation projects (Huang & Chen, 2010). However, such diversity can also prevent negative lock-in effects on a single technology path, thereby supporting continuous evolution and business renewal (Lin et al., 2006). Additionally, the presence of Stevenson & Radin (2009) suggests that professional independent directors enhance firms' monitoring capabilities because they possess advanced expertise and knowledge critical to innovation-related decisions. These directors can help firms recognize complementarities among innovation projects, minimize redundant phases in the innovation process, and improve the efficiency and productivity of new product development, especially when aligned with a technology diversity strategy. On the other hand, a high level of technology diversity can also increase the managerial complexity of innovation projects (Suzuki & Kodama, 2004), potentially making managers less inclined to pursue risky, long-term innovation investments.

In light of these arguments, this study proposes that a technology diversity strategy positively

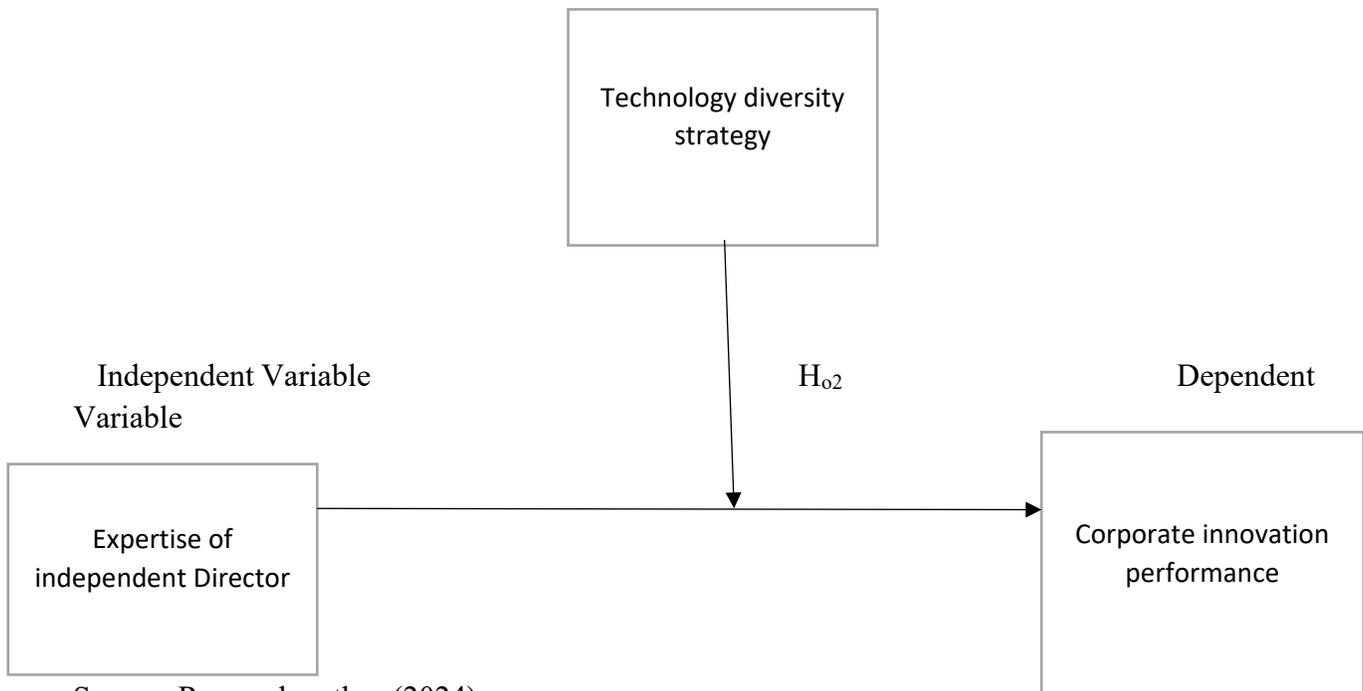
moderates the relationship between the expertise of independent board members and innovation performance.

Conceptual Framework

The main objective of the current study is to examine the moderating effect of technology diversity strategy on the effect of professional

independent directors on corporate innovation performance. Hence, the outcome variable is corporate innovation performance, the predictor variable is Professional Independent Director, and the moderator is technology diversity strategy. The theoretical relationship between the variables is depicted in the following conceptual framework.

Figure 1-Conceptual Framework



Source: Research author (2024)

Methodology

The study adopted positivist philosophical approach and was guided by both longitudinal

and explanatory research designs. The target population comprised all 40 non-financial firms listed on the NSE in Kenya (NSE, June

2024). However, the inclusion criterion was based on all firms listed at the NSE from 2010 to 2024. All the suspended and delisted firms were excluded. As a result, panel data from audited financial reports were collected from 36 listed firms. In total, the study accounted for 504 year-end observations.

In this study, patents were used as a measure of innovation to provide a tangible and quantifiable indicator of inventive activity. However, this approach has certain limitations. Patents capture only formal, codified innovations and may not reflect other important forms of innovation, such as process

improvements, service innovations, or informal knowledge creation. Additionally, the quality and commercial impact of patents can vary significantly, with some patents having minimal practical significance while others drive major technological advances. Patenting behavior may also be influenced by industry norms, firm strategy, or regulatory environments, which can affect the extent to which patents accurately reflect a firm's overall innovative capability. Therefore, while patents offer a useful proxy for innovation, the study acknowledges that they represent a partial and imperfect measure.

Table 1: The measurements and abbreviations for the study variables.

Variable	Proxy	Formula	Variable type	References
Corporate innovation performance	CIP	The number of patents granted to a firm in a given year t.	DV	(Carnahan et al., 2010)
Expertise of Independent Director	EID	The ratio of the expertise of independent directors to all independent directors	IV	(Liu,H., Tang, S., & Lou, 2012)
Technology diversity strategy	TDS	$TD = E_i [P_i \ln (1/P_i)]$ <ul style="list-style-type: none"> • Where: • \sum (sigma / E_i in your formula) → summation across all patent classes. It means you add up the calculations for each class. • i → patent class index (e.g., Class A, Class B, Class C, etc.). 	Moderator	(Miller, 2006)

		<ul style="list-style-type: none"> • $P_i \rightarrow$ proportion of patents a firm holds in class i out of its total patents in that year. • $\ln(1/P_i) \rightarrow$ natural logarithm of the inverse of that share. This is the entropy component, which grows when patents are spread out instead of concentrated. 		
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Source: Research Author (2024)

The hypotheses were evaluated using hierarchical multiple regression analysis. Given the use of panel data, the decision between fixed effects and random effects

regression models was guided by the Hausman test. Two regression models were employed: Model 1 tested the Direct effect, while Model 2 assessed the moderating effect.

Direct Effect

$$CIP_{it} = \beta_0 + \beta_1 EID_{it} + \beta_2 TDS_{it} + \epsilon_{it} \dots \dots \dots \text{model 1}$$

Moderating Effect

$$CIP_{it} = \beta_0 + \beta_1 EID_{it} + \beta_2 TDS_{it} + \beta_3 EID_{it} * TDS_{it} + \epsilon_{it} \dots \dots \dots \text{model 2}$$

Where:

CIP - Corporate innovation performance

EID – Expertise of Independent Director

TDS-Technology diversity strategy

β -Coefficients

ϵ - Error term

i - firm

t - time

Data Analysis

The data was analyzed using both descriptive and inferential statistical techniques, and the results were summarized using the mean, standard deviation, as well as the minimum and maximum values of the research variables. Furthermore, the nature and strength of the

relationships among variables were presented through Pearson product-moment correlation coefficient analysis. Before hypothesis testing via hierarchical multiple regression, several diagnostic tests were performed. The outcomes of these tests, displayed in Tables 2-5, confirm

the data's suitability for multiple regression analysis.

Panel Unit Root Test

The study tested for unit roots to establish whether the variables were stationary with the aid of the Fisher unit root test.(Maddala & Wu, 1999) and the Im, Pesaran, and Shin (IPS) test (Im, Pesaran, & Shin, 2003) to establish the presence or absence of a unit root. The hypothesis was evaluated using a 5% significance level, whereby a p-value below 0.05 leads to the rejection of the null hypothesis, indicating that the panel data is stationary.

The following null and alternative hypotheses were tested.

Test	Hypothesis
Fisher unit root test	Ho: All panel contain a unit root Ha: Panels are stationary
Im-Pesaran-Shin (IPS) test	Ho: All panel contain a unit root Ha: Panels are stationary

Keeping in view the p-values depicted in Table 2, the null hypothesis was rejected, which means that none of the variables had a unit root.

Table 2: Fisher's unit root - Phillips-Perron Unit Root Test and Im-Pesaran-Shin

Variables	Fisher Unit Root Test –Phillips-Perron	Im-Pesaran-Shin
CIP	-11.8421	-6.1124
p-value	(0.0000)	(0.0050)
PID	-12.3578	-4.9301
p-value	(0.0000)	(0.0007)
TDS	-14.2256	-2.3487
p-value	(0.0006)	(0.0009)

Source: Research Author (2024)

Test for Normality Assumption

Tabachnick & Fidell, (2001)warn that non-normal variables can distort correlation results. Normality assumes a symmetrical distribution around the mean (Casson & Farmer, 2014). The Shapiro-Wilk test (Shapiro & Wilk, 1965) was applied to assess normality, with the null hypothesis that the data are normally distributed. At a 5% significance level, results showed all p-values exceeded 0.05, indicating no violation of the

normality assumption; thus, the data were considered normally distributed.

The Shapiro-Wilk (1965) test was used to assess whether the data follow a normal distribution by testing the following hypothesis.

Ho: The distribution is normal.

H1: The distribution is not normal.

Decision criteria: Reject H_0 if P values are less than the 5% level of significance

The Shapiro-Wilk normality test results presented in Table 3 indicated that all p-

values exceeded the 0.05 significance level. Consequently, the study assumed that the sample data for all variables were drawn from a normally distributed population (Shapiro & Wilk, 1965).

Table 3: Shapiro–Wilk Normality Test

Variable	W	P > Z
CIP	0.9008	0.85439
PID	0.93580	0.93278
TDS	0.9765	0.0753

Source: Data Analysis, 2024

Test for Heteroskedasticity Assumption

Heteroskedasticity was tested using the Breusch-Pagan test. The error term mean was/remains constant over time; if not, it would affect the association between the experts of independent directors, the technology diversity strategy of the non-financial firms in NSE. Heteroskedasticity test was run to find out

whether the error terms were correlated across observations in the time series data. The findings revealed that Chi2 (1) was 0.85 with a p-value of 0.6106, implying that the hypothesis was not rejected. Hence, the assumption of constant variance was not violated. The findings are presented below in Table 4.

Table 4: Breusch-Pagan-Godfrey Test for Heteroscedasticity

chi2(1) = 0.85
Prob > chi2 = 0.61006

Source: Research Study, 2024

Test for Autocorrelation

The current study employed the Wooldridge test to examine the presence of autocorrelation in the data, specifically to determine whether the residuals are serially correlated. The results of this test are presented in Table 5. The

findings reveal that the estimated F value is 0.686 with one and 25degrees of freedom, deriving a p-value of 0.8513. Hence, the hypothesis of first-order autocorrelation is supported, and the study concludes that residuals are not autocorrelated.

Table 5: Wooldridge Test for Autocorrelation in Panel Data

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

$F(1, 25) = 0.686$

Prob > F = 0.8153

Source: Research Study, 2024

Hausman Test

The Hausman test was conducted to determine the suitability of either the fixed effect or the random effect regression model. The standard hypothesis of this test is that the random effect model estimates the panel data, whereas the alternative hypothesis suggests that the fixed effect model is the appropriate estimator. Based on the chi-square value of 5501 and p-value = 0.006, the null hypothesis was rejected, implying that the fixed effect model was the most appropriate model to test the hypotheses.

Results and Discussion

Table 6 presents the mean, minimum, maximum, and standard deviation of the research variables for the period 2010–2024. As shown, the mean value of CIP was 0.587, with a minimum of 0.00, a maximum of 1.00, and a standard deviation of 0.234. CIP reflects the proportion of patents granted to a firm in a given year for non-financial firms listed on the NSE. The wide range of CIP values (0.00 to 1.00) highlights the varied innovation practices across firms. A minimum value of 0.00 suggests that some firms remain highly focused on existing operations and do not engage in patenting activity. In contrast, a maximum value of 1.00 indicates that other firms actively pursue innovation. This aligns with prior literature, which argues that in the face of turbulent environments and international competition, innovation serves as a major

source of competitive advantage(Shapiro et al., 2015),. Innovation not only creates opportunities but also helps firms mitigate competitive pressures, thereby supporting long-term survival(Lodh et al., 2014).

The results show that the average TDS score was 0.789, indicating that, on average, non-financial firms listed on the NSE maintain a moderately diversified technological base. The minimum score of 0.234 suggests that some firms are highly specialized, concentrating their innovation efforts within a narrow range of technology fields. In contrast, the maximum score of 0.987 indicates that certain firms have achieved near-complete diversification, spreading their patents almost evenly across multiple technology domains. The standard deviation of 0.128 reflects moderate variation in technology diversity among firms, implying that while some firms adopt a focused innovation strategy, others pursue broader technological exploration.

The results indicate that the mean proportion of professional independent directors was 0.689, suggesting that, on average, nearly 69% of board members in non-financial firms listed on the NSE were independent professionals. The minimum value of 0.000 reflects that some firms had no professional independent representation on their boards, while the maximum value of 0.880 indicates that certain firms had boards composed of a very high

proportion of independent directors. The standard deviation of 0.231 shows considerable variation in board independence across firms, highlighting differences in governance

structures and the extent to which firms embrace professional independence in their boards.

Table 6: Summary Statistics Table of Variables

Variables	Obs	Min	Max	Mean	Std. Dev.
CIP	504	0	1	0.587	0.234
EID	504	0	0.880	0.680	0.231
TDS	504	0.234	0.987	0.789	0.128

Source: Research Study, 2024

Correlation Analysis

The study employed correlation analysis to explore the statistical relationships between corporate innovation performance (CIP), professional independent directors (EID), and technology diversity strategy (TDS). The correlation matrix is presented in Table 7. The results reveal that PID had a significant positive correlation with CIP ($r = 0.603$),

indicating that a higher proportion of professional independent directors is associated with higher levels of corporate innovation performance. Similarly, TDS exhibited a significant positive correlation with CIP ($r = 0.289$), suggesting that firms with more diversified technological portfolios tend to achieve moderately higher innovation performance.

Table 7: Correlation Results

	CIP	PID	TDS
CIP	1.000		
EID	0.603*	1.000	
TDS	0.289*	-0.0131	1.000

* Correlation is significant at the 0.05 level (2-tailed).

Source: Research Study, 2024

Regression Analysis

The regression results presented in Table 8 show that professional independent directors have a significant positive effect on corporate innovation performance ($\beta = 1.22801$, $\rho = 0.000 < 0.05$). This finding is consistent with agency theory, which emphasizes the

monitoring role of independent directors in mitigating managerial opportunism and aligning management decisions with shareholders' interests. By exercising oversight and bringing professional expertise, independent directors create governance structures that encourage strategic investments in innovation. Recent studies provide empirical support for this relationship, showing that board independence enhances innovation outcomes when directors possess relevant knowledge and experience (Chen et al., 2022; Li & Zhang, 2023). Similarly, evidence from Asian markets indicates that a higher proportion of independent directors contributes to greater innovation performance,

particularly through increased R&D activities and patent output (Wang et al., 2021).

The results in TDS on CIP ($\beta = 0.390609$, $p = 0.000$) indicate that technology diversity strategy significantly enhances corporate

innovation performance. Empirical studies support this, showing that firms leveraging diverse technological knowledge and cross-disciplinary approaches achieve higher innovation outcomes (Walrave et al., 2024).

Table 8: Direct Effect Regression Results

Fixed-effects (within) regression	Number of obs	=	504
Group variable: firm	Number of groups	=	36
R-sq: within = 0.6337	Obs per group: min	=	14
between = 0.3867	avg	=	14.0
overall = 0.5936	max	=	14
	F(8,25)	=	102.39
corr(u _i , Xb) = 0.0351	Prob > F	=	0.0000

(Std. Err. Adjusted for 36 clusters in the firm)

CIP	Coef.	Robust Std. Err.	t	P>t	[95% Conf. Interval]	
EID	1.22801	.0460311	21.79	0.000	1.097836	.9082306
TDS	.390609	.0439868	6.61	0.000	.3000165	.5812016
cons	.7644783	.0905085	2.92	0.007	.0780726	.450884
sigma_u	.0699646					
sigma_e	.12747244					
rho	.23150697 (fraction of variance due to u _i)					

Source: Research Study, 2024

The regression results in Table 9 reveal that technology diversity strategy plays a significant moderating role. Specifically, the level of technology diversity strategy impacts the professional independent directors' ability to function effectively, ultimately amplifying corporate innovation performance ($\beta = 0.7465030$, $p = 0.000 < 0.05$). These findings indicate that technology diversity strategy

strengthens the positive relationship between EIDs and corporate innovation performance, making the impact of PIDs more pronounced in firms with diverse technological capabilities. Consistent with Resource Dependence Theory, EIDs serve as critical boundary-spanning agents who can leverage their expertise and networks to secure vital external resources (Pfeffer & Salancik, 1978). In environments

rich in technological diversity, these directors are better positioned to mobilize varied knowledge, reduce environmental uncertainty, and promote strategic decision-making that enhances innovation outcomes.

Empirical evidence supports this notion: diverse technological knowledge facilitates greater recombination of ideas and fosters innovation (Walrave, 2024); technological diversity in strategic alliances is positively linked to innovation performance (Pritchard, 2023), and digital transformation, often

involving the adoption of diverse technologies, improves innovation through enhanced organizational agility (Xu et al., 2024). Firms that integrate professional independent oversight with technological diversity thus achieve superior innovation outcomes, suggesting that the strategic combination of human and technological resources is essential for driving corporate innovation. This underscores the practical importance for organizations to foster both strong governance structures and technological diversity to maximize innovation performance.

Table 9: Moderating effect of Technology Diversity Strategy on Corporate Innovation Performance Regression Results

Fixed effects (within) regression	Number of obs	=	504
Group variable: firm	Number of groups	=	36
R-sq: within = 0.6849	Obs per group: min	=	14
between = 0.2934	avg	=	14.0
overall = 0.6849	max	=	14
	F (9,25)	=	78.09
corr(u _i , Xb) = 0.0006	Prob > F	=	0.0000

(Std. Err. adjusted for 26 clusters in the firm)

CIP	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
EID	.7816027	.0476283	-20.61	0.000	-1.079695 - .8835104
TDS	.2876075	.0349196	8.24	0.000	.2156892 .3595258
EID*TDS	.7465030	.0081048	9.21	0.000	.0579581 .0913425
_cons	.3400878	.077867	4.37	0.000	.1797178 .5004578
sigma_u	.07446048				
sigma_e	.10386775				
rho	.33946036				(fraction of variance due to u _i)

Source: Research Study, 2024

5. Conclusion

The findings indicate that technology diversity strategy significantly strengthens the positive

impact of professional independent directors on corporate innovation performance in non-financial firms listed on the Nairobi Securities

Exchange (NSE). By enhancing directors' ability to leverage expertise and access diverse technological resources, these firms achieve higher innovation outcomes. This underscores the importance of integrating strong governance with technological diversity to drive sustained corporate innovation in the NSE context.

6. Recommendations, Implications, Contribution to Knowledge, Limitations and Suggestions for Future Recommendations

Non-financial firms listed on the Nairobi Securities Exchange (NSE) are encouraged to adopt technology diversity strategies by investing in a variety of technological capabilities and fostering cross-disciplinary collaborations to enhance innovation performance. Additionally, these firms should strengthen governance through the appointment of professional independent directors with relevant expertise, enabling more effective strategic decision-making. Integrating technological diversification efforts with the oversight provided by professional independent directors can help firms fully leverage the moderating benefits of technology diversity on corporate innovation.

Theoretical Implications

This study contributes to theory by integrating **Resource Dependence Theory (RDT)** and **Agency Theory**. RDT highlights how professional independent directors serve as boundary-spanning agents, leveraging external resources and networks to reduce uncertainty and enhance innovation performance. Agency Theory emphasizes the role of governance in

aligning the interests of managers with shareholders, ensuring that oversight mechanisms, such as professional independent directors, mitigate opportunistic behavior and promote effective decision-making. Together, these theories explain how technological diversity and professional independent oversight interact to enhance corporate innovation performance.

Managerial Implications

Managers of non-financial NSE firms should recognize that professional independent directors are more effective when firms adopt robust technology diversity strategies. Selecting directors with relevant expertise and aligning their strategic oversight with technological initiatives can optimize decision-making, integrate diverse knowledge, and enhance innovation outcomes.

Practical Implications

Practically, non-financial firms are encouraged to implement technology diversity strategies while strengthening governance structures through professional independent directors. Policymakers and regulators can develop guidelines that promote both technological diversification and strong board practices, creating an environment conducive to innovation and long-term competitiveness.

Contribution to Knowledge

This study provides empirical evidence on the moderating role of technology diversity strategy in enhancing the impact of professional independent directors on corporate innovation performance in non-financial firms

listed on the NSE. It fills a gap in the literature on emerging markets by highlighting the strategic importance of integrating human and technological resources to achieve superior innovation outcomes. Furthermore, it demonstrates how governance mechanisms and technological diversity jointly influence innovation performance.

Limitations

The study is limited to non-financial firms listed on the NSE, which may affect the generalizability of the findings to other sectors or markets. Additionally, the study uses data from a specific period, which may not fully capture long-term innovation trends. Other factors that could influence innovation performance, such as organizational culture or market dynamics, were not included in the analysis.

Suggestions for Future Research

Future studies could extend the research to financial firms or firms in other emerging markets to examine whether the findings hold in different contexts. Researchers may also explore additional moderators or mediators, such as board diversity, organizational culture, or managerial capabilities, in the relationship between governance and innovation. Conducting longitudinal studies would help to assess the long-term impact of technology diversity strategies and professional independent directors on corporate innovation performance.

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