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The strategic role of risk culture in enhancing innovation and non-financial performance: evidence from the insurance sector

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ABSTRACT
Organizational culture plays a critical role in shaping innovation and performance, yet the specific contribution of risk culture, a vital subset of organizational culture, remains underexplored, particularly in emerging economies. This study investigates how risk culture influences innovation and non-financial performance in the Nigerian insurance sector. Drawing on Resource-Based Theory and Dynamic Capability Theory, we analyze survey data from 251 employees across multiple organizational levels using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings show that risk culture significantly enhances customer-based performance, internal business processes, and learning and growth. Moreover, innovation mediates the relationship between risk culture and both customer-based performance and internal processes, though not learning and growth. These results highlight risk culture as both a strategic resource and an enabling capability for innovation. This study contributes to the literature by extending resource-based theorizing to non-financial performance outcomes and offering practical guidance for fostering innovation and resilience in service-oriented industries.

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Risk culture; firm innovation; non-financial performance; resource-based theory; dynamic capability theory

1. Introduction

Organizations today operate in environments characterized by rapidly evolving technologies, intense global competition, and ever-changing customer demands. In these complex and dynamic conditions, firms must increasingly rely on intangible resources to maintain a sustained competitive advantage (Stan et al. 2024). According to Resource-Based Theory (RBT), firm resources become a source of superior performance when they are valuable, rare, difficult to imitate, and effectively organized (Lukovszki, Rideg, and Sipos 2021; Priem and Butler 2001). Among these intangible assets, organizational culture, particularly risk culture, stands out as a significant but underexplored resource. Risk culture, a critical subset of organizational culture, encompasses the shared values, knowledge, and understandings regarding risk held by employees across all levels (Bockius and Gatzert 2024; IRM 2012; Ring et al. 2016). It shapes how employees perceive and act upon risk, influencing decision-making and strategic alignment (Cameron and Quinn 2011). Rippl (2002) further emphasizes that perceptions of risk vary across social, cultural, and

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national contexts due to differences in values and worldviews. Therefore, organizations must cultivate a risk culture that is attuned to both their internal culture and the broader context in which they operate, aligning risk-related behaviors with strategic objectives.

While interest in risk culture has grown, especially in the wake of financial sector crises, empirical studies examining its impact on firm performance remain limited (Carretta, Fiordelisi, and Schwizer 2017; Kpodo and Agyekum 2015; Owusu and Gupta 2024). Existing research has largely emphasized financial metrics, with relatively little attention paid to non-financial performance dimensions. Yet, non-financial metrics such as customer satisfaction, internal processes, and learning and growth offer valuable insights into an organization's long-term health and capacity for sustainable value creation (Banker, Potter, and Srinivasan 2000; Ittner and Larcker 2003). This study argues that risk culture constitutes a strategic resource that is directly linked to non-financial performance (Sheedy and Griffin 2018). Furthermore, in line with RBT, we propose that when risk culture is combined with other capabilities, specifically innovation, it forms a resource bundle that is even more valuable and difficult to replicate (Naor et al. 2014). Innovation serves as a dynamic capability (da Silva Etges and Cortimiglia 2019; Teece, Pisano, and Shuen 1997); enabling firms to reconfigure resources and adapt to shifting environments, thus enhancing the performance impact of risk culture.

Drawing on RBT and Dynamic Capability Theory (DCT), we empirically assess the relationship between risk culture, innovation, and non-financial performance in Nigerian insurance firms, an under-researched but strategically important sector in an emerging economy. We respond to calls for research that adopts a more nuanced view of performance, using perceptual indicators and multidimensional constructs (e.g. Wilderom, Glunk, and Maslowski 2000). To test these relationships, we conducted a cross-sectional survey of 251 employees across 27 Nigerian insurance firms, spanning a range of organizational levels and departments. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), which enabled us to simultaneously examine direct, indirect, and mediating effects among the constructs. The findings show that risk culture significantly enhances customer-based performance, internal business processes, and learning and growth. Moreover, innovation mediates the relationship between risk culture and both customer-based performance and internal processes, though not learning and growth.

This study makes three main contributions to existing research. First, we demonstrate that risk culture is not only a critical intangible asset but also significantly enhances non-financial performance, emphasizing the strategic value of cultivating a robust risk culture and extending the literature that predominantly assesses financial performance (e.g. Carretta, Fiordelisi, and Schwizer 2017). Second, we integrate risk culture and innovation into a single model and test their combined effects, bridging these traditionally isolated research streams, and providing insights into their dynamic interdependencies. Third, by adopting a multidimensional approach to non-financial performance, we reveal granular insights into the effects of risk culture and innovation on diverse facets of firm performance.

Practically, the findings offer actionable insights for managers, particularly in emerging economies, by showing how cultivating a strong risk culture can enhance innovation and strategic performance. Specifically, for firms with an embedded risk culture, encouraging frontline staff to take ownership of client engagement could lead to faster claims processing, higher customer retention, and greater employee satisfaction. In doing so, this research advances a more holistic understanding of how intangible assets contribute to organizational success, particularly in volatile environments where resilience and adaptability are essential.

2. Theoretical background

2.1. Organizational culture, resource-based view and dynamic capabilities

Organizational culture plays a fundamental role in shaping strategic decision-making and firm performance (Hogan and Coote 2014). It consists of shared values, norms, and practices that

influence employee behavior, managerial actions, and long-term competitiveness (Cameron and Quinn 2011; Schein 1990). Within this broader framework, risk culture has emerged as a critical but underexplored component, particularly in industries where uncertainty, risk management, and regulatory compliance are integral to operations (Bockius and Gatzert 2024; Marano and Grima 2022). Risk culture refers to the collective mindset, behaviors, and institutional mechanisms that guide how firms assess, communicate, and respond to risk (Bui, Fang, and Lin 2018). Unlike formal compliance-driven risk management systems, risk culture operates informally, shaping real-time decision-making and the organization's capacity to navigate uncertainty effectively (Berry-Stölzle and Xu 2018; Davidson et al. 2015).

Following the global financial crisis, the importance of risk culture in organizational stability and resilience has become increasingly recognized (Bockius and Gatzert 2024; Ring et al. 2016). Research suggests that firms with strong risk cultures integrate risk-awareness into their strategic objectives, allowing for balanced risk-taking while avoiding excessive caution or reckless behavior (Bockius and Gatzert 2024; Bui, Fang, and Lin 2018). Rippl (2002) demonstrates that risk is not perceived uniformly across organizations but is instead shaped by institutional and social contexts. The Financial Stability Board (FSB 2014) provides a structured framework for understanding risk culture, emphasizing four key dimensions: leadership tone, accountability, communication, and risk-aligned incentives. These dimensions influence how risk is perceived and managed across all levels of an organization, impacting innovation, operational efficiency, and customer-focused performance outcomes (Kpodo and Agyekum 2015). Despite its significance, risk culture remains under-theorized in relation to non-financial performance and innovation, particularly within emerging economies where institutional structures and regulatory frameworks differ from those in developed markets.

To explain the role of risk culture in firm performance, this study integrates RBT and DCT. RBT posits that firms achieve a sustainable competitive advantage when they possess resources that are valuable, rare, inimitable, and non-substitutable (Naor et al. 2014; Priem and Butler 2001). Intangible assets, including organizational culture, knowledge, and innovation capabilities, are central to this framework (Barney 1991). Risk culture aligns with this perspective as a strategic resource that enhances decision-making, mitigates threats, and fosters a stable yet adaptive organizational environment (Sheedy and Griffin 2018). Firms that embed risk-awareness within their decision-making processes can anticipate market disruptions, seize new opportunities, and maintain regulatory compliance more effectively than competitors with weak risk cultures (Fritz-Morgenthal, Hellmuth, and Packham 2016). However, RBT alone is insufficient for explaining how firms develop and deploy their risk cultures over time. The theory primarily emphasizes resource possession rather than the processes through which firms refine, adapt, and integrate resources dynamically (Teece 2007).

This limitation necessitates the incorporation of Dynamic Capabilities Theory, which focuses on how firms sense opportunities, seize them, and continuously reconfigure their internal capabilities to maintain long-term competitiveness (Teece, Pisano, and Shuen 1997). From a DCT perspective, risk culture enables firms to navigate uncertainty through structured risk assessment, adaptive decision-making, and resource reallocation (Fritz-Morgenthal, Hellmuth, and Packham 2016). Firms with strong risk cultures are better positioned to detect industry trends, regulatory changes, and market shifts, allowing them to anticipate risks rather than react to them (Carretta, Fiordelisi, and Schwizer 2017). Rather than perceiving risk as an obstacle, these firms integrate risk culture into strategic planning, fostering a decision-making environment that supports innovation rather than suppressing it (García-Granero et al. 2015). A well-developed risk culture facilitates internal agility, ensuring that firms refine their business processes, innovation strategies, and risk management frameworks in response to changing conditions (Ring et al. 2016). In highly regulated industries such as insurance, firms that treat risk culture as a dynamic capability are more likely to sustain long-term growth and resilience in the face of shifting regulatory landscapes and technological advancements (Nocco and Stulz 2006).

Innovation plays a crucial role in determining the extent to which risk culture translates into enhanced performance. The literature widely acknowledges that innovation is a primary driver of competitive advantage, allowing firms to develop new products, optimize internal processes, and enhance overall operational efficiency (García-Granero et al. 2015; Hogan and Coote 2014). While innovation can be classified into product and process categories, both forms require firms to navigate a degree of risk (Martínez-Ros and Labeaga, 2009). A well-developed risk culture encourages firms to embrace calculated risk-taking, facilitating innovation while minimizing the downsides associated with uncertainty (da Silva Etges and Cortimiglia 2019). In the insurance sector, innovation is increasingly driven by technological advancements such as artificial intelligence, blockchain, and digital underwriting models, each of which presents both risks and opportunities (Balasubramanian, Libarikian, and McElhaney 2021). Firms with strong risk cultures are better equipped to implement these innovations successfully, as they have embedded mechanisms for evaluating potential risks, mitigating adverse effects, and aligning innovation with long-term strategic goals (Fritz-Morgenthal, Hellmuth, and Packham 2016; Kpodo and Agyekum 2015).

In this study, we synthesize RBT and DCT, positioning risk culture as both a strategic resource and a dynamic capability that fosters both innovation and non-financial performance in the insurance sector. While RBT provides a foundation for understanding how risk culture functions as a source of competitive advantage, DCT explains how firms can continuously refine and deploy their risk cultures to sustain long-term innovation and resilience (Teece 2007). Firms that fail to cultivate strong risk cultures may face operational inefficiencies, regulatory challenges, and an inability to respond effectively to emerging risks, ultimately jeopardizing their market position (Sheedy and Griffin 2018). Integrating these theoretical perspectives offers a comprehensive framework for understanding how risk culture influences innovation and non-financial performance in the insurance industry.

2.2. Risk culture and firm performance

The pursuit of enhanced firm performance has been central to strategic management research, with scholars consistently investigating the factors that influence organizational outcomes (Cameron and Quinn 2011; Hogan and Coote 2014; Schein 1990). Traditionally, research has focused on financial indicators of firm performance, such as profitability and shareholder returns (e.g. Artz et al. 2010; Singh, Darwish, and Potočnik 2016). However, non-financial performance metrics, including customer satisfaction, internal business processes, and learning and growth, have emerged as equally critical for sustaining long-term competitiveness (Banker, Potter, and Srinivasan 2000; Ittner and Larcker 2003).

Organizational culture has long been recognized as a key determinant of firm performance, and risk culture, as a subset, has gained increasing attention in both academic and practical discourse (Davidson et al. 2015; Sheedy and Griffin 2018; Wood and Lewis 2018). Risk culture plays a pivotal role in shaping organizational decision-making, influencing firms' ability to balance risk-taking with resilience-building strategies (FSB 2014). A well-established risk culture fosters an environment where strategic risk management is not just a compliance function but an integral part of business operations, ensuring proactive responses to emerging challenges (Carretta, Fiordelisi, and Schwizer 2017). Empirical studies and recent reviews suggest that firms with a strong risk culture experience enhanced firm performance due to improved risk governance and strategic risk-taking (Bianchi et al. 2018; Bockius and Gatzert 2024; Owusu and Gupta 2024).

For example, research on European banks found that a well-established risk culture positively correlates with financial stability and profitability (Bui, Fang, and Lin 2018). Bianchi et al. (2018) developed a 'Sound Risk Culture Indicator' based on the Financial Stability Board's (FSB)

framework and found that banks with stronger risk cultures demonstrated superior financial performance. Similarly, Owusu and Gupta (2024) applied textual analysis to assess risk culture in U.S. banks and found that organizations with high or moderate risk cultures outperformed those with weak risk cultures.

Beyond financial outcomes, risk culture also influences non-financial performance indicators such as customer trust, operational efficiency, and employee engagement. Kpodo and Agyekum (2015) examined banks in Ghana and found that risk culture was strongly associated with non-financial performance indicators, particularly customer satisfaction and innovation. Similarly, Fritz-Morgenthal, Hellmuth, and Packham (2016) found that European banks with well-established risk cultures achieved better stress test results, reinforcing the link between risk culture and institutional resilience. Firms that embed risk-awareness into their corporate DNA tend to foster greater stakeholder confidence, improve organizational agility, and enhance internal efficiency (Sheedy and Griffin 2018).

Despite increasing interest in risk culture, empirical research examining its direct impact on non-financial performance remains limited. While prior studies have linked risk culture to financial outcomes, less is known about its influence on broader organizational measures such as customer satisfaction, internal efficiency, and employee learning & growth, especially in emerging economies (Fritz-Morgenthal et al. 2016; Hael, Belhaj, and Zhang 2024; Kpodo and Agyekum 2015; Marano and Grima 2022; Ogalo 2021). As highlighted by Bockius and Gatzert (2024), the literature remains fragmented, with persistent gaps around standardized definitions, measurement, and the mechanisms through which risk culture delivers value. This study contributes to addressing these gaps by focusing on non-financial performance and contextualizing risk culture within an emerging market insurance setting.

2.3. Innovation as a mediator in the risk culture-performance relationship

Innovation is widely regarded as a key driver of competitive advantage, enabling firms to respond to dynamic market conditions and sustain long-term growth (Hogan and Coote 2014; Teece 2007). However, innovation inherently involves risk, requiring firms to balance exploration with strategic caution (da Silva Etges and Cortimiglia 2019). Firms with rigid or risk-averse cultures may struggle to foster an environment conducive to innovation and creativity (Torrance 2016). Recent studies highlight that risk culture can facilitate innovation by promoting a mindset that views risk as an opportunity rather than a threat. For example, García-Granero et al. (2015) found that firms with well-integrated risk cultures were more likely to develop breakthrough innovations, while Carretta, Fiordelisi, and Schwizer (2017) demonstrated that risk-aware organizations were more agile in adapting to regulatory changes. Therefore, by embedding risk culture into their decision-making processes, firms can create an environment that supports experimentation, controlled risk-taking, and proactive responses to emerging market opportunities. While risk culture is acknowledged as a determinant of firm behavior, its interaction with innovation remains under-theorized

Innovation has been found to influence factors such as customer satisfaction, operational efficiency, and employee development (Hogan and Coote 2014; Naveed, Akhtar, and Cheema 2012). Product and process innovations can contribute to internal business process improvements, potentially reducing operational inefficiencies and enhancing service delivery speed (Martínez-Ros and Labeaga, 2009). Furthermore, firms that encourage innovation may experience higher customer loyalty and engagement, as they are better positioned to adapt to changing market needs (Hogan and Coote 2014). Innovative firms are also more likely to develop adaptive learning cultures, where employees engage in continuous upskilling to align with evolving industry trends (Hael, Belhaj, and Zhang 2024). However, studies have also shown that innovation does not always lead to improved learning and growth outcomes, as employees may resist change or require time to adapt to new systems (Nybakk 2012).

The mediating role of innovation in the risk culture-performance relationship remains an area requiring further empirical validation. While existing studies establish the independent effects of risk culture and innovation on firm performance (e.g. Bianchi et al. 2018; Martínez-Ros and Labeaga, 2009; Owusu and Gupta 2024), there is limited empirical evidence on how these two constructs jointly influence non-financial performance. This is particularly relevant in insurance firms operating in emerging economies, where the impact of risk culture may differ due to contextual and institutional factors (Davidson et al. 2015; Wood and Lewis 2018). To address this gap, this study examines the mediating role of innovation in the relationship between risk culture and non-financial performance. By conceptualizing risk culture as both a strategic resource (Priem and Butler 2001) and a dynamic capability (Teece 2007), we provide a comprehensive framework that integrates risk culture, innovation, and firm performance.

3. Hypotheses development

Building on the research gaps identified in the previous sections, this study proposes a conceptual model that links risk culture, innovation, and non-financial performance in insurance firms operating in emerging economies. Drawing on RBT and DCT, this study conceptualizes risk culture as both a strategic resource that underpins competitive advantage and a dynamic capability that enables innovation and organizational adaptability.

From an RBT perspective, risk culture is an intangible, valuable, and inimitable organizational asset that contributes directly to competitive advantage by embedding risk-awareness into decision-making and operational processes (Barney 1991; Priem and Butler 2001). However, possession of such resources is not sufficient. As DCT posits, firms must be able to sense, seize, and reconfigure these capabilities in response to shifting environmental conditions (Teece 2007). In this light, risk culture also functions as a dynamic capability, enabling innovation, agility, and continuous performance improvement.

This study therefore argues that employees' perceptions of risk culture influence firm outcomes in two primary ways: directly by promoting a proactive risk mindset that enhances customer satisfaction, internal processes, and learning and growth; and indirectly by fostering an innovation-oriented environment that mediates the relationship between risk culture and non-financial performance.

Based on this dual-theoretical framing and the empirical evidence reviewed, the study proposes the following hypotheses. The conceptual model is presented in Figure 1.

3.1. Risk culture and non-financial performance

Organizational culture significantly shapes firm performance by influencing employees' behaviors and attitudes toward achieving strategic objectives. Within this framework, risk culture determines how risks are perceived, assessed, and managed, ultimately shaping decision-making processes (Cameron and Quinn 2011; Sheedy and Griffin 2018). A strong risk culture ensures that employees develop a proactive, rather than reactive, approach to risk, aligning risk-taking with organizational goals and fostering a stable operational environment (Bockius and Gatzert 2024; Ring et al. 2016).

Empirical studies suggest that organizations with well-developed risk cultures are better positioned to manage uncertainties, leading to enhanced customer satisfaction, streamlined internal processes, and improved employee learning and development (Carretta, Fiordelisi, and Schwizer 2017; Kpodo and Agyekum 2015). These findings reinforce the argument that risk culture is a strategic asset influencing non-financial dimensions of firm performance. Accordingly, the following hypotheses are proposed:

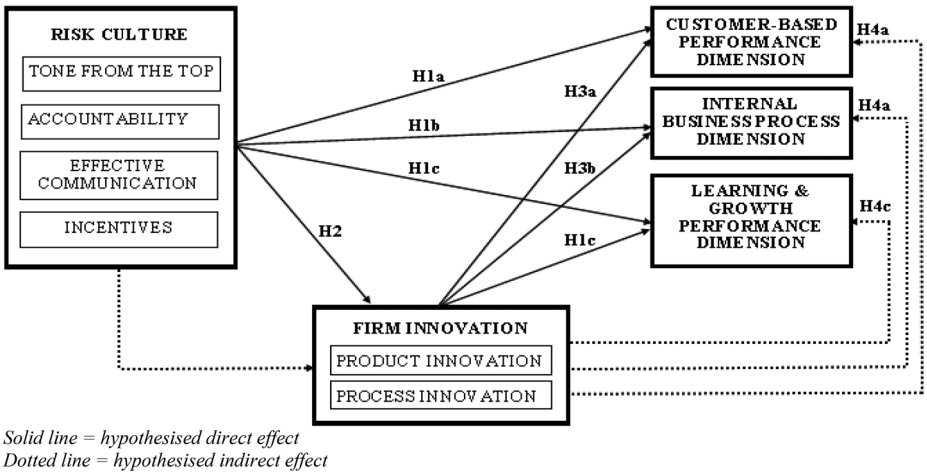

Figure 1. Conceptual model.

H1a: Employees' perceptions of risk culture are positively associated with customer satisfaction.

H1b: Employees' perceptions of risk culture are positively associated with internal business processes.

H1c: Employees' perceptions of risk culture are positively associated with organizational learning and growth.

3.2. Risk culture and innovation

Innovation is widely regarded as a key driver of sustained competitive advantage (Hogan and Coote 2014; Teece 2007). However, innovation inherently involves risk, making it imperative for firms to balance strategic risk-taking with uncertainty management (da Silva Etges and Cortimiglia 2019). A strong risk culture does not eliminate risk but structures it, allowing employees to engage in calculated experimentation and creative problem-solving while minimizing exposure to failure (García-Granero et al. 2015).

Firms that embed risk-awareness into their culture foster an environment where employees feel empowered to challenge the status quo, propose novel ideas, and engage in experimentation without fear of penalization (Fritz-Morgenthal, Hellmuth, and Packham 2016). Conversely, rigid risk-averse cultures may suppress innovation by discouraging employees from deviating from established norms (Giaccone and Magnusson 2022). Therefore, this study posits the following hypothesis:

H2: Employees' perceptions of risk culture are positively associated with their engagement in innovation-related activities.

3.3. Innovation and non-financial performance

While innovation is widely recognized as a key driver of performance, its impact can be complex. Innovation may introduce cost and uncertainty (Simpson, Siguaw, and Enz 2006; Vermeulen, De Jong, and O'shaughnessy 2005), yet it often contributes positively to firm performance by improving product quality, customer satisfaction, and internal efficiency (Hogan and Coote 2014; Naveed, Akhtar, and Cheema 2012).

Drawing on the RBT and DCT perspectives, innovation represents a valuable capability that enables firms to reconfigure resources and adapt to change (Hael, Belhaj, and Zhang 2024;

Teece 2007). In service industries like insurance, innovation enhances customer responsiveness, streamlines internal processes, and supports employee development (Fuglsang 2010; Nocco and Stulz 2006). By aligning services with customer needs, innovation fosters satisfaction and loyalty (Hollebeek, Jaakkola, and Alexander 2018), while also promoting operational efficiency and continuous learning (Fuglsang 2010). Accordingly, we hypothesize:

H3a: Engagement in innovation is positively associated with customer-based performance.

H3b: Engagement in innovation is positively associated with internal business processes.

H3c: Engagement in innovation is positively associated with learning and growth.

3.4. Mediating effect of innovation

While risk culture directly shapes organizational outcomes, its full impact on non-financial performance may be mediated through innovation. A risk-aware culture encourages employees to innovate, and in turn, innovation contributes to customer satisfaction, operational efficiency, and employee development (Hogan and Coote 2014; Martínez-Ros and Labeaga, 2009).

Innovation plays a particularly important role in sectors such as insurance, where firms must continuously adapt to regulatory changes, digital transformation, and shifting market conditions (Nocco and Stulz 2006; Silwal 2022). A well-integrated risk culture fosters innovation, and this innovation, in turn, enhances firm performance by improving service delivery, decision-making processes, and employee adaptability (da Silva Etges and Cortimiglia 2019). Accordingly, this study hypothesizes that innovation serves as a key mechanism through which risk culture enhances non-financial performance, leading to the following mediation hypotheses:

H4a: Innovation mediates the relationship between employees' perceptions of risk culture and customer satisfaction.

H4b: Innovation mediates the relationship between employees' perceptions of risk culture and internal business processes.

H4c: Innovation mediates the relationship between employees' perceptions of risk culture and learning and growth.

4. Research methodology: data and measures

4.1. Empirical context

This study utilizes quantitative data from employees of Nigerian insurance firms, providing a unique setting to test our hypotheses. The Nigerian insurance industry is particularly relevant for two main reasons.

First, extensive research highlights the pivotal role of risk culture in influencing innovation and performance, primarily within the financial sector (Bui, Fang, and Lin 2018; Kpodo and Agyekum 2015). However, most studies have focused on banks in developed economies (Carretta, Fiordelisi, and Schwizer 2017; Power, Ashby, and Palermo 2013; Sheedy and Griffin 2018), often assuming similar risk cultures in banks and insurance companies post-2008 financial crisis. Yet, distinct differences in risk culture dynamics between these sectors call for more targeted research, especially within insurance firms which face unique challenges in risk management (Davidson et al. 2015; Wood and Lewis 2018).

Second, despite the crucial role of insurance in economic development, its penetration in Africa, and particularly in Nigeria, remains significantly low. Nigeria's insurance penetration rate

stands at just 0.3%, contributing merely 0.7% to the national GDP by 2014, which is substantially below the global average of 7.23% (Swiss Re 2020). Such low rates suggest that weak risk cultures may be impairing innovation and overall firm performance, highlighting the need for deeper exploration in this area (Berry-Stölzle and Xu 2018).

By focusing on the Nigerian insurance sector, this study not only fills a gap in the literature concerning non-bank financial institutions in emerging markets but also offers insights that are applicable both academically and practically.

4.2. Data collection and sample selection

This study employed a multi-stage probability sampling approach to select participants from Nigerian insurance firms. The target population consisted of employees at all levels across firms licensed by the National Insurance Commission of Nigeria (NAICOM). This approach ensured a multi-level perspective on risk culture, rather than relying solely on senior management responses, which is a limitation in many prior studies (Naor et al. 2014).

In the first stage, the sampling frame included 58 NAICOM-licensed insurance firms. Firms were eligible for inclusion if they had at least 50 employees and active operations at the time of data collection. Given that over 90% of insurance firms are headquartered in Lagos, cluster sampling was applied based on geographical location. Firms were stratified into three zones within Lagos: Victoria Island (VID), Lagos Island (LID), and Lagos Mainland (LMD). From each stratum, firms were selected using proportionate random sampling, resulting in a total of 27 firms: 10 from VID, 7 from LID, and 10 from LMD.

In the second stage, 30 employees per firm were invited to participate in the survey, resulting in 810 distributed questionnaires (see Appendix B). Selection within each firm was stratified by department and organizational level to ensure coverage across functional areas (e.g. underwriting, finance, marketing, claims) and roles (managers, assistant managers, and non-managerial staff). This addressed potential bias from over-representation of any specific unit or role. By including a wide range of roles, our approach captures a comprehensive view of the organizational culture (Wilderom, Glunk, and Maslowski 2000).

To ensure clarity and reliability, the questionnaire was piloted to a small group of insurance employees. Data were collected over 12 weeks (November 2020–February 2021). Despite multiple follow-ups, the response rate was 31%, yielding 251 usable responses. This rate is comparatively higher than that in similar studies (Lee, Lee, and Garrett 2019; Omerzel 2016) and is deemed adequate for robust statistical analysis. For details on the stratified sampling approach and firm selection, see Appendix A.

4.3. Measurement of variables

4.3.1. Risk culture

This was assessed using the Financial Stability Board (FSB) framework, recognized for its comprehensive evaluation of organizational risk culture (Carretta, Fiordelisi, and Schwizer 2017; Kpodo and Agyekum 2015). The FSB framework's emphasis on tone from the top, accountability, communication, and risk-aligned incentives is consistent with recent literature syntheses, which identify these as core actionable dimensions for both assessment and targeted improvement of risk culture (Bockius and Gatzert 2024). This study adapted a 12-item scale from the FSB framework, focusing on tone at the top, accountability, effective communication, and incentives. Responses were gathered using a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree).

4.3.2. Innovation

Measured through a dual-focus scale on product and process innovations, adapted from Wang and Ahmed (2004) and Uzkurt et al. (2013), this scale incorporates the consumer perspective on innovation, essential for capturing its market effectiveness. It consists of six items rated on a five-point Likert scale.

4.3.3. Firm performance

Non-financial performance metrics were utilized, assessing customer satisfaction, internal business processes, and learning and growth, following Ittner and Larcker (2003). Each dimension was evaluated using items from established scales in prior studies, with responses on a five-point Likert scale. These three dimensions align with the Balanced Scorecard framework and are particularly relevant for service-oriented industries like insurance, where customer satisfaction, operational efficiency, and employee development are critical performance outcomes (Ittner and Larcker 2003; Kaplan and Norton 1996). While the Balanced Scorecard includes financial metrics, this study focuses on the non-financial dimensions for two key reasons: (1) these are widely recognized as leading indicators of long-term performance in knowledge- and service-intensive sectors (Banker, Potter, and Srinivasan 2000; Kaplan and Norton 1996), and (2) financial performance data were not accessible at the individual level of analysis, making perceptual, non-financial indicators more appropriate for this study's design and objectives.

4.3.4. Control variables

The study controlled for factors known to influence performance, such as firm age, ownership type, length of service, and department/unit.

Data for these variables were collected directly through the survey, recognizing that diverse organizational and employee attributes can impact the results. A summary of all latent constructs, their acronyms, descriptions, and latent types is presented in Table 1 to enhance clarity and support interpretation of subsequent analyses.

4.4. Analytical strategy and hypothesis testing procedures

To test the hypothesized relationships among risk culture, innovation, and non-financial performance, this study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4. PLS-SEM was selected due to its suitability for complex models with both formative and reflective constructs, its ability to handle non-normal data, and its effectiveness in theory development and prediction-focused research (Hair et al. 2021).

PLS-SEM simultaneously estimates both the measurement and structural models, allowing for robust assessment of latent variables and the interrelations among them. In this study, risk culture was modeled as a second-order formative construct using the two-stage approach (Ringle, Sarstedt, and Straub 2012). The four first-order dimensions — tone from the top, accountability, effective communication, and incentives — were first estimated, with their latent variable scores subsequently used as formative indicators for the higher-order risk culture construct. Innovation was specified as a second-order reflective construct, comprising product and process innovation dimensions. All performance outcomes — customer-based performance, internal business processes, and learning and growth — were treated as reflective latent constructs.

A two-step analytical approach was followed (Anderson and Gerbing 1988). The first step involved evaluating the measurement model for reliability and validity, using criteria such as factor loadings, composite reliability (CR), average variance extracted (AVE), and discriminant

Table 1. Summary of constructs, acronyms, and measurement details.

Construct name	Acronym	Description	Latent type
Tone from the Top	TFTT	Leadership's role in setting risk tone	Formative
Accountability	ACC	Clarity of roles and ownership of decisions	Formative
Effective Communication	EFFC	Openness and transparency in risk discussions	Formative
Incentives	INC	Alignment of rewards with risk behavior	Formative
Product Innovation	PRODIN	Introduction of new products	Reflective
Process Innovation	PROCIN	Improvement in service delivery/ efficiency	Reflective
Customer-based Performance	CBP	Measures of customer satisfaction and service	Reflective
Internal Business Process	IBP	Operational efficiency and control	Reflective
Learning and Growth	LGP	Staff development, skills, adaptability	Reflective
Firm Innovation	FIN	Second-order: Combined PRODIN and PROCIN	Reflective

validity *via* the HTMT ratio. The second step assessed the structural model, focusing on path coefficients, effect sizes (f^2), coefficient of determination (R^2), and predictive relevance (Q^2).

Hypothesis testing and mediation analysis were performed using the standard PLS algorithm, with significance assessed through bootstrapping (5,000 resamples). This approach enables robust estimation of path coefficients and bias-corrected confidence intervals, for both direct and indirect (mediation) effects (Hair et al. 2021; Nitzl, Roldan, and Cepeda 2016). In line with best practice, mediation was considered significant if the bootstrapped *p*-value was below .05, indicating that the bias-corrected confidence interval did not include zero (Nitzl, Roldan, and Cepeda 2016).

To illustrate the structural relationships tested, the model can be expressed using the following equations:

Let:
RC = Risk Culture
FIN = Firm Innovation
CBP = Customer-Based Performance
IBP = Internal Business Processes
LGP = Learning and Growth

Then the model estimates:

Innovation as a function of risk culture:

$$FIN = \beta_1 \text{ x } RC + \varepsilon_1$$

Direct effects of risk culture on performance:

$$CBP = \beta_2 \text{ x } RC + \varepsilon_2$$
$$IBP = \beta_3 \text{ x } RC + \varepsilon_3$$
$$LGP = \beta_4 \text{ x } RC + \varepsilon_4$$

Indirect (mediation) effects of risk culture on performance through innovation:

$$CBP = \beta_5 \text{ x } FIN + \varepsilon_5$$
$$IBP = \beta_6 \text{ x } FIN + \varepsilon_6$$
$$LGP = \beta_7 \text{ x } FIN + \varepsilon_7$$

The total effect of risk culture on each performance outcome is calculated as the sum of the direct effect and the indirect effect *via* innovation. This analytical approach provides a robust framework for validating the proposed conceptual model and testing the hypothesized

mediation effects, addressing the complex relationships central to the study's research objectives.

4.5. Descriptive statistics

Table 2 provides a synthesis of the survey output, presenting both respondent demographics (e.g. age, education, tenure, and role) and organizational characteristics (e.g. department, business type, firm age, and multinational status). This overview supports the interpretation of risk culture perceptions across organizational levels and contexts. Given that both dependent and independent variables were sourced from the same Likert-scale responses, we assessed the potential for common method bias. Using Harman's single-factor test, a standard method for detecting common method variance (CMV), we performed a principal component analysis (PCA) without rotation (Podsakoff et al. 2003).

The analysis identified eight factors that cumulatively accounted for 60% of the total variance, with the largest factor explaining only 23.8%. This result suggests a minimal risk of CMV, as no single factor dominates the explained variance.

Table 2. Respondent and firm-level survey profile

	N	%
Age		
18–35	130	51.79
36–55	108	43.03
Above 56	13	5.18
Education		
Secondary Education	2	.8
National Diploma	5	1.99
Higher National Diploma	23	9.16
Bachelor's Degree	106	42.23
Postgraduate	41	16.33
Professional Qualification	74	29.48
Tenure at work		
Less than 1	30	11.95
1–5	118	47.01
Above 6	103	41.04
Position		
Managers	28	11.16
Assistant managers	106	42.23
Other employees	117	46.61
Department		
Claims and Underwriting	82	32.67
Marketing	67	26.69
Policy Issue and Administration	29	11.55
Customer relations	50	19.92
Finance	6	2.39
Human Resources	8	3.19
Actuarial	9	3.59
Business Type		
Life	68	27.09
General business	131	52.19
Composite	52	20.72
Firm age		
1–15	72	28.69
16–30	98	39.04
Above 30	81	32.27
Multinational		
Yes	121	48.21
No	130	51.79

5. Analysis and results

5.1. Evaluation of the measurement model

The measurement model's reliability was assessed using composite reliability (CR), which accounts for factor loadings and sidesteps the assumption of equal weighting for each item (Naor et al. 2014). Table 3 shows that the CR values for all constructs surpassed the recommended threshold of 0.7, confirming internal consistency. Factor loadings were all above 0.6, and the Average Variance Extracted (AVE) for each construct was greater than 0.50, demonstrating convergent validity (Hair et al. 2021). Due to poor metrics, one indicator for internal business processes was removed, which improved convergent validity.

Multicollinearity was assessed using the Variance Inflation Factor (VIF), and as displayed in Table 3, the VIF values ranged from 1.227 to 1.471, well below the threshold of 5, indicating no concerns of multicollinearity (Hair et al. 2021). The heterotrait-monotrait (HTMT) ratio was employed to test discriminant validity. HTMT values below 0.90 confirmed that constructs are distinct from one another (Hair et al. 2021), as illustrated in Table 4. For model fit assessment, the Standardized Root Mean Square Residual (SRMR) was used, measuring the discrepancy between observed and model-implied correlations. With an SRMR value of 0.070, falling below the 0.08 threshold, the model demonstrated a good fit (Hu and Bentler 1999). Further, the dG and dULS values (0.640 and 1.992, respectively) suggested an acceptable model fit (Henseler, Hubona, and Ray 2016).

Consistent with the approach described in Section 4.4, risk culture was modeled as a higher-order formative construct using the two-stage approach, while innovation was specified as a reflective latent construct. The reliability and validity tests showed that both the composite reliability and AVE values exceeded the required thresholds, confirming the quality of the measurements as detailed in Table 3. For the formative risk culture construct, while three of the four indicator weights were statistically significant, one non-significant indicator was retained due to its conceptual relevance to the risk culture construct.

5.2. Evaluation of the structural model

Upon validating the indicators through the measurement model assessment, we advanced to evaluate the structural model. The quality of the inner PLS model was assessed by examining key metrics such as the coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and variance inflation factor (VIF). Utilizing the consistent PLS bootstrapping technique with 5,000 subsamples, we derived robust results, detailed in Table 5 and illustrated in Figure 2.

The coefficient of determination (R^2) served to quantify the variance explained by the exogenous constructs. The results showcased R^2 values ranging from 0.212 to 0.304, indicating that our predictors account for a significant portion of the variance in the dependent constructs. Specifically, the model explains 30.4% of the variance in internal business processes, 22.5% in customer-based performance, 22.2% in learning and growth, and 21.2% in innovation, reflecting substantial explanatory power amidst the complexities of social science research (Hair et al. 2021).

Effect size (f^2) was assessed to evaluate the contribution of each exogenous variable to the explained variance of the endogenous constructs. As shown in Table 6, the effect sizes ranged from 0.021 to 0.268, following Cohen's (1988) guidelines, where 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively. These results highlight the varying influence of the predictors across performance dimensions, reinforcing the complexity of the hypothesized relationships in the model. Predictive relevance (Q^2) was assessed using the PLS predict procedure, with values greater than zero suggesting meaningful predictive relevance. Our model achieved Q^2 values between 0.152 and 0.215, affirming its strong predictive capabilities. Moreover,

Table 3. Reliability and Validity of the measurement model.

Indicator	Mean	SD	FL	AVE	CR	VIF
First order						
(A) Tone from the Top (TFTT)				**0.661**	**0.854**	**1.307**
TFTT1	4.28	0.733	0.797			
TFTT2	4.16	0.697	0.831			
TFTT3	4.17	0.703	0.810			
(B) Accountability (ACC)				**0.588**	**0.809**	**1.322**
ACC1	4.15	0.688	0.834			
ACC2	4.10	0.750	0.777			
ACC3	4.11	0.699	0.682			
(C) Effective Communication (EFFC)				**0.607**	**0.822**	**1.340**
EFFC1	3.94	0.893	0.728			
EFFC2	4.09	0.754	0.842			
EFFC3	3.91	0.797	0.762			
(D) Incentives (INC)				**0.640**	**0.842**	**1.227**
INC1	4.24	0.652	0.788			
INC2	4.11	0.716	0.839			
INC3	4.15	0.705	0.770			
(E) Product Innovation (PRODIN)				**0.598**	**0.816**	**1.471**
PRODIN1	4.11	0.721	0.761			
PRODIN2	4.13	0.669	0.782			
PRODIN3	4.24	0.564	0.738			
(F) Process Innovation (PROCIN)				**0.672**	**0.860**	**1.446**
PROCIN1	4.24	0.646	0.823			
PROCIN2	4.26	0.594	0.845			
PROCIN3	4.27	0.604	0.790			
(G) Customer-based Performance (CBP)				**0.582**	**0.807**	**Endogenous**
CBP1		4.39	0.551	0.709		
CBP2		4.40	0.595	0.782		
CBP3		4.31	0.580	0.796		
(H) Internal Business Process (IBP)				**0.567**	**0.839**	**Endogenous**
IBP2		4.11	0.660	0.690		
IBP3		4.15	0.697	0.767		
IBP4		4.34	0.552	0.757		
IBP5		4.32	0.603	0.794		
(I) Learning and Growth (LGP)				**0.576**	**0.802**	**Endogenous**
LGP1		4.05	0.813	0.829		
LGP2		4.31	0.682	0.707		
LGP3		4.08	0.798	0.735		
Second order						
(J) Firm Innovation (FIN)				**0.749**	**0.806**	**1.255**
PRODIN	4.1580	0.50534	0.845			
PROCIN	4.2563	0.50359	0.886			

Note: SD = Standard deviation; FL = Factor loading; AVE = Average variance extracted; CR = Composite reliability, VIF = variance inflation factor.

The bold values in Table 3 highlight that AVE (≥ 0.5) and CR (≥ 0.7) meet recommended thresholds for convergent validity and reliability, and that VIF values (< 5) confirm absence of multicollinearity.

the VIF values confirmed the absence of collinearity concerns, all well below the threshold, ensuring no vertical or lateral collinearity in our model assessments.

5.3. Hypothesis testing and empirical findings

In the third phase of our analysis, we employed the bootstrapping method (5,000 subsamples) to test the study's hypotheses. The analysis assessed the significance and direction of the structural path coefficients, using 95% bias-corrected confidence intervals (BCa CI). A significance threshold of $p < 0.05$ was adopted. Tables 6 and 7 present the results of the direct and indirect effects, respectively.

Table 4. Assessment of discriminant validity using the HTMT.

Construct	1	2	3	4	5	6	7	8	9	Saturated model
TFTT										
ACC	0.537									
EFFC	0.568	0.568								
INC	0.389	0.497	0.480							
PRODIN	0.105	0.185	0.209	0.628						
PROCIN	0.127	0.202	0.320	0.550	0.703					
CBP	0.265	0.414	0.328	0.553	0.469	0.527				
IBP	0.252	0.541	0.400	0.554	0.513	0.537	0.769			
LGP	0.510	0.392	0.568	0.460	0.331	0.447	0.392	0.633		
SRMR										0.070
d_{ULS}										1.992
d_G										0.640

Table 5. Structural model assessment.

Construct	R^2	Adj. R^2	Q^2	VIF
Risk Culture (RC)	–	–	–	1.336[1]
Firm Innovation (FIN)	0.212	0.208	0.193	1.000
Customer-based Performance (CBP)	0.225	0.219	0.152	1.268
Internal Business Process (IBP)	0.304	0.298	0.215	1.268
Learning and Growth (LGP)	0.222	0.216	0.184	1.268

[1]VIF for RC reflects outer model collinearity among formative indicators, not structural model multicollinearity.

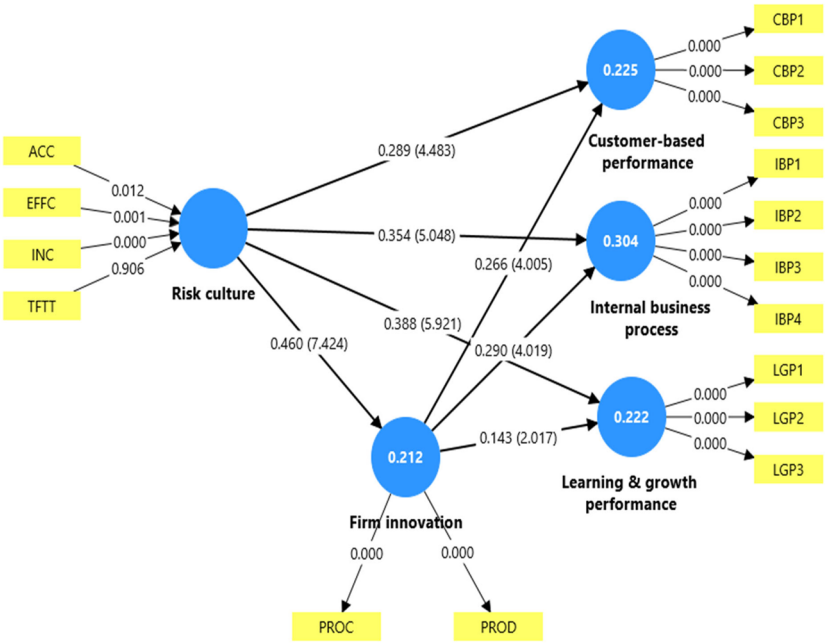

Figure 2. Structural model results.

Notably, the relationships between risk culture and the three dimensions of non-financial performance - customer-based performance ($\beta = 0.289$, $p < 0.001$), internal business processes ($\beta = 0.354$, $p < 0.001$), and learning and growth ($\beta = 0.388$, $p < 0.001$) - were statistically significant, supporting hypotheses H1a, H1b, and H1c. Similarly, risk culture had a strong positive effect

Table 6. Testing of hypotheses (direct effect).

Structural path	Coef (β)	t-Statistics	Effect size (f^2)	*p*-value @ <0.05	Decisions
RC → CBP	0.289	4.483	0.085	0.000	H1a supported
RC → IBP	0.354	5.048	0.142	0.000	H1b supported
RC → LGP	0.388	5.921	0.153	0.000	H1c supported
RC → FIN	0.460	7.424	0.268	0.000	H2 supported
FIN → CBP	0.266	4.005	0.072	0.000	H3a supported
FIN → IBP	0.290	4.019	0.095	0.000	H3b supported
FIN → LGP	0.143	2.017	0.021	0.044	H3c marginal

Table 7. Testing of hypotheses (indirect effect).

Structural path	Coef (β)	t-Statistics	*p*-value @ <0.05	Decisions
RC → FIN → CBP	0.122	3.360	0.001	H4a supported
RC → FIN → IBP	0.133	3.368	0.001	H4b supported
RC → FIN → LGP	0.066	1.892	0.059	H4c not supported

on innovation ($\beta = 0.460$, $p < 0.001$), confirming H2. The results also showed significant positive effects of innovation on customer-based performance ($\beta = 0.266$, $p < 0.001$) and internal business processes ($\beta = 0.290$, $p < 0.001$), supporting H3a and H3b. However, the relationship between innovation and learning and growth was only marginally significant ($\beta = 0.143$, $p = 0.044$), providing limited support for H3c.

We further tested the mediating role of innovation in the relationship between risk culture and non-financial performance. As shown in Table 7, innovation significantly mediated the relationships between risk culture and both customer-based performance ($\beta = 0.122$, $p = 0.001$) and internal business processes ($\beta = 0.133$, $p = 0.001$), supporting hypotheses H4a and H4b. The mediating effect of innovation on the relationship between risk culture and learning and growth ($\beta = 0.066$, $p = 0.059$) was not statistically significant, thus H4c was not supported. These findings offer robust empirical support for the conceptual model, highlighting both the direct and indirect pathways through which risk culture contributes to firm performance in emerging market insurance firms.

To ensure the robustness of the findings, three sensitivity tests were conducted: (1) sequentially omitting one latent construct at a time, (2) subgroup analyses based on organizational type (e.g. national vs. multinational firms), and (3) re-estimating the model with increased bootstrapping resamples (from 5,000 to 10,000). Across all tests, the core relationships remained consistent in both significance and direction. This reinforces confidence in the stability and reliability of the model estimates. Detailed outputs and model diagnostics are presented in Appendix C.

6. Discussion and implications

Guided by RBT and DCT, this study explored how organizational risk culture influences non-financial performance in Nigerian insurance firms, with a particular focus on the mediating role of innovation. The results, based on survey data from 251 employees, demonstrate that risk culture significantly shapes non-financial performance outcomes through leadership, accountability, and effective communication.

Consistent with the literature (Kpodo and Agyekum 2015; Sheedy and Griffin 2018), our results reaffirm the pivotal role of risk culture in shaping long-term organizational outcomes, extending beyond mere financial metrics. Notably, risk culture demonstrated a pronounced impact on learning and growth, surpassing its influence on other non-financial performance dimensions. This suggests that a robust risk culture not only supports operational efficiency

but also fosters an environment conducive to employee development and continuous innovation (Berry-Stölzle and Xu 2018). Such findings challenge prior research that predominantly focused on financial outcomes, highlighting the broader benefits of a well-developed risk culture (Power, Ashby, and Palermo 2013; Silwal 2022).

Contrary to concerns in the literature that strong risk culture may stifle innovation by promoting excessive caution (Nocco and Stulz 2006), our evidence suggests that, when properly embedded, risk culture can facilitate firm innovation. This supports RBT's assertion that organizational culture is a critical resource for competitive advantage (Lukovszki, Rideg, and Sipos 2021). This finding also challenges the assumption that risk-averse behaviors necessarily hinder innovation (Torrance 2016), by demonstrating that a well-managed risk culture can enable it.

Firm innovation was found to positively influence key dimensions of non-financial performance, specifically customer satisfaction and internal business processes. However, the effect of innovation on learning and growth was only marginally significant ($p = 0.044$), just below the conventional threshold for statistical significance, indicating a weak or potentially delayed relationship. This finding may reflect the time lag often required for innovation to influence learning-related outcomes (Nybakk 2012; Herstad and Sandven 2020), highlighting the complexity and dimension-specific nature of innovation's impact on organizational performance.

Importantly, innovation was found to mediate the effects of risk culture on customer satisfaction and internal business processes, consistent with RBT's emphasis on leveraging internal resources through innovative practices (García-Granero et al. 2015). However, the absence of a mediating effect for learning and growth suggests that some benefits of a strong risk culture on employee development may occur independently of innovation, highlighting the importance of context-specific management strategies.

Overall, these findings contribute to RBT and DCT by illustrating that risk culture can serve as both a strategic resource and a dynamic capability, enabling innovation and multidimensional performance in emerging market settings. The nuanced and sometimes delayed effects observed reinforce the value of adopting differentiated approaches to managing risk culture and innovation across various performance domains.

6.1. Theoretical implications

This study's exploration of the interplay between risk culture, innovation, and non-financial performance within Nigerian insurance firms provides novel theoretical insights, particularly through the lenses of RBT and DCT. These findings significantly enrich the discourse on innovation and risk management, especially within emerging economies. Our paper makes three main contributions to the existing research.

First, the existing literature primarily emphasizes financial outcomes when discussing risk culture and organizational performance (Carretta, Fiordelisi, and Schwizer 2017). In contrast, this study demonstrates that risk culture is not only a critical intangible asset but significantly enhances non-financial performance. Consistent with RBT, which emphasizes internal intangible resources as essential for sustained competitive advantage (Naor et al. 2014; Priem and Butler 2001), our findings emphasize the strategic value of cultivating a robust risk culture. Such a culture not only contributes to operational efficiency but also promotes sustainability by enhancing long-term organizational outcomes such as customer satisfaction, internal process efficiency, and employee development (Berry-Stölzle and Xu 2018). Conversely, the results imply that a weak risk culture, characterized by excessive control and risk aversion, could limit innovation, leading to stagnation (Sheedy and Griffin 2018).

Second, while existing research extensively explores direct relationships between either risk culture and performance or innovation and performance separately (Bui, Fang, and Lin 2018; Hael, Belhaj, and Zhang 2024; Hogan and Coote 2014; Owusu and Gupta 2024), fewer studies

have integrated these constructs within a single model. By analyzing innovation as a mediator, this study uniquely bridges these traditionally isolated research streams, providing deeper insights into their dynamic interdependencies. In doing so, it explicitly engages DCT, highlighting how risk culture acts not merely as a static resource but as a dynamic capability that enables firms to sense opportunities for innovation, seize them effectively, and continuously reconfigure organizational practices to enhance non-financial performance.

Third, adopting a multidimensional approach to non-financial performance - specifically, examining customer-based outcomes, internal business processes, and learning and growth - offers nuanced theoretical contributions. Previous literature highlights the value of multidimensional performance frameworks in capturing the complexity of organizational outcomes beyond financial metrics (Ittner and Larcker 2003; Kaplan and Norton 1996). Recent research also emphasizes the importance of evaluating how organizational resources and capabilities influence different aspects of performance, particularly in service-oriented and knowledge-intensive contexts (Berry-Stölzle and Xu 2018; Naor et al. 2014; Wilderom, Glunk, and Maslowski 2000). Our findings reveal differential effects of risk culture and innovation across these performance dimensions, emphasizing the importance of accounting for varied organizational dynamics. This granularity advances theoretical understanding by illustrating how organizational resources and capabilities (RBT and DCT perspectives) interact differently with diverse facets of firm performance.

Finally, this study enriches our understanding of how organizations leverage risk perception to foster innovation. Aligning with Rippl's (2002) argument that risk perception significantly shapes organizational decision-making, our findings extend this by showing that a balanced and well-managed risk culture enhances employees' engagement in innovative activities, thus driving sustained non-financial performance improvements. Firms that strategically cultivate such balanced perceptions of risk are better positioned to foster innovation, leading to sustained competitive advantage in dynamic market environments.

6.2. Managerial implications

This study emphasizes the crucial role of cultivating a robust risk culture to enhance non-financial performance, highlighting the need for targeted strategic interventions. Establishing a strong risk culture notably strengthens customer satisfaction, internal business efficiency, and organizational learning and growth. Managers should prioritize accountability at all organizational levels, ensuring that employee actions align clearly with corporate objectives, thus enhancing service quality and operational excellence. Embedding whistleblowing mechanisms can effectively mitigate risks while reinforcing an ethical work environment, aligning with best practices in risk management frameworks such as ISO 31000.

Aligning the organizational understanding of risk consistently across all levels is essential. A cohesive approach to risk management encourages calculated risk-taking and promotes innovation, both fundamental for continuous improvement and enhanced customer experiences. This aligns with the findings of Sheedy and Griffin (2018), who emphasize the importance of a shared risk culture in fostering innovation. Therefore, managers must actively foster an organizational climate that values diverse perspectives and supports constructive dissent, essential for driving innovative initiatives. Compensation structures should reflect the organization's values and risk culture, providing incentives that promote behaviors aligned with strategic goals. Structuring performance metrics around responsible risk-taking and innovative outcomes can motivate employees, thereby enhancing overall organizational performance and competitive advantage.

Leveraging past experiences as tools for organizational learning is another important strategy. Reflecting systematically on past successes and failures and benchmarking these experiences

against industry standards can help firms refine their risk management practices and innovation capabilities. Such reflective practice reinforces risk culture and enhances a firm's agility and capacity to seize emerging opportunities, contributing significantly to sustainable competitive advantage. This approach resonates with the principles of DCT, which emphasizes the importance of learning and adaptation in rapidly changing environments (Teece 2007).

Importantly, the findings highlight that the interplay between risk culture and innovation may differ based on organizational contexts - specifically, between multinational and national firms. Managers in multinational firms should recognize the pronounced influence of innovation on learning and growth outcomes, indicating that global operational complexity may require a heightened focus on innovation strategies to fully capture employee development benefits. Conversely, managers in national firms should prioritize leveraging innovation initiatives to enhance customer satisfaction, given the stronger observed link between innovation and customer-based performance in this subgroup. These insights extend the work of Berry-Stölzle and Xu (2018), who discuss the varying impacts of risk management practices across different organizational settings.

Finally, understanding these nuanced effects of risk culture and innovation on distinct dimensions of non-financial performance enables managers to strategically tailor interventions. Since innovation mediates the relationship between risk culture and certain performance outcomes (customer satisfaction and internal processes) but not others (learning and growth), managers must judiciously align their innovation strategies with organizational risk perceptions to optimize overall performance across all critical dimensions.

7. Conclusion, limitations, and future research

This research significantly advances the understanding of the intricate relationships among organizational risk culture, innovation, and non-financial performance. Drawing from survey data within the Nigerian insurance sector and employing PLS-SEM, the study confirms that a robust organizational risk culture positively influences three critical dimensions of non-financial performance: customer-based outcomes, internal business processes, and learning and growth. These findings extend existing literature (Berry-Stölzle and Xu 2018; Carretta, Fiordelisi, and Schwizer 2017) by providing empirical evidence that risk culture is not merely an intangible asset but a critical driver of sustained non-financial success.

The study further elucidates innovation's pivotal mediating role, specifically between risk culture and both customer-based performance and internal business processes. However, innovation's mediation between risk culture and learning and growth was not statistically significant, suggesting that the influence of risk culture on employee development might operate independently of innovative activities. This nuanced finding highlights the complexity of how innovation translates risk-oriented cultures into diverse performance outcomes, contributing novel insights to the literature on organizational innovation (García-Granero et al. 2015; Lukovszki, Rideg, and Sipos 2021). These insights emphasize the value of cultivating a robust risk culture, which can independently enhance critical organizational outcomes even in scenarios with limited innovation activities. Consequently, firms aiming for sustainable competitive advantage should prioritize embedding a proactive risk management culture to leverage its inherent benefits fully.

Despite these contributions, the study has several limitations. First, the cross-sectional nature of the data restricts definitive assertions about causality. While the analysis provides strong support for the hypothesized relationships, future research employing longitudinal designs could offer deeper insights into the temporal dynamics between risk culture, innovation, and firm performance. Second, while the Nigerian insurance industry provides a valuable empirical context, the findings' generalizability across different geographical and cultural contexts remains

limited. Replicating this study in diverse sectors and cultural settings would validate the broader applicability of the conclusions and provide comparative insights into industry-specific variations in risk management practices and innovation.

Future studies could also enhance robustness by utilizing larger samples or adopting mixed method approaches to enrich data quality and contextual depth. Additionally, exploring the influences of leadership styles, strategic decision-making, and employee behaviors could further illuminate mechanisms through which organizations cultivate and maintain effective risk cultures. Such research would not only enrich theoretical understanding but also offer tangible managerial guidance on adapting risk cultures amid evolving organizational and market dynamics.

Disclosure statement

No potential conflict of interest was reported by the authors.

Data availability statement

The dataset supporting the conclusions of this article is available in the University of Dundee Repository.

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Appendices

Appendix A: Sampling and firm selection procedure

To select a representative sample of Nigerian insurance firms, a stratified random sampling approach was employed. Based on geographical location within Lagos State, 58 firms licensed by the National Insurance Commission (NAICOM) were categorized into three strata: Victoria Island (VID), Lagos Island (LID), and Lagos Mainland (LMD). Firm distribution and selection are shown below.

Stratum	No. of firms in stratum	Sampling fraction	Firms selected	Notes
Victoria Island	19	52.6%	10	Randomly selected
Lagos Island	14	50.0%	7	Randomly selected
Lagos Mainland	19	52.6%	10	Randomly selected
Total	58	–	27	Stratified by location

Firms within each stratum were assigned unique identifiers and randomly drawn without replacement. Firms were included only if they had:

- ≥50 employees
- Active operations (not suspended or merging)

Full organizational coverage was ensured by selecting 30 employees per firm, spanning departments such as underwriting, marketing, finance, and claims, and roles from top management to frontline staff. This process ensured representative and diverse insights into organizational risk culture.

Appendix B: Questionnaire

Please complete the questions below by circling one of the options, using this scale:

1	2	3	4	5
Strongly disagree	Disagree	Undecided	Agree	Strongly agree

Risk culture assessment	
Tone from the top	
(1) Management provides a clear sense of direction in relation to risk management	1-2-3-4-5
(2) Management promotes a sound risk-taking behavior through their action	1-2-3-4-5
(3) Our company learn from the risk experience of other firms	1-2-3-4-5
Accountability:	
(1) Employees are disciplined for exceeding risk limit, despite high revenue generation	1-2-3-4-5
(2) The risk to which my business unit is exposed are assessed on regularly	1-2-3-4-5
(3) Risk information is widely shared with other teams	1-2-3-4-5
Effective challenge:	
(1) Sufficient effort is made to get the opinions of employees in relation to risk relation to risk management	1-2-3-4-5
(2) Our company's risk management professionals have appropriate levels of influence on strategic decisions	1-2-3-4-5
(3) Our company has a culture that support constructive dissent	1-2-3-4-5
Incentives:	
(1) Compensation is linked to employees risk-taking behavior	1-2-3-4-5
(2) My company's performance metrics consistently and drive sound risk-taking behaviors	1-2-3-4-5
(3) Employees performance appraisal includes adherence to risk management policies	1-2-3-4-5
Non-financial performance	
Customer performance:	
(1) Most of our customers are through referral	1-2-3-4-5
(2) Our customers always renew their contracts with us at expiration	1-2-3-4-5
(3) Our company respond to and resolve customers' complaints on time	1-2-3-4-5
Internal business process performance:	
(1) Information is readily available with automated systems to help handle customer inquiries satisfactorily during first call	1-2-3-4-5
(2) Customer transactions are processed promptly	1-2-3-4-5
(3) Our underwriters assess risks within a good time frame	1-2-3-4-5
(4) Our company constantly invests in new initiative to drive business operations	1-2-3-4-5
(5) Our company has minimal underwriting error	1-2-3-4-5

Learning & growth performance:	
(1) Our employees' turnover rate is low compared to the last 3 years	1-2-3-4-5
(2) Our employees receive constant training	1-2-3-4-5
(3) There is prospect for growth in our company	1-2-3-4-5
Firm innovation	
Product innovation:	
(1) We often add significantly improved products to our existing ranges	1-2-3-4-5
(2) We develop products that meet the needs of consumers than any other product currently available	1-2-3-4-5
(3) We often introduce new range of product not previously offered by our company	1-2-3-4-5
Process innovation:	
(1) Our company has significantly improved methods of rendering services to customers compared to the last 3 years	1-2-3-4-5
(2) Our company has new methods of rendering services to customers compared to the last 3 years	1-2-3-4-5
(3) Leveraging technology, our company's new product development process is efficient	1-2-3-4-5

Appendix C: Sensitivity tests

Sensitivity analysis 1 – model robustness when omitting one construct at a time

To assess the robustness of our PLS-SEM results, we conducted a sensitivity analysis by sequentially omitting each major construct from the structural model and observing the resulting changes in path coefficients and explanatory power (R^2). The table below summarizes the key findings, indicating that the core relationships remain stable, with notable shifts only when the mediator (FIN) is omitted, thereby confirming its central role.

Model variant	Removed construct	R^2 (CBP)	R^2 (IBP)	R^2 (LGP)	R^2 (FIN)	Significant paths retained	Notable changes in path coefficients	Interpretation
Full Model (Baseline)	None	0.225	0.304	0.222	0.212	RC→CBP, RC→IBP, RC→LGP, RC→FIN, FIN→CBP, FIN→IBP, FIN→LGP, RC→FIN→CBP, RC→FIN→IBP	N/A	Reference model
Model 1	CBP	–	0.301	0.226	0.212	RC→IBP, RC→LGP, RC→FIN, FIN→IBP, FIN→LGP, RC→FIN→IBP	Slight increase in RC→IBP (from 0.354 to 0.394), slight decrease in RC→LGP (from 0.388 to 0.350), FIN→LGP is still marginally significant ($\beta = 0.140$, $p = 0.049$)	Model remains robust. The IBP path strengthened slightly.
Model 2	IBP	0.220	–	0.225	0.219	RC→CBP, RC→LGP, RC→FIN, FIN→CBP, FIN→LGP, RC→FIN→CBP,	RC→LGP slightly decreases (from 0.388 to 0.350), FIN→LGP is marginal ($\beta = 0.137$, $p = 0.049$).	Model remains stable. Omission of IBP does not substantially weaken key relationships.

(continued)

Model variant	Removed construct	R^2 (CBP)	R^2 (IBP)	R^2 (LGP)	R^2 (FIN)	Significant paths retained	Notable changes in path coefficients	Interpretation
Model 3	LGP	0.222	0.299	–	0.229	RC→CBP, RC→IBP, RC→FIN, FIN→CBP, FIN→IBP, RC→FIN→CBP, RC→FIN→IBP	RC→IBP slightly decreases (0.354→0.351), RC→CBP decreases (0.289→0.286), FIN→IBP decreases (0.290→0.284). RC→FIN→CBP (β = 0.126, p = 0.001), RC→FIN→IBP (β = 0.136, p = 0.001)	Main findings are stable; minimal changes in path coefficients and indirect effects.
Model 4	FIN	0.165	0.241	0.224	–	RC → CBP, RC → IBP, RC → LGP	RC→CBP increases (0.289→0.407); RC→IBP increases (0.354→0.491); RC→LGP increases (0.388→0.473); all indirect/ mediation effects removed	Model shifts to full direct effects; R^2 for performance outcomes decrease notably, and mediation paths are absent. Confirms FIN's role as a mediator in the baseline model.

Sensitivity analysis 2 – subgroup robustness: multinational vs. national firms

To assess the stability of our findings, a subgroup analysis was conducted by splitting the sample into multinational and national firms. The majority of direct and mediating effects remained statistically significant and in the expected direction across both groups, reinforcing the robustness of the model. Notably, the effects of risk culture on key performance outcomes (CBP, IBP, LGP) and firm innovation were consistently significant in both groups.

Some differences were observed: for nationals, the impact of innovation on customer-based performance was strong and significant, while for multinationals, it was not significant. Conversely, innovation's effect on learning and growth was only significant among multinational firms. The mediating role of innovation (RC → FIN → performance) also varied slightly, but core relationships persisted.

These variations reflect the nuanced ways risk culture and innovation interact in different organizational contexts, rather than a weakness in the model. Overall, the structural relationships are stable, indicating the findings are robust to organizational type.

Pathway	Coefficient (multinational)	p-value (multinational)	Coefficient (national)	p-value (national)	Interpretation
FIN → CBP	0.147	0.135	0.353	0.000	Significant only in nationals
FIN → IBP	0.251	0.012	0.308	0.002	Significant in both, higher for nationals
FIN → LGP	0.281	0.012	–0.003	0.971	Only significant for multinationals
RC → CBP	0.331	0.002	0.276	0.001	Significant in both, comparable effect sizes
RC → FIN	0.414	0.000	0.457	0.000	Significant in both groups
RC → IBP	0.349	0.000	0.395	0.000	Significant in both, stronger for nationals
RC → LGP	0.313	0.000	0.561	0.000	Significant in both, much stronger for nationals
RC → FIN → CBP	0.061	0.192	0.161	0.002	Only significant in nationals

(continued)

Pathway	Coefficient (multinational)	*p*-value (multinational)	Coefficient (national)	*p*-value (national)	Interpretation
RC → FIN → IBP	0.104	0.031	0.141	0.016	Significant in both, higher for nationals
RC → FIN → LGP	0.116	0.043	–0.002	0.972	Only significant for multinationals

Sensitivity analysis 3 - robustness to bootstrapping resamples

To evaluate the robustness of our PLS-SEM estimates, we increased the number of bootstraps resamples from 5,000 to 10,000. Across both specifications, the path coefficients and significance levels remained virtually unchanged. All key direct and indirect relationships were stable, with no substantive changes in coefficient magnitude or significance. This confirms that the findings are not sensitive to the number of bootstraps resamples and reinforces the reliability of the model's structural estimates.

Appendix Table C1. Path coefficients and significance.

Pathway	Main model (5,000)	Bootstrapped (10,000)	Interpretation
FIN → CBP	0.266 (0.000)	0.266 (0.000)	Stable and significant
FIN → IBP	0.290 (0.000)	0.290 (0.000)	Stable and significant
FIN → LGP	0.143 (0.045)	0.143 (0.045)	Marginal; stable across resamples
RC → CBP	0.289 (0.000)	0.289 (0.000)	Stable and significant
RC → FIN	0.460 (0.000)	0.460 (0.000)	Stable and significant
RC → IBP	0.354 (0.000)	0.354 (0.000)	Stable and significant
RC → LGP	0.388 (0.000)	0.388 (0.000)	Stable and significant
RC → FIN → CBP	0.122 (0.001)	0.122 (0.001)	Stable and significant
RC → FIN → IBP	0.133 (0.001)	0.133 (0.001)	Stable and significant
RC → FIN → LGP	0.066 (0.058)	0.066 (0.058)	Remains marginal, not statistically significant