“Enterprise risk management and firm performance: Exploring the roles of knowledge, technology, and supply chain”

AUTHORS	Le Vinh Quang Nguyen Ngoc-Long Pham Xuan Giang

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Le Vinh Quang (Vietnam), **Nguyen Ngoc-Long** (Vietnam), **Pham Xuan Giang** (Vietnam)

ENTERPRISE RISK MANAGEMENT AND FIRM PERFORMANCE: EXPLORING THE ROLES OF KNOWLEDGE, TECHNOLOGY, AND SUPPLY CHAIN

Abstract

Risk management has become crucial for organizations in the current era. Therefore, this study assesses the impact of Enterprise Risk Management (ERM) on an organization's performance and examines how knowledge management and technology adoption mediate this impact, along with the moderating effect of supply chain resilience based on the resource-based view and dynamic capabilities theory. Utilizing a questionnaire-based survey, data were collected from 297 respondents in Ho Chi Minh City, Binh Duong, and Dong Nai, Vietnam, by cluster random sampling. The data were statistically analyzed using the partial least squares method. The results indicated a positive effect of ERM on financial performance, while the association with non-financial performance lacked significance. Knowledge management and technology adoption fully mediated the positive impact of ERM on non-financial performance and partially mediated its relationship with financial performance. Furthermore, supply chain resilience strengthened the positive link between ERM and financial performance. In conclusion, these findings contribute to advancing the comprehension of the mechanisms and dynamics involved in knowledge management and technology adoption as mediators and supply chain resilience as a moderator, regarding an emerging country. The study enriches the risk management literature and significantly contributes to enhancing firm effectiveness.

Keywords enterprise risk management, firm performance, knowledge management, technology adoption, supply chain management, Vietnam

JEL Classification M10, O30

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Le Vinh Quang, Ph.D. Student, Department of Business Administration, Faculty of Business Administration, Industrial University of Ho Chi Minh City, Vietnam.

Nguyen Ngoc-Long, Dr., Vice Dean, Department of Business Administration, Faculty of Business Administration, Industrial University of Ho Chi Minh City, Vietnam. (Corresponding author)

Pham Xuan Giang, Associate Professor, Department of Business Administration, Faculty of Business Administration, Industrial University of Ho Chi Minh City, Vietnam.

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INTRODUCTION

The modern business world faces challenges like rapid technology changes, global supply chain uncertainties, and the impact of macroeconomic events (Fierro Hernandez & Haddud, 2018; Lüscher & Lewis, 2008; Peker et al., 2022). These challenges, including both traditional and emerging risks, can negatively affect business performance and sustainability (Haywood, 2022). To tackle these issues, many companies are adopting ERM, a comprehensive system successfully applied across various industries and company sizes, positively impacting value, size, and profitability (Hoyt & Liebenberg, 2011). The use of ERM is on the rise, especially with a more assertive movement amid the COVID-19 crisis (Barbosa et al., 2022).

Unlike traditional risk management, which deals with risks in isolation, ERM offers a comprehensive framework that incorporates all risk management processes, considering risks and opportunities as integral parts of an organization's strategy (Hoyt & Liebenberg, 2011). According to the Committee of Sponsoring Organizations (COSO) of the Treadway Commission (COSO, 2004), "Enterprise risk manage-

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ment is a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives."

Debates on ERM have gained significant attention in recent years, attracting both researchers and practitioners seeking to explore its implications for organizational success (Choi et al., 2016). The current discussions in the ERM domain primarily revolve around two key issues: adoption and effectiveness, with a particular emphasis on understanding the relationship between ERM implementation and firm performance (Bromiley et al., 2015). While the majority of studies indicate a positive impact of ERM on firm performance, there are also studies reporting contrasting findings (Anton & Nucu, 2020). For instance, Otero González et al. (2020) found no significant relationship between the adoption of ERM and the performance of Spanish companies. Similarly, Khalil-Oliwa (2019) proved that the effectiveness of ERM implementation is constrained and does not consistently translate into financial outcomes and company value. Moreover, several studies argue against the direct enhancement of firm performance by ERM practices, suggesting that other factors may mediate and moderate these relationships (Al-Nimer et al., 2021). Despite these findings, there remains a gap in the research landscape as no study has examined the integrated role of knowledge management, technology adoption, and supply chain resilience in influencing the relationship between ERM and firm performance. To address the aforementioned research gap, this study has two primary objectives. Firstly, it aims to examine the influence of ERM on firm performance. Secondly, it seeks to explore the importance of knowledge management, technology adoption, and supply chain resilience in influencing the relationship between ERM and firm performance. This research's theoretical model is developed by employing the resource-based view (Barney, 1991) and dynamic capabilities theory (Teece et al., 1997) to develop a theoretical framework that can benefit organizations improve their performance by focusing on four factors: ERM, knowledge management, technology adoption, and supply chain resilience.

This study is expected to provide novel insights into how knowledge management, technology adoption, and supply chain resilience impact the relationship between ERM and company performance, crucial for improving corporate outcomes in Vietnam.

1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

With corporations confronting a larger range of risks in recent decades as a result of globalization, industrial consolidation, and deregulation, ERM has emerged as a coping mechanism for the expectations imposed on organizations to manage effectively (Lundqvist, 2014). ERM is gradually gaining attention among businesses and organizations all around the world (Saeidi et al., 2019). Expecting a positive impact on overall firm performance, most research has explored how implementing ERM influences business effectiveness, spanning various business sizes, countries, and industries. Empirical studies on ERM's impact on company performance yield varied results, but most researchers emphasize a positive effect (Otero González et al., 2020).

Numerous studies have begun to examine ERM and firm performance association (Florio & Leoni, 2017; Malik et al., 2020; Otero González et al., 2020; Saeidi et al., 2021; Syrová & Špička, 2023). The majority of these studies focus on financial performance. Syrová and Špička (2023) proved that ERM also assists in transforming the negative impact of foreign capital on the financial performance of SMEs into a positive impact. It was discovered that there is not only a positive and substantial association between ERM and company financial success but also a positive and significant relationship between ERM and non-financial performance (Saeidi et al., 2021). Malik et al. (2020) found that effective ERM practices improved

company performance, as measured by Tobin's Q, consistent with the findings of Florio and Leoni (2017), Gordon et al. (2009), and Liebenberg and Hoyt (2003) regarding the performance impact of ERM deployment. In contrast, a study by Otero González et al.(2020) showed that the use of ERM has no effect on the performance of Spanish enterprises (as evaluated by return on equity, return on assets, and Tobin's Q), nor does it lessen the likelihood of bankruptcy. Therefore, the study proposes to investigate the positive impact of ERM on financial and non-financial performance.

Several studies have been conducted to investigate the indirect effects of ERM on company performance. These studies look at the mediating roles of competitive advantage (Yang et al., 2018), business model innovation (Al-Nimer et al., 2021), investment decisions (Faisal et al., 2021), organizational culture, and strategic risk performance (Syrová & Špička, 2023). Furthermore, moderating roles were also addressed such as intellectual capital dimensions (Saeidi et al., 2021) and financial literacy (Yang et al., 2018). However, no study has examined the indirect effects of knowledge management, technology adoption, and supply chain resilience.

Knowledge management (KM) is a structured and purposeful process of collecting, updating, and using information to make a business more effective and get the most value from what it knows (Rodriguez & Edwards, 2014). Heisig (2009) claimed Knowledge management involves sharing, generating, utilizing, retaining, identifying, and obtaining knowledge, and sharing of knowledge is the key process. The information management system carries risks that can hinder organizations from fully benefiting from its practices, methods, and tools (Oliva & Kotabe, 2019). ERM helps to integrate risk management into all aspects of the organization, including decision-making and business processes (Anton & Nucu, 2020), which can help ensure that relevant knowledge and information are captured and used consistently and effectively. Enhanced information systems improve knowledge management across various stages but pose security challenges and risks (Belsis et al., 2005). With more informed ERM practices, businesses can better handle cybersecurity and privacy risks, minimizing harms while promoting innovation and value (Romanosky & Petrun-Sayers, 2023). It raises the question of whether there is a positive relationship between ERM and knowledge management.

Technology adoption refers to successfully implementing and utilizing technology within an organization. Modern businesses confront both traditional and technological risks (Amraoui et al., 2019). The adoption of technology is risky, with associated risks, including obsolescence, self-cannibalization, and high switching costs (Dos Santos Paulino, 2014). ERM classifies and manages various types of risks, including additional risks related to the application of technology required in today's business environment (Abrams et al., 2007). ERM is a useful preventative approach that helps control and achieve a company's goals, including managing technology strategically in line with the overall strategic plan (Arnaboldi & Lapsley, 2014; Wu et al., 2010). Sakrabani and Teoh (2021) showed that ERM has been implemented as a positive moderator of the influence of technology adoption on retailer performance. Therefore, ERM is implemented to ensure the achievement of the set objectives in which the objectives relate to the adoption of technology.

Effective knowledge management practices can help organizations capture, store, and disseminate knowledge, leading to improved decision-making, increased innovation, and enhanced organizational performance (Brauner & Becker, 2006). Rehman et al. (2022) stated that effective knowledge management is crucial in fostering organizational innovation by facilitating the creation of new knowledge-based products that provide substantial added value. The adoption and execution of knowledge management have a significant influence on financial and non-financial performance improvement (Chen et al., 2018; Sucahyo et al., 2016).

Amidst growing market competition, adopting innovative technologies offers companies a significant competitive advantage. Adopting suitable technology has helped firms differentiate from competitors by enhancing their relationships with suppliers and customers (Sundarakani et al., 2019). Lin et al. (2020) showed that the adoption of technical innovation improves firm performance in a

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business-to-business environment. Furthermore, in the hotel industry, adopting IT technology not only positively influences a hotel's long-term profitability but also significantly improves employee performance (Ezzaouia & Bulchand-Gidumal, 2023). Thus, effective knowledge management and technology adoption leads to a significant increase in an organization's performance.

This work relies on the resource-based view theory and dynamic capabilities theory to study the influence of ERM on knowledge management, technology adoption, and firm performance. The resource-based view theory focuses on examining the internal resources of a business as a source of competitive strength and differentiation from competitors (Barney, 1991). The ERM system is designed to identify, analyze, mitigate, and monitor internal and external risks at all levels to ensure the achievement of a company's strategic objectives (COSO, 2004). In the ERM and firm performance relationship, ERM is considered a strategic asset that has the potential to boost both company performance (Saeidi et al., 2019). The resource-based view theory provides answers to why businesses use knowledge management practices and why such techniques have an impact on performance (Yang, 2010). Technological adoption is vital to maintaining competitiveness and enhancing operational performance (Bag et al., 2022). Resource-based view theory can help analyze how internal resources, such as knowledge, technological capabilities, and risk management abilities, can create value and influence performance. According to dynamic capabilities theory, an organization's capacity to combine, develop, and reorganize internal and external competencies will provide it the ability to adapt quickly to changing environments (Teece et al., 1997). This theory aims to provide light on how dynamic skills, which can quickly adapt to changes in the internal and external environment, help to obtain a competitive edge (Kamukama & Sulait, 2017). ERM can be viewed as a dynamic capability, including the integration and coordination of resources and capabilities in order to recognize and respond to opportunities and risks in a changing environment (Nair et al., 2014). Sensing and scanning to discover new risks, assessment and evaluation to understand hazards and their potential effect, and coordination and communication to design and implement risk management strategies are needed for ERM (Bogodistov & Wohlgemuth, 2017).

Resilience is a supply chain's ability to adapt to unforeseen occurrences while keeping control over its structure and operations, allowing it to recover from interruptions and return to normal operation (Christopher & Peck, 2004). Numerous studies have explored the role of supply chain resilience as a moderator. Donadoni et al. (2018) investigated the moderating role of supply chain resilience in the relationship between product complexity, disruption, and performance. The findings confirmed that the capabilities of supply chain resilience moderate the adverse impact of disruptions on performance. However, no research to date investigates the moderating role of supply chain resilience in the ERM and firm performance relationship. Supply chain resilience is integrated with ERM practices, which identify, assess, and prioritize risks across all business areas, including supply chain risk management (Paul et al., 2020), thus enhancing overall resilience to potential disruptions. Dynamic capabilities can be viewed as the resilience capabilities of the organizations and their supply chains to overcome these turbulent changes (Chowdhury & Quaddus, 2017). This synergy moderates the relationship between ERM and firm performance, enhancing overall adaptive capacity and positively impacting financial and non-financial outcomes. Hence, it is reasonable to argue that Supply chain resilience moderates the relationship between ERM and Firm performance.

This study's purpose is to investigate the relationship between ERM and firm performance, considering the mediating effects of knowledge management and technology adoption and the moderating effect of supply chain resilience. Therefore, this study formulates the following hypotheses as per the hypothesized model in Figure 1.

H1: ERM has a positive impact on financial performance.

H2: ERM has a positive impact on non-financial performance.

H3: ERM has a positive impact on knowledge management.

Source: Compiled by the authors.

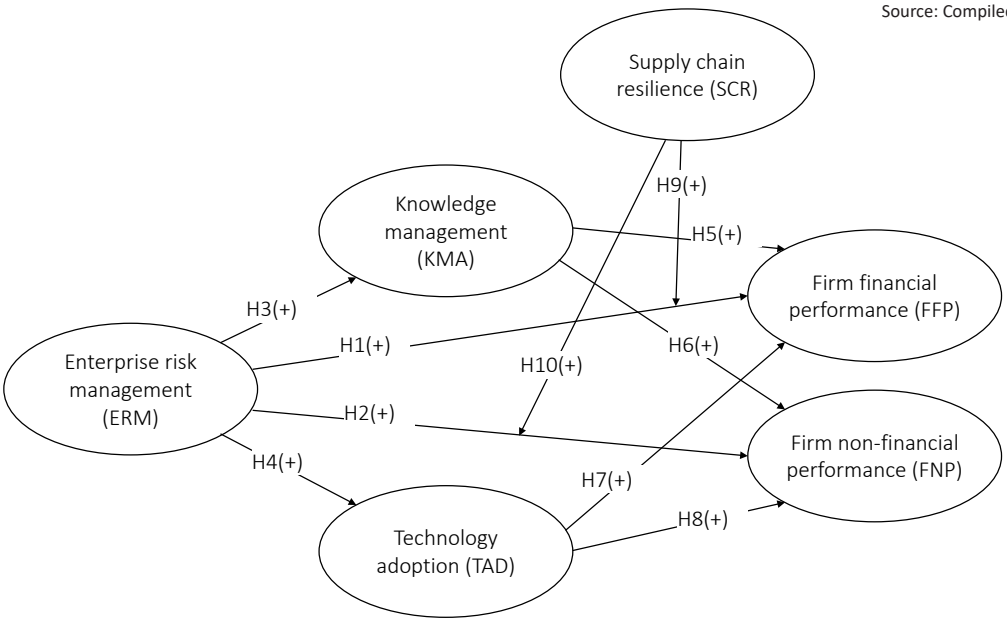

Figure 1. Hypothesized model

H4: ERM has a positive impact on technology adoption.

H5: Knowledge management has a positive impact on financial performance.

H6: Knowledge management has a positive impact on non-financial performance.

H7: Technology adoption has a positive impact on financial performance.

H8: Technology adoption has a positive impact on non-financial performance.

H9: The positive impact of ERM on financial performance is more robust for businesses with high supply chain resilience.

H10: The positive impact of ERM on non-financial performance is more robust for businesses with high supply chain resilience.

2. METHODOLOGY

This study utilized a survey design with questionnaires to test the proposed hypotheses, gathering data from companies in Binh Duong, Dong Nai, and Ho Chi Minh City, key industrial hubs in southern Vietnam. Collaboration with Eastern International University (Binh Duong) and the Industrial University of Ho Chi Minh City facilitated data collection from 297 respondents from over 200 participating companies, predominantly operating in service sectors such as healthcare, education, finance, and manufacturing, including furniture, textiles, electronics, and precision machining. As per the survey findings in Table 1, the respondent profile reflects a diverse range of ages, with over 60% falling under the age of 30, followed by nearly 27% aged between 30 and 40, and around 12% between 40 and 50 years old. Despite the majority having less than a decade of experience, many respondents hold critical roles such as executive staff, team leader, and department head in manufacturing, supply chain manager, and financial departments. Additionally, others with more than ten years of experience generally occupy company leadership roles such as managing director, chief technology officer, chief financial officer, and chief executive officer. Specifically, 66.6% of respondents hold executive staff positions, 21.6% hold team leader positions, 7.9% hold department head positions, and the remaining 3.9% occupy various company leadership roles. This diverse representation ensures a wealth of experience and expertise in risk management, technology management, and supply chain management within the context of dynamic business environments in Vietnam's most vibrant regions.

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Table 1. Demographic analysis of respondents

Source: Compiled by the authors.

Profile of samples		
	Frequency (*n*=297)	**Frequency (percent)**
Gender		
Male	171	57.58%
Female	124	41.75%
Others	2	0.67%
Total	297	**100%**
Ages (years old)		
Under 30	179	60.27%
From 30 to under 40	80	26.94%
From 40 to under 50	35	11.78%
From 50 to under 60	3	1.01%
Above 60	0	0.00%
Total	297	**100%**
Literacy		
Undergraduate	24	8.08%
Graduate	222	74.75%
Postgraduate	51	17.17%
Total	297	**100%**
Years working in the same fields		
Under 10 years	237	79.8%
From 10 to under 15 years	33	11.11%
From 15 to under 20 years	16	5.39%
Above 20 years	11	3.70%
Position occupied		
Executive staff	199	66.5%
Team leader	64	21.7%
Department head	23	7.9%
Company leader	11	3.9%
Total	297	**100%**

The items are measured using 5-point Likert scales ranging from "1" (strongly disagree) to "5" (strongly agree). Measurements adapted from prior work have been used to establish content validity. The ERM scale is composed of six components and was taken from Sax & Torp (2015). The scales for knowledge management, supply chain resilience, and technology adoption consist of five, four, and four items, respectively, adapted from the works of Rašula et al. (2012), Bahrami et al. (2022), and Guo et al. (2017), respectively. Furthermore, the scales for financial and non-financial performance, encompassing five and four items, respectively, are adapted from Anwar and Shah (2021).

The two-step modeling process by Anderson and Gerbing (1988) was employed in this study. First, a measurement model was established to conduct confirmatory factor analysis. Reliability and validity tests assess the model's reliability and validity. Then, a structural model was evaluated via path analysis to confirm hypotheses. Data analysis was conducted using the partial least squares structural equation model (PLS-SEM). PLS-SEM was developed by Herman Wold and other researchers (Lohmöller, 2013). Initially designed to address least-squares regression problems, it has since been widely adopted in economics, social sciences, and biology by researchers (Vinzi et al., 2010).

The research model was checked by using the dataset of 297 employees as described in the data collection and samples section above. The data processing and statistical analysis were conducted using Smart PLS 4.0 software. Evaluation of measurement models included the use of Cronbach's alpha (α), average variance extracted (AVE), and composite reliability (CR). PLS-SEM can handle multiple independent variables, even with multicollinearity. Partial Least Squares (PLS) serves as a regression model by generating a group of independent factors to predict one or more dependent variables, or it can be used as a path model to relate a set of independent variables to multiple dependent variables. It can also be used as a tool for dimension reduction by creating a smaller group of uncorrelated variables from a larger group of correlated variables (Hair Jr et al., 2013).

3. RESULTS

Reliability and validity were assessed using Smart PLS 4.0. Outer loadings should be above the common threshold of 0.70 (Hair et al., 2017). The outside loadings of each indicator vary between 0.719 and 0.904, as shown in Table 2.

The reliability of the measurement scale in Smart PLS is assessed using Cronbach's Alpha (α) and Composite Reliability (CR). CR is more suitable for PLS-SEM analysis than the conventional Cronbach's technique. However, it is advisable to consider and report both criteria. CR and α values above 0.6 are acceptable (Hair et al., 2017). α and CR coefficients in Table 2 are above 0.80 in all cases, demonstrating that the reliability of all scale variables is acceptable.

Table 2. Variables and their indicators

Source: Compiled by the authors.

Variable	Code	Indicators	Loading	AVE	CR
Enterprise risk management (ERM)	ERM1	A policy is implemented to address major risks impacting the organization's capacity to attain strategic goals	0.866	0.711	0.918
	ERM2	Standard procedures are established to identify major risks and opportunities	0.904		
	ERM3	Risks and opportunities are assessed to determine how to handle them	0.747		
	ERM4	Standard procedures exist for initiating measures to reduce risks	0.854		
	ERM5	Risk reports are prepared routinely for both top management and the board of directors	0.799		
	ERM6	Major hazards and risk-reduction strategies are monitored using standard processes.	0.878		
Technology adoption (TAD)	TAD1	Frequently acquire advanced, crucial equipment, components, materials, software, or hardware externally	0.852	0.721	0.870
	TAD2	Advanced sets of apparatus or prototypes are frequently purchased from external sources	0.875		
	TAD3	Technical materials such as patents, drawings, or designs are often purchased and adopted	0.806		
	TAD4	Technical knowledge, such as know-how or non-patent inventions, is often purchased and adopted	0.861		
Knowledge management (KMA)	KMA1	Employees gain valuable knowledge from external sources: seminars, journals, and expert networks…	0.719	0.608	0.907
	KMA2	Our personnel learn a lot from suppliers and clients.	0.775		
	KMA3	Knowledge is exchanged among our employees and their co-workers	0.821		
	KMA4	Experience, skills, and knowledge form the basis upon which our employees rely in their work	0.783		
	KMA5	Employees depend on written sources, such as project documentation, organizational procedures…	0.760		
	KMA6	Our employees discuss information at meetings, lunches, and hallways.	0.813		
	KMA7	Employees share knowledge through formal channels: reports, procedures, instructions, and company publications	0.762		
	KMA8	Our company values employee expertise as an organizational benefit rather than an individual strength.	0.800		
Supply chain resilience (SCR)	SCR1	Material flow can be easily restored	0.730	0.719	0.868
	SCR2	Quick recovery of normal operating performance	0.863		
	SCR3	The supply chain quickly recovers to its original state	0.893		
	SCR4	Quick resolution of disruptions can be achieved	0.895		
Financial Performance (FFP)	FFP1	ROI (Return on investment)	0.882	0.770	0.925
	FFP2	ROS (Return on Sales)	0.864		
	FFP3	ROE (Return on equity)	0.899		
	FFP4	ROE (Return on Equity)	0.888		
	FFP5	Sales growth	0.855		
Non-Financial Performance (NFP)	NFP1	Satisfaction of customers	0.817	0.721	0.870
	NFP2	Satisfaction of employee	0.880		
	NFP3	The quality of products/services	0.877		
	NFP4	The loyalty of the employee	0.819		

Convergent validity refers to how well a measure corresponds with other measures of the same construct. To evaluate for convergent validity, the average variance extracted (AVE) should be greater than 0.5 (Hair et al., 2017); the AVE values in Table 2 consistently exceed the 0.5 threshold, ranging between 0.608 (for knowledge management) and 0.770 (for firm financial performance). Discriminant validity refers to the extent to which a construct is clearly distinguished from other constructs. The discriminant validity was assessed using the Fornell-Larcker Criterion and the Heterotrait-Monotrait Correlation Ratio (HTMT). The Fornell-Larcker Criterion requires AVE square roots to be bigger than other structures vertically in a column. Furthermore, the HTMT should not exceed 1 (Henseler et al., 2016). This study's constructs passed the validity test, and all values were within acceptable limits. Table 3 and Table 4 show the findings.

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Table 3. Fornell-Larcker criterion

Source: Compiled by the authors.

Construct	ERM	FFP	KMA	NFP	SCR	TAD
ERM	0.843					
FFP	0.555	0.878				
KMA	0.598	0.692	0.780			
NFP	0.531	0.682	0.748	0.849		
SCR	0.479	0.546	0.512	0.469	0.848	
TAD	0.541	0.663	0.668	0.606	0.537	0.849

Table 4. Heterotrait-Monotrait ratio (HTMT)

Source: Compiled by the authors.

Construct	ERM	FFP	KMA	NFP	SCR	TAD
ERM						
FFP	0.601					
KMA	0.653	0.752				
NFP	0.596	0.760	0.840			
SCR	0.535	0.608	0.572	0.531		
TAD	0.602	0.739	0.751	0.694	0.612	

After evaluating the quality of the measurement model, the second step consisted of assessing the structural model in order to reach a conclusion regarding the hypothesis' acceptability. The path coefficient was employed to validate the relationship between the two constructs (Hair Jr et al., 2013). Bootstrapping was used to calculate PLS-SEM or path coefficients. A t-value greater than 1.96 at a significance level of 0.05 (ρ value <0.05) indicates significance. Table 5 shows that all hypotheses except *H2* and *H10* were accepted.

The proposed research model fits well with the empirical data. Chi-square = 1020.003 was significant at the 0.05 level (ρ = 0.00) in Table 6. The standardized root mean square residual (SRMR) measured the suggested research model's approximate model fit. A model is considered to have a satisfactory fit if the SRMR is less than 0.08 (Hu & Bentler, 1999). Based on Table 5, the model demonstrated a satisfactory fit with an SRMR value of 0.048 (< 0.08).

Table 6. Model fitness

Source: Compiled by the authors.

Indicator	Saturated model
SRMR	0.048
d_ULS	1.144
d_G	0.602
Chi-square	1020.003

The results presented in Table 5 show that supply chain resilience moderates ERM and financial performance relationship (β = 0.106, ρ < 0.05). Therefore, Hypothesis 9 is supported. On the other hand, there is a moderating effect of supply chain resilience on ERM and non-financial performance association (β = 0.007, ρ = 0.884> 0.05). Thus, hypothesis 10 is rejected. To demonstrate the moderating impact of supply chain resilience, Figure 2 shows a simple plot for the correlation between ERM and financial performance, which is moderated by supply chain resilience. It shows that for high supply chain resilience (for example, +1 standard deviation above the mean; the top line), there is a steeper positive relationship between ERM and financial performance than for low supply chain resilience (for example, –1 standard deviation below the mean; bottom line), with a flatter slope. This illustrates that supply chain resilience strengthens the positive relationship between ERM and financial performance.

Table 5. Path analysis results

Source: Compiled by the authors.

Hypotheses	Path	Path coefficient (β)	STDEV	t Values	ρ Values	Decision
H1	ERM → FFP	0.165	0.063	2.630	0.009	Accepted
H2	ERM → NFP	0.084	0.062	1.360	0.174	Rejected
H3	ERM → KMA	0.598	0.044	13.602	0.000	Accepted
H4	ERM → TAD	0.541	0.049	10.996	0.000	Accepted
H5	KMA → FFP	0.346	0.061	5.658	0.000	Accepted
H6	KMA → NFP	0.569	0.058	9.730	0.000	Accepted
H7	TAD → FP	0.257	0.059	4.333	0.000	Accepted
H8	TAD → NFP	0.150	0.070	2.141	0.032	Accepted
H9	SCRxERM → FFP	0.106	0.039	2.731	0.006	Accepted
H10	SCRxERM → NFP	0.007	0.045	0.146	0.884	Rejected

Source: Compiled by the authors.

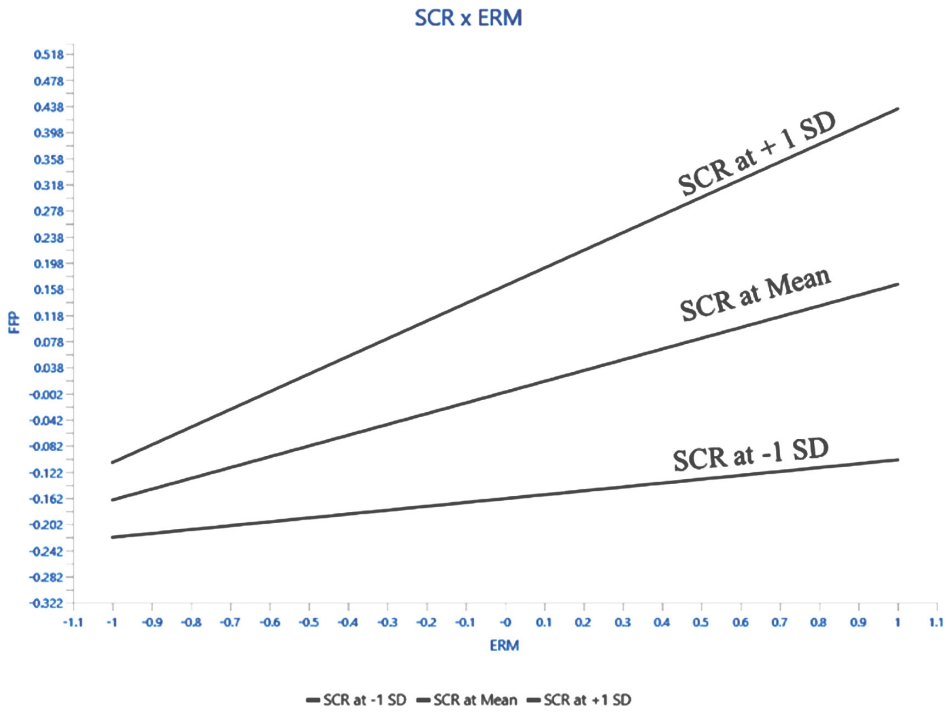

Figure 2. Moderation effect of supply chain resilience on ERM and financial performance

Furthermore, a comprehensive exploration of the cause-and-effect dynamics among ERM, knowledge management, technology adoption, and firm performance is conducted through mediation analysis, employing the bootstrapping approach proposed by Hayes (2009). The findings clearly demonstrate the substantial impact of knowledge management and technology adoption on both financial and non-financial performance. Notably, ERM is found to be significantly linked to financial performance but exhibits no significant association with non-financial performance. This indicates that the relationship between ERM and non-financial performance is entirely mediated by knowledge management and technology adoption. Additionally, the connection between ERM and financial performance is characterized as complementary partial mediation by knowledge management and technology adoption. As a result, all proposed hypotheses are validated in terms of the mediating effects. Refer to Table 7 for a detailed presentation of the mediation analysis results.

Table 7. Analysis of the mediating effect

Source: Compiled by the authors.

Relationship	Path of mediation	Estimate	*ρ* value	Conclusion
ERM – KMA – FFP	Knowledge management; 0.598*; 0.346*; Enterprise risk management; 0.165*; Financial Performance	0.207	0.000	Complementary partial mediation
ERM – KMA – NFP	Knowledge management; 0.598*; 0.569*; Enterprise risk management; 0.084**; Non Financial Performance	0.340	0.000	Full mediation

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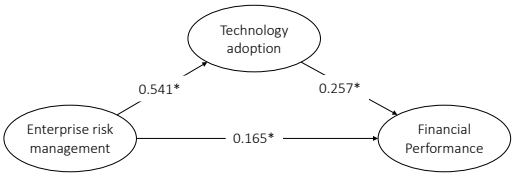
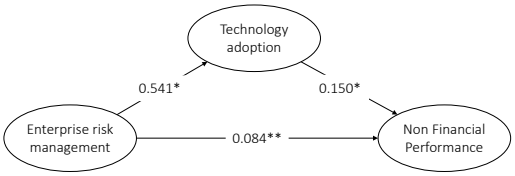
Table 7 (cont.). Analysis of the mediating effect

Relationship	Path of mediation	Estimate	*ρ* value	Conclusion
ERM – TAD – FFP		0.139	0.000	Complementary partial mediation
ERM – TAD – NFP		0.081	0.043	Full mediation

Notes: ** ρ > 0.05 (not statistically significant), * ρ < 0.05 (statistically significant).

4. DISCUSSION

While previous studies have recognized that ERM has both a direct and indirect positive influence on a firm's financial and non-financial performance, no prior research has incorporated knowledge management, technology adoption, and supply chain resilience to explore the mechanisms and context by which ERM influences firm performance.

Comparing with prior studies that examined the relationship between ERM and firm performance with mediators such as competitive advantage (Yang et al., 2018), business model innovation (Al-Nimer et al., 2021), investment decisions (Faisal et al., 2021), and moderators being intellectual capital (Saeidi et al., 2021), this study goes further by incorporating knowledge management and technology adoption as mediators and supply chain resilience as a moderator in the ERM and firm performance relationship, resulting in the detailed findings outlined below:

Similar to prior research, ERM has a positive influence on financial performance (Florio & Leoni, 2017; Saeidi et al., 2021). However, one notable contradiction to the findings of Saeidi et al. (2021) and Al-Nimer et al. (2021) is that ERM is not significantly related to the non-financial performance of the firms (ρ value = 0.174). ERM practices are primarily focused on financial risk mitigation rather than integrating a holistic approach that includes non-financial aspects (Nocco & Stulz, 2006), its impact on customer and employee-related metrics may be limited.

The findings indicated that ERM has a positive effect on knowledge management and technology adoption. The ERM implementation may enhance both knowledge management and technology adoption. Furthermore, knowledge management and technology adoption serve as key mediators, connecting ERM to firm performance. Knowledge management and technology adoption play a crucial mediating role in shaping the relationship between ERM and overall firm performance. This study offers persuasive evidence, shedding light on the complicated mechanisms through which ERM influences financial performance. In essence, it suggests that companies should actively enhance their ERM practices and cultivate improvements in knowledge management and technology adoption to effectively elevate their overall performance. Building on prior research that has investigated the mediating functions of knowledge management and technology adoption (Jalil et al., 2021; Zheng et al., 2010), this study reinforces the proposed model. The findings robustly support the idea that knowledge management and technology adoption act as full mediators in the connection between ERM and non-financial performance, while also playing a partial mediating role in the relationship between ERM and financial performance. Simultaneously, these results align with previous findings that highlight the significance of knowledge management and technology adoption as substantial drivers influencing overall firm performance (Jalil et al., 2021; Zheng et al., 2010).

This study highlights the crucial moderating role of supply chain resilience in the ERM-firm performance relationship, filling a gap in prior research. Findings indicate that supply chain resilience strengthens the positive association between ERM and financial performance but not non-financial performance.

CONCLUSION

This study, drawing on the resource-based view and dynamic capabilities theories, explored how ERM influences firm performance.

The study sets the foundation for several theoretical contributions. It explores how ERM relates to firm performance by combining two theories: the resource-based view and dynamic capabilities theory. Using both theories offers a more comprehensive understanding. This integration highlights that ERM, knowledge management, and technology adoption are unique resources, enabling the renewal of capabilities to align with a changing business environment. These factors contribute to achieving overall firm performance. By confirming that knowledge management and technology adoption fully mediate the relationship between ERM and non-financial performance, and partially mediate each relationship between ERM and firm financial performance, this study enhances our understanding of how ERM influences firm performance.

The study emphasizes that having a resilient supply chain that can adapt to challenges positively influences ERM and contributes to good financial performance. It stresses the need for continual adjustment and effective resource use in response to changing risks, aligning with dynamic capabilities theory.

This study not only contributes to theories but also offers valuable practical suggestions for companies, especially in developing countries, looking to implement ERM. While ERM shows a positive impact on financial performance, the unexpected lack of significance in non-financial performance suggests a need for a balanced approach. Companies can strategically leverage ERM practices, focusing on knowledge management and technology adoption. This can enhance non-financial performance, emphasizing the need for an integrated approach to maximize the effectiveness of ERM. Acknowledging the positive impact of resilient supply chains, organizations should invest in building supply chain resilience. This adjustment can boost ERM benefits, particularly in achieving better financial performance.

This study comes with acknowledged limitations. Firstly, it is constrained by a small survey sample and relies on subjective measures of firm performance from respondents, lacking the inclusion of actual financial data from the companies. To enhance generalizability, future research should expand the sample size and integrate real financial data, providing a more holistic view of firm performance. Secondly, the research utilizes a static questionnaire-based survey design, capturing data at a single point in time to validate hypotheses.

Recognizing the limitation in capturing dynamic changes, future studies are recommended to explore alternative designs, such as longitudinal studies, to offer a more comprehensive understanding of the evolving relationships. Furthermore, the study focuses solely on supply chain resilience as the moderator in the ERM and firm performance relationship. Future research is encouraged to explore additional moderators and delve deeper into the intricate dynamics of these relationships.

AUTHOR CONTRIBUTIONS

Conceptualization: Nguyen Ngoc-Long.
Data curation: Le Vinh Quang.
Formal analysis: Pham Xuan Giang.
Funding acquisition: Pham Xuan Giang.
Investigation: Le Vinh Quang.
Methodology: Nguyen Ngoc-Long, Pham Xuan Giang.
Project administration: Pham Xuan Giang.

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Resources: Le Vinh Quang.
Software: Le Vinh Quang.
Supervision: Nguyen Ngoc-Long.
Validation: Le Vinh Quang.
Visualization: Le Vinh Quang.
Writing – original draft: Le Vinh Quang.
Writing – review & editing: Nguyen Ngoc-Long, Pham Xuan Giang.

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