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The Impact of Emerging Technology Risks on the Performance of Insurance Companies in Emerging Markets

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Abstract

Purpose: The objective of the study is to examine the influence of Emerging Technologies (ET) such as Artificial Intelligence (AI), Blockchain (BLK), Internet of Things (IoT), and Big Data Analytics (BDA) on the Performance (PER) of insurance firms in the Palestinian market and analyze how this is moderated by Risk Management (RM). **Methodology**: The quantitative study design has been adopted, and a cross-sectional approach has been used for data gathering from 220 employees working in Palestinian insurance companies that were analyzed PLS-SEM. **Result**: The study reveals that ET has a remarkable influence on PER. RM frameworks strengthen such relationships by alleviating risks and maximizing the benefits of new technologies. In terms of ET, AI, BLK, IoT, and BDA had the highest influence on both RM and PER. Data showed RM leads to effective ET implementation coupled with an increase in financial, operational, and reputational advantages to insurers. **Originality**: The analysis shows the necessity of comprehensive risk management practices, employee training, and observance of the regulatory norms for insurance businesses in emerging countries like Palestine to maximize the benefits of ET adoption. Limitations are imposed by the cross-sectional approach for the study and the specific markets that it focuses on. The findings enhance scholarly understanding of the adoption of technology under constricted situations and provide advantageous recommendations for policymakers and insurers in promoting sustainability within the insurance sector.

Keywords: Emerging Technologies, Risk Management, Performance, Artificial Intelligence, Blockchain, Internet of Things, Big Data Analytics, Insurance Palestinian Market.

1.0 BACKGROUND AND INTRODUCTION

The evolution of emerging technologies (ET), such as Artificial Intelligence (AI), Blockchain (BLK), Internet of Things (IoT), and Big Data Analytics (BDA) has immensely transformed the business of insurance globally (Lissy et al., 2021). They stand to offer unparalleled opportunities for boosting operational efficiencies, improving the customer experience, and developing innovative products of insurance (Lanfranchi & Grassi, 2021). Predictive analytics, through artificial intelligence, allows insurers to determine risk profiles as well as tailor coverages (Adeoye et al., 2024). BLK makes transactions more transparent and secure (Thumburu, 2021), IoT devices provide real-time information, enabling better assessment of risks and improved claims management (Spender et al., 2019). BDA allows insurers to analyze huge amounts of data for better, more informed decision-making and increased competitiveness in the market (Pareek et al., 2022).

Technological development is characterized by four industrial revolutions that have all been preceded by major innovations. AI, IoT, BDA, and BLK define the Fourth Industrial Revolution. It is such a revolution that touches all industries, insurance not being an exception. These innovations have remarkably been influent in the operations of insurers in presenting new opportunities as well as new challenges and risks (Tarr et al., 2023). The last part of the 20th century heralded digitalization that had been hastened by the Dot-Com Bubble through the 1990s. At the end of the bubble, a lot of money was lost (McAleer et al., 2016), yet it also facilitated the emergence of strong technology giants like Amazon and Google, which underline an incredible potential in technology innovation.

Palestine and other developing markets are potentially offering new challenges and opportunities to adopt innovative technologies in the insurance market. These markets present dynamic economic growth, increased digitization, and higher insurance penetration. Palestine faces enormous limitations: lack of infrastructure for the internet; limited provision of 3G services; and political barriers that hinder access to global digital advancement. Such limitations restrict the use of technology in terms of IoT and AI. So, Palestinian insurers would carry with them a competitive disadvantage. Adding to these constraints, socio-economic and legal barriers such as those relating to data privacy and insufficient risk management frameworks, further make it hard for new technologies to be adopted. Yet, the potential exists for the use of such emerging technologies in the new insurance business in Palestine to improve scalability and accessibility (Rahman et al., 2024). But with these emerge massive threats like cyber-attacks, regulatory violations, and operational disruption. Such a scenario prompts insurers to face the music of these challenges to take full advantage of technological development while protecting their operations.

The present study is focused on the impacts of emerging risks from technology on the productivity of insurance firms in Palestine with specific objectives: identification of emerging technological risks, assessment of their performance, in financial, operational, and reputational terms, study of the peculiar challenges from the socio-economic and regulatory context of Palestine; as well as suggestions of sound strategies for the mitigation of risk in the presence of enabling innovation. The scarcity of extensive literature in the field has led to a notable knowledge gap, hence the need for a much deeper understanding of the penetration of these risks into insurers in Palestine. These processes will also contribute profound insights into policymakers, insurers, and technology providers through the study of these processes to bring forth sustainable development and innovations in the insurance sector of Palestine.

2.0 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

This section integrates a comprehensive overview of the literature on the latest technology and hazards emerging from it and their impact on the insurance industry, particularly for emerging markets. It further investigates how technological innovations affect operational efficiency, decision-making, and consumer involvement and considers related concerns such as cybersecurity threats, data breaches, and regulatory problems. This part integrates relevant studies into a theoretical model to understand the effect of new technological hazards on the country and the performance and sustainability of insurance businesses within that context.

This section provides a review of the literature on new technological risks and their implications for the insurance industry, particularly in emerging markets. It reviews how things have been understood to change through technology for efficiency in operation, transformation in decision-making, and ways of involving the consumer inside insurance companies while addressing other issues such as cybersecurity threats, data breaches, and regulatory problems. This section aligns studies relevant to the issue in a theoretical model to understand the influence of new technological hazards on a country, and its performance and sustainability of insurance businesses under such a scenario.

2.1 Conceptual and Theoretical Framework

2.1.1 Emerging Technology: AI Tools Usage, Blockchain, Internet of Things, Big Data Analytics

The emerging technology wave has turned the insurance industry into a data-driven consumer-centric business. Artificial intelligence makes it possible to automate very complex operations, such as underwriting and claims management and provides personalized consumer interactions through chatbots (Song et al., 2022). BLK improves transparency and data integrity by enabling efficient claims processing and the usage of smart contracts for processing (Kouhizadeh et al., 2021). IoT devices including telematics and wearable health monitors provide real-time data for personalized policies and improved risk assessment (Miorandi et al., 2012). BDA analyzes vast datasets helping insurers make decisions, anticipate customer behavior optimally, and price accordingly (Mayer-Schönberger & Cukier, 2013).

Serious threats in information technology come from risks such as cyber security threats, pitfalls in the privacy of data, ethical dilemmas, and barriers in the regulatory context. The risks outlined are more severe in new markets compared to established ones like Palestine due to weak infrastructure, unstable

regulatory environments, and resource constraints. For instance, low technological infrastructure does not permit the utilization of IoT and AI tools in Palestine. There are also other external factors and causes, for instance; political instability and market volatility also become a hurdle in the adoption of BLK and BDA (Karamchand, 2021).

Theoretical frameworks like the Innovation Diffusion Theory (IDT) highlight factors like perceived benefits, compatibility, and organizational readiness as determinants of technology adoption (Rogers, 2003). The Technology-Organization-Environment (TOE) framework examines the influence of technological readiness, organizational capabilities, and environmental factors (Tornatzky & Fleischer, 1990). In Palestine, these frameworks emphasize the need for workforce training, infrastructure enhancement, and regulatory alignment to support technology adoption (Baker, 2012; Yee-Loong Chong et al., 2009).

2.1.2 Technology Risk Management

Technology Risk Management (RM) is pertinent to the proper integration of emerging technologies in the insurance industry, especially in emerging markets. Risk management would mean identifying, analyzing, managing, and monitoring threats that come from technology, such as artificial intelligence, blockchain, IoT, and big data analytics (Ganesh & Kalpana, 2022). Certainly, new technologies build up the scope of infusion to improve operational efficiency, and client experience, and introduce new products, yet at the same time pose great risks that can harm the profitability and sustainability of these companies (Halima & Yassine, 2022). The incorporation of IoT and BDA would; therefore, elevate concerns regarding data privacy, particularly as there are no proper provisions in the legislation about data protection, leaving insurers to the possibilities of mismanagement of sensitive client information and hence undermining the trust built in this industry (Karamchand, 2021; Mikes & Kaplan, 2014; Mukhopadhyay et al., 2013).

One of the key access barriers in RM for Palestine is that there is no clarity in the regulations concerning the technologies to be developed. Such constraints limit BLK's capacity to foster transparency and efficiency in their use. There are also ethical hazards due to AI threats, such as algorithmic bias and a lack of transparency, which add barriers to building customer trust, particularly in places like Palestine, where awareness of them is still developing (Bharadwaj et al., 2013; Song et al., 2022). To address these issues, Palestinian insurers may implement risk management as a systematic approach. This includes identifying, ranking, and understanding threats with the help of risk assessment tools, such as risk matrices, and implementing comprehensive cybersecurity protocols such as encryption and employee training culture. The strategy must align with local infrastructural and legal landscapes. Continuous monitoring and rapid reporting are significant to early identification and mitigation of risks to safely ensure business continuity. Partnerships with international technology entities and regulators may also provide therapeutic expertise and resources toward the solution of challenging problems. Besides, capacity-building initiatives such as staffing training programs and investments in IT infrastructure constitute key elements of resilience improvement for the insurance sector in Palestine (Neely et al., 1995; WHO, 2017). In spite of these limitations, risk management offers an opportunity for all the Palestinian insurance companies to become more resilient and competitive. For example, BLK might be used for secure claims processing, while working with regulators might give established legal frameworks, thereby eliminating ambiguities and increasing efficiency. Investments in cybersecurity infrastructure and employee training can help mitigate AI and BDA-related vulnerabilities (Mikes & Kaplan, 2014).

2.1.3 Performance of Insurance Companies

The efficiency and efficacy of insurance businesses is a very complex aspect that deals with the financial, operational, as well as reputational performance (Tarr et al., 2023). In developing countries like Palestine, the incorporation of advanced technologies such as AI, blockchain, the Internet of Things, and big data analytics are likely to affect performance measures dramatically (Hirzallah et al., 2024). These technologies, however, are perceived to create room for growth and innovations while at the same time posing threats that could affect operational continuity and consumer confidence.

Profitability, revenue growth, and cost efficiency are the most relevant indicators through which financial performance is frequently evaluated in an insurer's success (Oscar Akotey et al., 2013). The advances in technology are making it possible for insurers to improve operational efficiency, minimize administrative costs, and refine and even do profile pricing. Predictive and prescriptive analysis will enable AI to underwrite better and minimize risks related to fraud detection, as well as enable greater underwriting accuracy and profitability (Qudus, 2024). Likewise, claim-processing expenditures are reduced, while the efficiency of the processing payment is improved through smart contracts that are based on blockchain (Kouhizadeh et al., 2021). It allows real-time data collection, improves risk assessment, and enables personalized plans for policyholders through IoT devices and big data analytics (Miorandi et al., 2012). In a competitive insurance marketplace, reputational performance is becoming increasingly important (Brammer & Pavelin, 2005). Trust is inevitable in the insurance sector, and technologies like that of BLK would foster transparency and thus build the confidence of clients in claims management. Yet risks like data breaches and algorithmic discrimination in AI can undermine data privacy and generally reduce trust, especially for emerging markets with limited government regulation (Mukhopadhyay et al., 2013).
The absence of modern digital infrastructure, such as high-speed Internet and sound IT systems, is a hindrance to achieving operational excellence in Palestine. Disintegrated regulatory frameworks and political instability may still prevent the adoption of technology and affected processes. The performance of insurance businesses in Palestine is not only determined by the socio-economic but also the political environments unique to the Palestinian Territory. As such, the restricted environment, limiting access to technology and risking market instability, calls for innovative solutions that would use technology integration in managing risks. Strong risk management frameworks enable insurers to control risks while pushing new technologies to develop the bottom line through financial, operational, and reputational benefits. Insurers might, however, need to invest in employee training, strengthen cybersecurity protocols, and collaborate with regulators to develop clear and precise legislative frameworks able to empower them with the requisite levers they need to manage challenges and improve performance indicators (Shaikh & Siponen, 2024).

2.2 Conceptual Model and Hypotheses Development

2.2.1 Emerging Technology and Risk Management

Emerging Technologies (AI, BLK, IoT, and BDA) have been traditionally used for insurance risk management. These technologies promote proactive identification, measurement, and mitigation of risks by insurers, thus improving operational resilience and competitiveness (Okpala et al., 2020). The significance of Artificial Intelligence in risk management is realized in fully automated processes, better predictive analytics, and constant instantaneous real-time monitoring of the risk (Halima & Yassine, 2022). AI complements algorithms used in the identification of fraudulent claims patterns, evaluates risk profiles with improved precision, and makes decisions on underwriting (Thesmar et al., 2019). However, the insurance sector in Palestine faces challenges including inadequate resource availability and weak digital infrastructure. Consequently, AI can help to optimize resource allocations and reduce inefficiencies operationally. BLK technology improves processes transparency and trust in insurance processes like claims management and policy issuing (Nimmagadda, 2021). BLK more makes the transaction secure by immutable records, as a result making fraud risk less and preserving transaction integrity, as stated by Dahal (2023). The technology is helpful to regions in areas such as Palestine, hitherto a developing regulatory framework, as it proposes a decentralized solution to problems of compliance. IoT devices have real-time data streamed from interconnected systems, telematics for example in cars and wearable health monitors (Dian et al., 2020). The insurers will carry dynamic risk assessments through individualized insurance coupled with proactive methods in risk mitigation, all of which are made possible through the new data available. The limitation of inadequate modern internet infrastructure in Palestine completely impedes the overall potential of IoT toward risk management (Tawil-Souri, 2022). BDA processes large datasets to uncover patterns, predict risks, and inform decision-making (Vassakis et al., 2018). It supports insurers in pricing optimization, identifying high-risk customers, and detecting anomalies in claims data. In Palestine, adopting BDA can provide a competitive edge but requires significant investment in digital infrastructure and skilled personnel.

***H1**: The ET positively influences the effectiveness of RM in the insurance sector in the Palestinian market.*

2.2.2 Risk Management and Performance

Risk management has always been an important part of the insurance sector being directly related to the financial, operational, as well as reputation-related consequences of the organization (Gatzert & Schmit, 2016). Strong risk management frameworks allow insurers to identify, assess, and reduce risks relating to emerging technologies, thereby providing stability and improved performance across the board (Adeniran et al., 2024). Countries realizing emerging marketplaces, such as Palestine, have unique socio-economic and regulatory challenges in doing business and would therefore require appropriate risk management strategies to ensure long-term growth and competitiveness. Efficient risk management enables the organization to reduce financial losses inherent in risks such as cybersecurity, regulatory non-compliance, and fraud. Well-planned measures on cybersecurity would avoid potential financial loss through a breach of sensitive consumer data. Such information may become very expensive and strain on the budget in Palestine, where digital infrastructures are still nascent, and the expense associated with ensuring such lacks can apply pressure on the budget. However, risk management solutions tailored towards local realities, such as affordable fraud detection and well-structured compliance with regulations, can mitigate costs and increase profitability (Blessing, 2024). Risk management helps guarantee operational continuity by minimizing technological and systemic risks, such as software glitches and hardware breakdowns. In Palestine, where poor technological infrastructure magnifies the need for measures any disruption in operations could severely impact customer satisfaction and market competitiveness (Qattan et al., 2021). implementing regular system audits and real-time monitoring utilities comes in handy by further improving the reliability of crucial processes like claim handling and policy issuing. The reputations of insurers appear to be deeply related to the ability to manage risks on their part. Transparent claims processing, compliance with data protection standards, and an ethical application of AI algorithms, then contribute significantly to developing customer trust and loyalty. On the contrary, the most adverse reputational performance is caused by deficiencies in risk management, such as data breaches and biased AI decision-making. The lack of comprehensive data protection legislation and ethical standards towards AI in Palestine aggravate the reputational problem, thus requiring the establishment of internal policies and best practices to maintain trust and reliability (Habbal et al., 2024).

***H2**: The RM positively influences the effectiveness of PER in the insurance sector in the Palestinian market.*

2.2.3 Emerging Technology and Performance

Emerging technologies such as artificial intelligence, blockchain, the Internet of Things, and big data analytics transform by broadening operational, financial, and reputational performance in insurance companies (Tarr et al., 2023). They facilitate improvement in productivity, optimization of operations, and even more personalization through customer-specific solutions, giving rise to competitive advantages for an institution (Ali Albasheir, 2023). Their effect on performance dramatically relies on the efficient management of resulting risks, mostly in an emerging market such as Palestine, where infrastructure and regulation issues remain. Artificial intelligence augments the processes of underwriting and claims management, reducing processing times and increasing accuracy. Chatbots and virtual assistants improve customer service levels with immediate responses to requests, providing a level of satisfaction and loyalty (Ekechi et al., 2024). BKL provides efficient and fraud-proof smart claims processing. By this, human error and operational inefficiencies are reduced (Madhala, 2023). The IoT devices, including telematics, allow insurers to gather real-time data to facilitate dynamic risk evaluation and customized insurance provisions. Restricted access to advanced technological infrastructure such as high-speed internet in Palestine does not enhance the performance of the companies significantly. ET supports cost reduction and revenue generation. Predictive analytics powered by AI can improve price risk and reduce losses from underpriced policies. BDA is beneficial to insurance companies by enabling the identification of profitable groupings of consumers and improving product offerings, thus increasing revenue streams (Akande, 2018). This is how it would work: By automating transaction verification and optimizing documentation processes, BLK reduces administrative costs. In Palestine, high costs associated with technology setting up and maintenance will limit the feasibility of profit-making for all those niche

insurers who are on a tight budget (Mujahed et al., 2022). Technologies such as BLK enhance trust through transparency, assurance, and integrity in transactions thus fostering closeness with customers. The IoT devices are set for early risk identification, with advanced alerts to a customer for the approaching threat, which increases a feeling of trust and care. However, many trust-related issues such as data breaches and algorithm bias in AI demystification will emerge if not proper and timely handled (Ryan, 2020). The absence of comprehensive data protection legislation in Palestine intensifies such reputational issues, indicating the need for increased regulatory frameworks.

***H3**: The adoption of ET positively impacts the PER of insurance companies in the insurance sector in the Palestinian market.*

2.2.4 Moderating the Role of Risk Management in the Relationship Between Emerging Technology and Performance

Risk management plays an essential role in determining how the adoption of emerging technologies correlates with the performance of insurance firms (Rodríguez-Espíndola et al., 2022). Technologies such as AI, blockchain, the Internet of Things, and big data analytics promise dramatic prospects for improving their financial, operational, and reputational performance. However, these technologies are very risky, and the risks must be well managed to gain all the benefits (Alnawaiseh & Al-Mahasneh, 2024). This effect is more felt in emerging countries like Palestine, which have structural, regulatory, and economic barriers that add to the complexity of technology adoption. Emerging technologies present specific risks like cybersecurity dangers, issues of data privacy, and interruptions in operations (Dhirani et al., 2023). For instance, based on Cheng et al. (2021) AI can improve underwriting accuracy and customer personalization but may also lead to ethical concerns like algorithmic bias or data misuse. Although it increases openness and reduces fraud, BLK may be faced by regulatory ambiguity, especially in emerging countries (Salmon & Myers, 2019). The introduction of IoT and BDA has been able to bring real-time risk assessment and real-time decision-making; however, it has also made an organization more vulnerable to either data or system failure (Venticinque & Amato, 2018). If proper risk management frameworks do not exist to accommodate these, such risk factors could well eliminate the performance advantages that technology adoption brought. Risk management minimizes these hazards, linking emerging technology risks to their power to create performance improvements. Proactive measures, such as cybersecurity provisions and regulatory compliance plus ethical AI forms, fortify an insurer's operational safety while riding the technology (Saeidi et al., 2019). Sufficiently effective risk management maximizes the benefits accrued from high-performance-enhancing emergent technologies. Then it transforms them into losses, thanks to their influence over fraud, cyber-attacks, and even system failures. It ensures profit at a safe margin in every case. Reduce obstruction and strengthen services for efficient claims processing and client service. Transparency and security in the process create confidence and, consequently, loyalty from the consumers. On the ground, the developing countries of Palestine are facing practically two similar problems: poor infrastructure and little regulation. Therefore, efficient risk management is key in achieving the results expected in these performance measures (Ibrahim, 2012).

H4: *RM moderates the relationship between ET and PER in Palestinian insurance companies.*

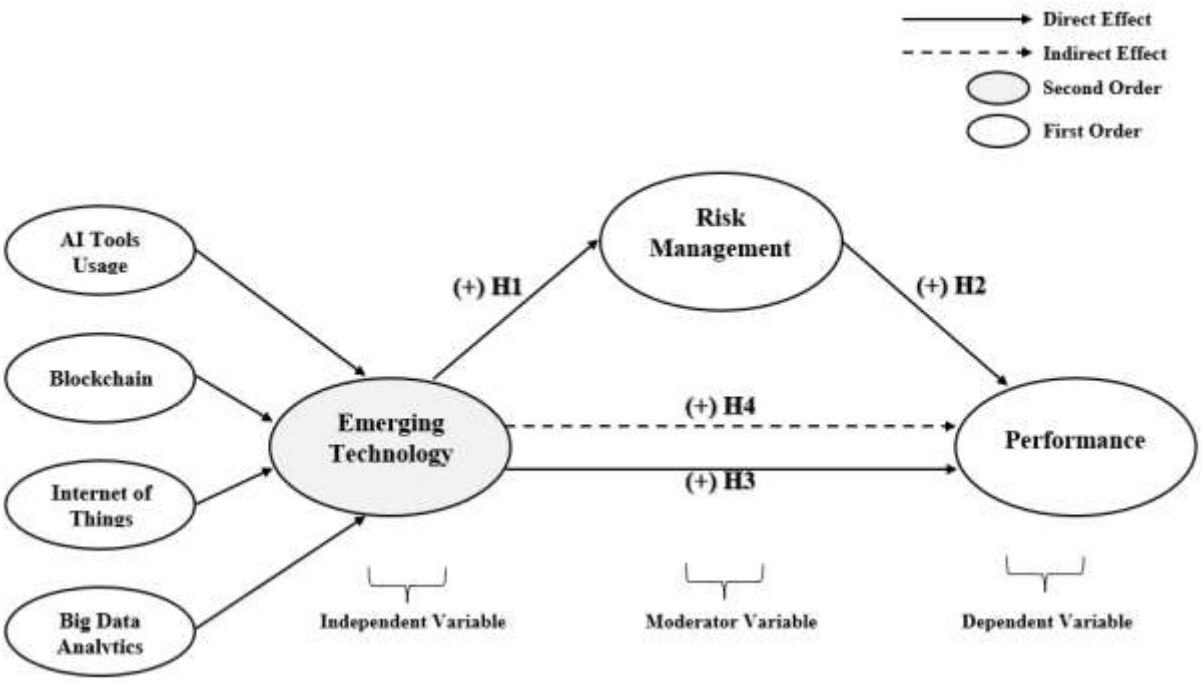

Figure (1) Theoretical framework and research hypotheses.

3.0 METHODOLOGY

3.1 Research design

This study adopts a quantitative research approach to investigate the relationship between ET and PER and the moderating role of RM in the ET-PER relationship within the Palestinian insurance market. To accomplish this, the study first develops a conceptual framework (Fig.1) and validates it using Partial Least Squares Structural Equation Modeling (PLS-SEM).

3.2 Data collection and sampling

A cross-sectional design was employed to gather data from Palestinian insurance companies operating in the West Bank. According to the Palestinian Capital Market Authority (2022), the insurance sector in the West Bank comprises 10 insurance companies, 187 branches, 1,551 employees, 258 agents and producers, 24 insurance intermediaries, and one reinsurance intermediary (PCMA, 2022). This dataset highlights the scope and distribution of the insurance sector in the region, providing a foundation for understanding its dynamics and challenges. A sample size of 309 was computed for the study, with a 5% margin of error, a 95% confidence level, and an assumed response distribution of 50%. The calculation was conducted using the Raosoft® application, applying the following formula:

$$x= Z(c/100)2r(100-r),\ n= N\ x/((N-1)\ E2 + x),\ E= Sqrt\ [(N - n)\ x/n(N-1)]$$

The researcher developed a self-administered online survey to collect the required data for this study. The questionnaire, created using Google Forms, was distributed electronically to 10 Palestinian insurance companies. Data collection took place between October 2024 and December 2024. A total of 220 complete questionnaires were analyzed, representing 71.2% of the targeted sample size.

3.3 Measures

The structured questionnaire consists of 53 items. The first section of the questionnaire consists of five demographic variables (Age and Gender, Educational Degree, Work Experience, and Job Role Level); the second section has 53 questions and seeks to investigate three main constructs: Performance (PER) as a dependent variable, Risk Management (RM) as a moderate variable, and Emerging Technology (ET) as the independent variable. All were evaluated on a Likert scale with five points. PFR consists of 12 Indicators, this construct of PRE was measured based on Idris et al. (2013). In addition, as evidenced by

Omasete (2014) RM consists of 7 Indicators. Finally, the construct of ET was measured based on four dimensions: Artificial Intelligence (AI) consists of 5 Indicators by Falebita and Kok (2024), Blockchain (BLK) consists of 8 Indicators by Philsoophian et al. (2022), Internet of Things (IoT) consists of 9 Indicators by Sun et al. (2021), and Big Data Analytics (BDA) consists of 9 Indicators by Sohail Khan and Siddiqui (2023).

3.4 Ethical Considerations

This research obeyed the strictest ethical requirements and secured officially stipulated consent from the designated Palestinian insurance companies before giving out the questionnaire. In this regard, a clear explanation of the study's purpose, method, and data utilization was made available to ensure transparency. Participation was voluntary, with strict adherence to anonymity and secrecy. Information was managed cautiously to avoid any harm or pain to participants. The study was in keeping with local culture and legal statutes as they relate to data privacy, thereby assuring responsible and respectful research procedures.

4.0 RESULTS

This part brings forth the conclusions from a study on the obtained data from the Palestinian insurance firms as it correlates to ET adoption, RM practices, and the PFR of insurance companies. The results are structured according to research objectives and hypotheses, bringing to focus the roles played by EM and the moderating effects of RM. The data thus obtained subjected to descriptive statistics, model structure assessment, and validation under analysis would achieve a holistic understanding of interrelations between the components involved with respect to the Palestinian insurance sector.

4.1 Demographic Data

The demographic profile of the respondents, as outlined in Table 4.1, reveals key insights into the composition of the sample. In terms of gender, the highest respondents were male (57.7%), while females constituted 42.3%. When examining the age distribution, the largest group of respondents (38.6%) fell within the 30 to 39 age range. In terms of educational qualifications, the majority of respondents (64.5%) held a bachelor's degree. Regarding work experience, the largest group of respondents (36.8%) had 6 to 10 years of experience. Finally, in terms of job titles the highest respondents (73.6%) were employees, while 17.7% were heads of departments, and only 8.6% were directors or managers.

Table (4.1) Demographic Profile

Variables	Categories	Frequency	Percent
Gender	Male	127	57.7%
	Female	93	42.3%
Age	Less than 30 years	61	27.7%
	30 to 39 years	85	38.6%
	40 to 50 years	44	20.0%
	More than 50 years	29	13.2%
Education Degree	Diploma	32	14.5%
	Bachelors	142	64.5%
	Higher Education	46	20.9%
Experience	Less than 2 years	37	16.8%

	3 to 5 years	68	30.9%
	6 to 10 years	81	36.8%
	More than 10 years	34	15.5%
Job title	Director/Manager	19	8.6%
	Head of Department	39	17.7%
	Employee	162	73.6%

4.2 Descriptive Analysis

Table 4.2 presents central tendency (mean) and dispersion (standard deviation) measures for key variables. A 5-point Likert scale was used, with scores of 1 to 2.9 indicating a "Low" agreement, 3 to 3.9 reflecting "Medium" agreement, and 4 to 5 representing "High" agreement. IoT achieved the highest agreement (mean = 4.400, 97.27% positive responses), followed by BDA (mean = 4.209, 82.73%), and BLK (mean = 4.182, 85.45%), all reflecting high acceptance. ET (mean = 4.110, 80.00%) also scored highly. RM (mean = 3.995, 74.55%) and AI (mean = 3.650, 54.55%) showed moderate agreement. PER (mean = 3.682, 62.73%) reflected moderate outcomes.

Table (4.2): Constructs: Mean, Standard Deviation, and Percent Agreement

Construct	Mean	Std.	% of Positive Responses	Level of Agreement
AI	3.650	1.064	54.55%	Medium
BLK	4.182	0.742	85.45%	High
IoT	4.400	0.637	97.27%	High
BDA	4.209	0.845	82.73%	High
ET	4.110	0.822	80.00%	High
RM	3.995	0.785	74.55%	Medium
PER	3.682	1.170	62.73%	Medium

4.3 Assessment of Measurement Model

The quality of the constructs in this study was evaluated through the assessment of the measurement model, focusing on factor loadings, Cronbach's Alpha (α), Composite Reliability (Spender et al.), and Average Variance Extracted (AVE). As shown in Table 2, all constructs demonstrated strong reliability and validity. The factor loadings for all items exceeded the recommended threshold of 0.60, confirming their significant contribution to their respective constructs (Hair Jr et al., 2010). α-values ranged from 0.929 to 0.985, and CR-values ranged from 0.947 to 0.986, surpassing the minimum recommended value of 0.70. These results indicate excellent internal consistency and reliability of the constructs (Hair Jr et al., 2010). Additionally, AVE values ranged from 0.747 to 0.859, exceeding the threshold of 0.50 as recommended by Fornell and Larcker (1981). This confirms that the constructs explain more than 50% of the variance in their indicators, establishing strong convergent validity. Constructs such as AI (α = 0.929, CR = 0.947, AVE = 0.782), BLK (α = 0.966, CR = 0.971, AVE = 0.809), and BDA (α = 0.980, CR = 0.982, AVE = 0.820) demonstrated particularly high levels of reliability and convergent validity. Similarly, RM (α = 0.942, CR = 0.953, AVE = 0.747) and PER (α = 0.985, CR = 0.986, AVE = 0.859) also exhibited strong measurement properties. These findings validate the robustness of the measurement model, ensuring its suitability for subsequent structural model analysis.

Table 2. Construct reliability and validity

Constructs	Codes	Outer loadings	α	CR	AVE
Artificial Intelligence	AI.1	0.858	0.929	0.947	0.782

	AI.2	0.921			
	AI.3	0.778			
	AI.4	0.926			
	AI.5	0.928			
Blockchain	BLK.1	0.956	0.966	0.971	0.809
	BLK.2	0.841			
	BLK.3	0.900			
	BLK.4	0.903			
	BLK.5	0.949			
	BLK.6	0.916			
	BLK.7	0.825			
	BLK.8	0.898			
Internet of Things	IoT.1	0.948	0.963	0.969	0.778
	IoT.2	0.930			
	IoT.3	0.929			
	IoT.4	0.903			
	IoT.5	0.941			
	IoT.6	0.792			
	IoT.7	0.766			
	IoT.8	0.890			
	IoT.9	0.814			
Big Data Analytics	BDA.1	0.941	0.98	0.982	0.82
	BDA.2	0.794			
	BDA.3	0.985			
	BDA.4	0.954			
	BDA.5	0.945			
	BDA.6	0.927			
	BDA.7	0.774			
	BDA.8	0.929			
	BDA.9	0.899			
	BDA.10	0.898			
	BDA.11	0.875			
	BDA.12	0.919			
Risk Management	RM.1	0.930	0.942	0.953	0.747
	RM.2	0.815			
	RM.3	0.683			
	RM.4	0.851			
	RM.5	0.953			
	RM.6	0.927			
	RM.7	0.861			
Performance	PER.1	0.905	0.985	0.986	0.859
	PER.2	0.883			
	PER.3	0.909			
	PER.4	0.929			
	PER.5	0.954			
	PER.6	0.934			
	PER.7	0.958			
	PER.8	0.949			
	PER.9	0.954			
	PER.10	0.924			

PER.11	0.910
PER.12	0.907

Discriminant validity ensures that the constructs in the model are distinct from one another, and this was evaluated using the Heterotrait-Monotrait (HTMT) ratio and the Fornell-Larcker criterion, as shown in Table 3. The HTMT values for all construct pairs were below the stringent threshold of 0.90 (Fornell & Larcker, 1981). However, some HTMT values approached the threshold, such as AI and ET (1.01) and BDA and AI (1.003), indicating the need to further refine the constructs to establish clearer distinctions. Other constructs, such as PER and RM (0.784), demonstrated strong discriminant validity with lower HTMT values. The Fornell-Larcker criterion compares the square root of the AVE for each construct with its correlations with other constructs (Fornell & Larcker, 1981). All constructs satisfied this criterion, as the diagonal values representing the square root of AVE were greater than the off-diagonal correlations. For example, the square root of AVE for AI (0.884) was greater than its correlations with other constructs, such as BDA (0.957) and ET (0.966). Similarly, RM had a square root of AVE value of 0.864, which was higher than its correlations with PER (0.769) and IoT (0.787).

Table 3. Discriminant validity

HTMT	**AI**	**BDA**	**BLK**	**ET**	**IoT**	**PER**	**RM**
AI							
BDA	1.003						
BLK	0.842	0.701					
ET	1.01	0.95	0.911				
IoT	0.923	0.849	0.933	0.983			
PER	0.775	0.73	0.722	0.791	0.779		
RM	0.709	0.676	0.813	0.79	0.805	0.784	
Fornell Larcker	**AI**	**BDA**	**BLK**	**ET**	**IoT**	**PER**	**RM**
AI	0.884						
BDA	0.957	0.905					
BLK	0.801	0.689	0.899				
ET	0.966	0.935	0.893	0.837			
IoT	0.878	0.834	0.908	0.963	0.882		
PER	0.743	0.718	0.711	0.783	0.763	0.927	
RM	0.672	0.662	0.791	0.777	0.787	0.769	0.864

4.4 Structural Model Assessment

The structural model was estimated to use the bootstrapping technique with 5,000 iterations. The coefficient of determination (R^2) assesses the variability of dependent variables explained by the independent constructs, with values classified as substantial (≥ 0.67), moderate (0.33–0.67), or weak (≤ 0.19) (Chin, 1998). As shown in Table 4, the model demonstrates substantial predictive power for constructs like AI (R^2 = 0.933), IoT (R^2 = 0.927), and BDA (R^2 = 0.875). PER exhibited moderate predictive power (R^2 = 0.678), while RM showed slightly lower but still moderate predictive power (R^2 = 0.604). These results indicate that the structural model explains a significant proportion of the variability in these constructs. The effect size (F^2), which measures the impact of independent constructs on dependent constructs, ranged from 0.203 to 13.991. Constructs such as AI (F^2 = 13.991) and IoT (F^2 = 12.728) showed a large effect size, indicating their strong influence on the model, while RM exhibited a small to moderate effect size (F^2 = 0.203). These results highlight the varying degrees of influence that

independent constructs exert on their respective outcomes. Predictive relevance (Q^2) was also evaluated, with values greater than zero indicating that the model has predictive relevance for the corresponding constructs. All constructs, including AI (Q^2 = 0.932), IoT (Q^2 = 0.928), and BDA (Q^2 = 0.853), demonstrated strong predictive relevance. PER and RM showed moderate predictive relevance, with Q^2 values of 0.607 and 0.599, respectively. These results confirm that the structural model provides significant predictive relevance and robust explanatory power for the constructs under study, supporting its validity for understanding the relationships between emerging technologies, risk management, and performance in the insurance sector.

Table 4. Fit model

Constructs	R2	R2 Adjusted	RMSE	MAE	Q2	F2
AI	0.933	0.933	0.262	0.782	0.932	13.991
BDA	0.875	0.874	0.385	0.775	0.853	7.005
BLK	0.797	0.796	0.428	0.808	0.819	3.915
IoT	0.927	0.927	0.27	0.79	0.928	12.728
PER	0.678	0.675	0.629	0.824	0.607	0.267
RM	0.604	0.603	0.636	0.782	0.599	0.203

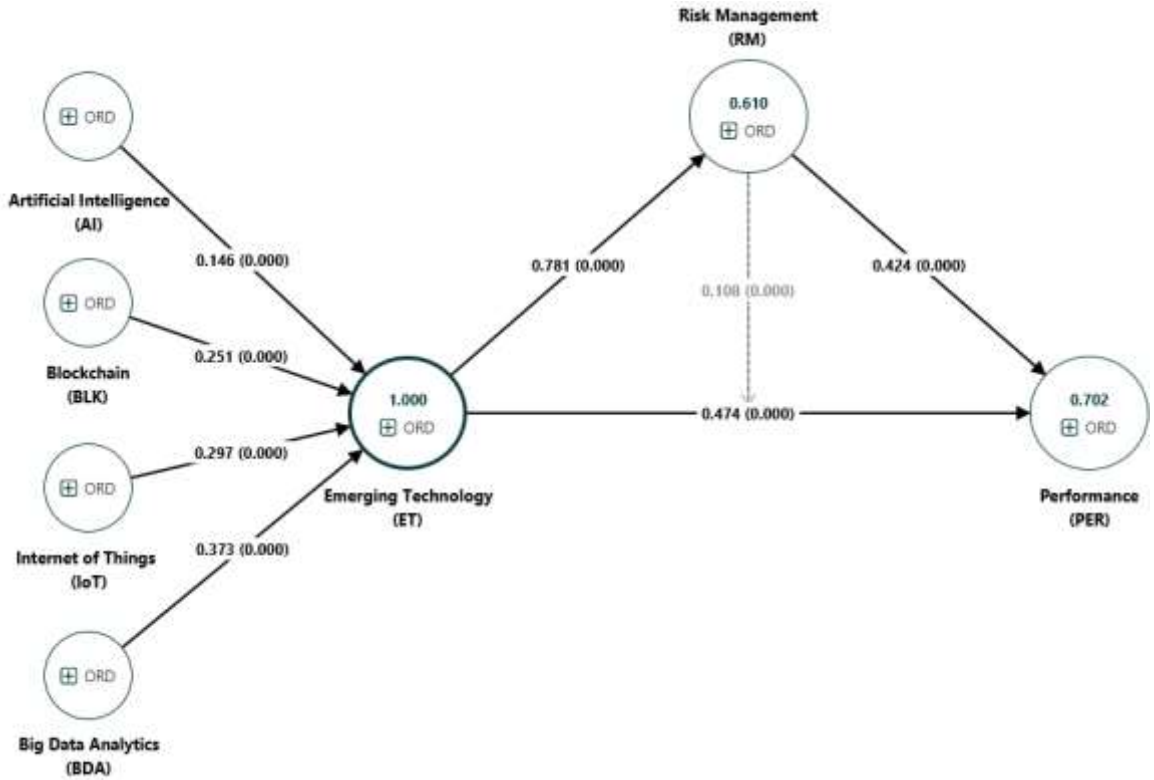

Figure 2. Path coefficients and (P-vale) in the structural model

4.5 Hypotheses Testing

The results of the hypotheses testing, as presented in Table 5, provide strong support for all proposed relationships in the study, highlighting the significant influence of ET and RM on PER in the Palestinian insurance sector.

Emerging Technology and Risk Management: H1 and its sub-hypotheses (H1a–H1d) examine the influence of ET and its components (AI, BLK, IoT, and BDA) on RM. The results show that ET significantly and positively impacts RM (β = 0.781, t = 28.656, p < 0.001). The sub-components also demonstrate strong relationships: AI (β = 0.114, t = 12.852), BLK (β = 0.196, t = 28.604), IoT (β = 0.232, t = 34.413), and BDA (β = 0.292, t = 29.591). These findings confirm that emerging technologies enhance the effectiveness of risk management practices in the Palestinian insurance sector.

Risk Management and Performance: H2 evaluates the direct impact of RM on PER, showing a significant and positive relationship (β = 0.424, t = 4.859, p < 0.001). This indicates that effective risk management practices contribute to improved performance outcomes for Palestinian insurance companies.

Emerging Technology and Performance: H3 and its sub-hypotheses (H3a–H3d) explore the influence of ET and its components on PER. The results reveal a strong direct effect of ET on PER (β = 0.806, t = 18.923, p < 0.001). Individually, AI (β = 0.069, t = 4.638), BLK (β = 0.119, t = 5.621), IoT (β = 0.141, t = 5.652), and BDA (β = 0.177, t = 5.559) also significantly influence performance, confirming that emerging technologies enhance performance in the insurance sector.

Moderating Role of Risk Management: H4 and its sub-hypotheses (H4a–H4d) examine RM's moderating role in the relationship between ET and PER. The results support the moderating effect of RM (β = 0.331, t = 4.927, p < 0.001), demonstrating that RM strengthens the impact of ET on PER. The moderation effects for individual components are also significant: AI (β = 0.048, t = 4.382), BLK (β = 0.083, t = 4.841), IoT (β = 0.098, t = 4.913), and BDA (β = 0.124, t = 4.896). These findings indicate that RM enhances the effectiveness of ET by mitigating associated risks and optimizing its contribution to performance.

Table 5. Hypotheses Testing

Hypothesis	Direction	*β* coefficient	Std.	*t* Value	*p* Value	Result
H1	ET → RM	0.781	0.027	28.656	0.000	Supported
H1a	AI → ET → RM	0.114	0.009	12.852	0.000	Supported
H1b	BLK → ET → RM	0.196	0.007	28.604	0.000	Supported
H1c	IoT → ET → RM	0.232	0.007	34.413	0.000	Supported
H1d	BDA → ET → RM	0.292	0.010	29.591	0.000	Supported
H2	RM → PER	0.424	0.087	4.859	0.000	Supported
H3	ET → PER	0.806	0.043	18.923	0.000	Supported
H3a	AI → ET → PER	0.069	0.015	4.638	0.000	Supported
H3b	BLK → ET → PER	0.119	0.021	5.621	0.000	Supported
H3c	IoT → ET → PER	0.141	0.025	5.652	0.000	Supported
H3d	BDA → ET → PER	0.177	0.032	5.559	0.000	Supported
H4	ET → RM → PER	0.331	0.067	4.927	0.000	Supported
H4a	AI → ET → RM → PER	0.048	0.009	5.382	0.000	Supported
H4b	BLK → ET → RM → PER	0.083	0.017	4.841	0.000	Supported
H4c	IoT → ET → RM → PER	0.098	0.020	4.913	0.000	Supported
H4d	BDA → ET → RM → PER	0.124	0.025	4.896	0.000	Supported

5.0 Discussion and Implications

This study offers significant insights into the intricate links among Emerging Technology (ET), Risk Management (RM), and Performance (PER) in the Palestinian context of the insurance market. It points also to several critical areas for both theoretical understanding and practical implementation.

Firstly, the performance relationship between emerging technologies and risk management is evidenced by a high positive value (H1 supported). Emerging technologies were well established to perform an essential requirement for the improvement of efficiency in risk management. For example, AI, BLK, IoT, and BDA equip insurers to identify, assess, and mitigate risk in a much more effective manner to enhance adaptation and resilience through operation changes. This finding corroborates studies that maintain that developing technologies improve risk management frameworks (Albris et al., 2020; Mikes & Kaplan, 2014; Moturi & Ogoti, 2020; Ullah et al., 2021). The study also confirmed that risk management is a

direct predictor for performance (H2 supported): proficient risk management approaches generate improved financial, operational, and reputational outcomes for insurance firms.

Moreover, the direct impact of emerging technologies on organizational performance (H3 supported) shows that these technologies have the potential to be revolutionary. This finding supports the growing consensus in current literature that technology adoption increases efficiency as well as customer satisfaction and competitiveness in the marketplace (Kouhizadeh et al., 2021; Moslehpour et al., 2022; Olan et al., 2022). However, the findings indicate that RM moderates this association (H4 supported) by amplifying the positive effects of ET on PER. This suggests that the total benefits of ET can only be realized with comprehensive risk management practices since these mitigate possible risks and improve the outcomes of performance. This finding is also consistent with studies that view RM as an enabler in boosting the strategic impact of technological innovation (Rodríguez-Espíndola et al., 2022; Wang et al., 2010).

The findings emphasize the importance of including RM frameworks to reap the whole potential of ET and achieve improved performance. Managers must ensure priority in spending on risk management technologies and employee training and nurture an innovative culture to ensure the innovative technologies are used well and profitably. This work increases our understanding of how ET is linked through RM in influencing performance and offers practical recommendations to insurers in developing economies.

The findings have practical implications for insurance companies, politicians, and technology suppliers in emerging markets like Palestine. The findings suggest that robust risk management frameworks need to be implemented to alleviate risks associated with emerging technology adoption. Funding for cybersecurity, training, and compliance should be targeted toward maximizing benefits from advances in information communication technology in insurance firms. While using AI for predictive analytics results in operational efficiencies, proactive risk management should address ethical considerations and algorithmic biases that could arise. There remains the need to formulate clear legal frameworks within which transformative technologies can be adopted, while at the same time mitigating their resultant hazards by policymakers. This requires the establishment of comprehensive data privacy legislation and the facilitation of partnerships between public and private sectors to better the digital infrastructure. Lastly, technology suppliers should develop solutions to meet the specific requirements of emerging markets, ensuring access and scalability in resource-poor settings.

6.0 Conclusion, Limitations, and Future Studies

The present study sheds light on the important moderating role played by risk management (RM) in the relationship between emerging technologies (ET) and performance (PER) officers within the Palestinian insurance sector. Results show that effective risk management not only mitigates technology-related risks but also enhances the positive impact of new technologies on performance, highlighting its critical role in promoting an organization's sustainable success. Despite these advances, some limitations exist: causal relationships cannot be developed due to the cross-sectional nature of the method, and applicability could be limited with foci on the Palestinian market. Future research should be longitudinal designs to observe the long-term implications of ET dependence and RM on performance. In addition, comparisons among different emerging markets would provide a broader perspective on the contextual differences in technology adoption, and risk management strategies. Further study into particular regulatory and cultural factors could increase the theory and practice relevance of the study.

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