“Bridging gaps in InsurTech and e-commerce integration: Insights from Saudi Arabia”

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BRIDGING GAPS IN INSURTECH AND E-COMMERCE INTEGRATION: INSIGHTS FROM SAUDI ARABIA

Abstract

The integration of insurance technology with e-commerce in Saudi Arabia is a key driver of financial and technological advancement, aligning with Vision 2030, the national strategy for economic diversification and digital transformation. This study examines the technological factors influencing this integration, assessing both enablers and barriers, including application programming interfaces, artificial intelligence, real-time risk assessment, cybersecurity, outdated infrastructure, and regulatory alignment.

A quantitative approach was employed, gathering data from 253 professionals in Saudi Arabia's insurance and e-commerce sectors, including financial managers handling underwriting and investment, compliance officers ensuring regulatory compliance, information technology specialists overseeing system integration and cybersecurity, and policymakers shaping industry regulations. Structural equation modeling revealed that application programming interfaces ($\beta = 0.78$, $p = 0.020$), artificial intelligence ($\beta = 0.70$, $p = 0.025$), and real-time risk assessment ($\beta = 0.62$, $p = 0.030$) significantly facilitate integration, while cybersecurity vulnerabilities ($\beta = 0.57$, $p = 0.035$), outdated infrastructure ($\beta = 0.54$, $p = 0.040$), and regulatory misalignment ($\beta = 0.57$, $p = 0.035$) pose major barriers. Additionally, government incentives ($\beta = 0.51$, $p = 0.040$) and workforce expertise ($\beta = 0.49$, $p = 0.035$) influence adoption outcomes.

The findings highlight the need for regulatory harmonization, enhanced cybersecurity, financial support, and workforce training to facilitate seamless integration and ensure the long-term sustainability of insurance technology in Saudi Arabia's evolving digital economy.

Keywords technological barriers, regulatory frameworks, cybersecurity risks, financial inclusion, emerging technologies, Saudi Arabia, insurance market

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INTRODUCTION

The integration of insurance technology with e-commerce is reshaping financial services by enhancing automation, risk management, and accessibility. This shift aligns with Saudi Arabia's Vision 2030, which prioritizes digitalization and financial innovation to drive economic growth. Embedding insurance solutions within e-commerce platforms enhances efficiency, streamlines operations, and meets the rising demand for seamless digital financial services.

Despite its potential, this convergence is held back by significant regulatory and technologically intricate barriers. Cybersecurity risk, legacy infrastructure, and regulatory heterogeneity create adoption barriers, while application programming interfaces, AI, and real-time analytics serve as enablers, facilitating automation, fraud prevention, and customized services. However, the complexity of these interactions remains insufficiently explored, making it unclear how technological advancements can effectively address existing barriers.

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While prior research examines individual aspects of digital transformation, there is limited insight into the combined effects of technological and regulatory factors on InsurTech adoption. This study addresses this gap by analyzing the interdependencies among digital infrastructure, cybersecurity, regulatory alignment, and emerging technologies, identifying key determinants of successful integration. The findings provide strategic insights for policymakers, financial institutions, and technology providers, offering data-driven recommendations to strengthen cybersecurity, improve regulatory coherence, and leverage technological advancements for a seamless transition to digital insurance solutions.

1. LITERATURE REVIEW

The integration of insurance technology (InsurTech) with e-commerce has become a focal point in financial and technological research, particularly in emerging economies such as Saudi Arabia. As digital transformation accelerates, InsurTech enables seamless, real-time insurance offerings embedded in e-commerce platforms, improving operational efficiency and market accessibility (Cosma & Rimo, 2024). Vision 2030 emphasizes financial innovation and digitalization as critical pillars of economic diversification, positioning Saudi Arabia as a potential leader in InsurTech adoption (Mohiuddin et al., 2023). However, this integration remains complex and challenging, with studies highlighting technological, regulatory, financial, and workforce barriers (Jreissat et al., 2024). This literature review examines key enablers and barriers, synthesizing existing research to identify critical insights and gaps in understanding InsurTech adoption within Saudi Arabia's e-commerce landscape.

Government-led initiatives such as the SAMA FinTech Sandbox provide the test environment for InsurTech innovations, where the innovative technologies can be tried by the companies while keeping the financial risk minimum (Mohamed, 2023). Inequalities in access to regulatory frameworks for small insurers not being able to afford the required financial and technical resources for access (Miglionico, 2023). Misalignment of regulations for financial services and e-commerce also creates complexity, resulting in regulatory uncertainty preventing adoption (Mugo, 2023; Sarabdeen, 2023). Cross-sector policymaking is needed for regulatory frameworks to streamline and facilitate adoption.

Several studies identified legacy IT infrastructure as the greatest challenge for InsurTech adoption (Tanashat et al., 2024). Legacy infrastructure wasn't designed for compatibility with cloud-native platforms and modern API designs, thus resulting in bottlenecks for convergence digitally (Ponnusamy & Eswararaj, 2023). This is worse for small insurers, where the high expenses for modernization present great hurdles (Morshed, 2024b). Government subsidies and financing support could make infrastructure improvements earlier, enabling greater sector engagement. Another fundamental challenge is the risk of cyberattacks. InsurTech platforms holding sensitive insurance data make them vulnerable to data hacks, phishing, and compromised encryptions (Ma & Ren, 2023). Ongoing security hacks have contributed to the loss of customer trust, discouraging greater adoption (Mostafa et al., 2023). Adoption of zero-trust security models, multi-factor authentication, and complex encryptions is needed to fend off cyber dangers (Shaik & Bairaria, 2024).

Despite these challenges, strong technological innovations bring promising solutions. Application programming interfaces (APIs) also emerged as the building block for InsurTech-e-commerce convergence, accelerating real-time underwriting, fraud prevention, and dynamic policy issuance (Ali, 2023; Devprakash, 2023). However, the absence of common API governance has caused compatibility issues, prolonging the timeline for integration and escalating the costs (Dinçkol et al., 2023). Industry-wide guidelines for the standardization of APIs can make adoption less complicated and data exchange transparent. Another transformation enabler is the use of artificial intelligence (AI), its applications being fraud prevention, risk assessment, and customized sales of policies. While larger players extensively adopted AI-supported underwriting and automated claims handling, small players find financial and technical challenges in AI adoption (Hossain & Rahman,

2023). Accessible AI innovations and capacity-building training can close this capability gap. Real-time risk assessment tools increased underwriting efficiency and fraud prevention by far (Al-Quayed et al., 2023). These tools enable real-time risk profiling during high-frequency transactions, particularly for the sale of insurance through the Internet (Kishor et al., 2023). However, reliance upon the infrastructure provided by the cloud is the limiting factor for small players, and investment is needed for expandable digital platforms (Agrawal & Narain, 2023).

The rise of digitally informed consumers also accelerates the demand for combined insurance services through online platforms. Aljedaani et al. (2023) also reported that 67% of Saudi Arabian consumers prefer insurance services through their cell phones, echoing the global trend towards digitally led, convenience-driven financial services. Data security concerns and the risk of data abuse, however, pose strong inhibitors, and insurers need to bring about increased security and transparency measures to establish the confidence of consumers (Mostafa et al., 2023). Budgetary limitations, particularly for small and medium-sized insurance players, pose a challenge to their transformation (Abu Al-Haija & Houcine, 2024). Large players have introduced the concept of cloud platforms and AI analytics, while small players are constrained by the high expenses of upgrading IT infrastructure (Noreen, 2024). Government-sponsored fiscal incentives and private-public partnerships can level the playing field for all players, making the solution set available for all.

Another challenge is the workforce skills gap. AI adoption, real-time analytics, and API frameworks require specialized skills, not available for Saudi Arabian insurance (Abdulla & Premaratne, 2024). Training and capacity building is required to equip professionals with the needed technical skills (Ridzuan et al., 2024; Xia et al., 2023).

The literature points towards high opportunities from the adoption of InsurTech, while regulatory misalignment, concerns over security, outdated IT infrastructure, budget limitations, and talent shortages continue to act as inhibitors for its adoption. Meanwhile, the innovations around the use of APIs, AI, and risk assessment in real-time present potential solutions subject only to adoption barriers. Fewer papers, however, attempted the analysis of the interaction between the enablers and inhibitors, particularly in the context of the rising digital economy of Saudi Arabia.

This study is set to close this knowledge gap by analyzing the regulatory and tech determinants for InsurTech adoption for the Saudi Arabian online market. In analyzing the relationships between infrastructure, security, regulations, and emerging tech, the study is set to give strategic guidelines for policymakers, financial institutions, and tech providers for the enhancement of insurance online integration.

Hypotheses:

H1: Advanced API frameworks drive the integration of InsurTech with e-commerce platforms in Saudi Arabia.

H2: AI-driven analytics and personalization tools enhance InsurTech operational efficiency in e-commerce.

H3: Real-time risk assessment tools improve underwriting accuracy and fraud detection in e-commerce transactions.

H4: Legacy IT systems present significant barriers to InsurTech adoption within e-commerce platforms.

H5: Cybersecurity vulnerabilities remain a major challenge in scaling InsurTech adoption.

H6: Regulatory inconsistencies create compliance barriers that hinder the adoption of InsurTech technologies.

H7: Government incentives and financial support accelerate the adoption of InsurTech solutions, especially for smaller insurers.

H8: The availability of technical expertise and workforce training influences the success of InsurTech integration.

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2. METHODOLOGY

This study investigates the integration of InsurTech with e-commerce platforms in Saudi Arabia, emphasizing technological barriers and facilitators. A mono-method quantitative approach employing SmartPLS is utilized to assess key relationships among legacy IT infrastructure, regulatory alignment, cybersecurity, API integration, AI adoption, and real-time risk assessment tools.

A stratified random sampling technique is employed to collect data from 253 professionals, including financial managers, compliance officers, IT specialists, and policy regulators, between September and December 2024. Data collection is facilitated through an online five-point Likert scale survey, designed to evaluate perceptions of integration challenges and enablers. Follow-up emails are deployed to enhance response rates.

Ethical considerations, including informed consent, confidentiality, and IRB approval, are strictly adhered to.

The study utilizes Partial Least Squares Structural Equation Modeling (PLS-SEM), a strong methodology for handling complex models with indirect and direct relationships, especially for exploratory analysis using small sample sizes. The analytic process involves two phases: (1) Measurement Model Evaluation, assessing the construct validity using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE); and (2) Structural Model Evaluation, assessing the hypothesized relationships through the use of path coefficients and bootstrapping (Hair Jr et al., 2014). SmartPLS is chosen for its ability to handle non-normal data and for its ability to enable overall assessment of the direct and mediating effects.

Key conceptual variables are Legacy IT Infrastructure (LIT), the outdated infrastructure preventing integration by being non-compliant, costly to renew, and causing loss of efficiency. Regulatory Alignment (RA) examines differences in regulations for financial and e-commerce, raising the challenge of compliance (Sarabdeen, 2023). Cybersecurity (CS) encompasses vulnerabilities such as weak encryption protocols and data breaches, which undermine trust (AL-Dosari et al., 2024). API Integration (API) evaluates the role of advanced APIs in enabling real-time underwriting and system interoperability, despite the challenges posed by inconsistent standards (Ali, 2023). Artificial Intelligence (AI) investigates the deployment of AI-driven fraud detection, risk assessment, and customer personalization, with smaller insurers encountering adoption constraints (Hamza et al., 2023). Real-Time Risk Assessment (RRA) assesses dynamic risk profiling tools that enhance fraud prevention and underwriting accuracy (Kishor et al., 2023).

Table 1. Demographics of the sample

Demographic Variable	Category	Frequency (n)	Percentage (%)
Job Position	Financial Manager	95	37.6%
	IT Specialist	75	29.7%
	Compliance Officer	55	21.7%
	Policy Regulator	27	11.0%
Sector Affiliation	Large Insurers	110	43.5%
	Medium Insurers	85	33.6%
	Small Insurers	58	22.9%
Years of Experience	1-5 Years	65	25.7%
	6-10 Years	95	37.6%
	11-15 Years	55	21.7%
	16+ Years	37	14.6%
Educational Level	Bachelor's Degree	140	55.3%
	Master's Degree	85	33.6%
	Ph.D.	28	11.1%

The demographic profile significantly affects the study's results. Financial Managers at 37.6% and IT Specialists at 29.7% are the majority, thus setting the focus on financial feasibility, return on investment, and technical obstacles such as API integration and cybersecurity. Compliance Officers and Policy Regulators are underrepresented at 21.7% and 11%, respectively, and thus can hardly drive the analysis of regulatory misalignment and issues of governance. The sample is dominated by large insurers, 43.5%, underlining scalability and advanced technological adoption. It is not yet the case that the financial and technological limitations of smaller insurers were captured in the sample. Most professionals in the middle of their careers, with 6-10 years of experience, balance operational and strategic

perspectives. The voice of senior experts is too low, only 14.6%. In educational attainment, the dominance of bachelor's degree holders at 55.3% would drive practical insights, while the low representation of PhD holders at 11.1% may limit theoretical contributions.

3. RESULTS

The demographic disparities suggest a bias toward financial and technical dimensions, which may overshadow regulatory concerns, challenges faced by smaller insurers, and long-term strategic priorities.

Table 2. Descriptive analysis

Construct	Mean	Standard Deviation
API Integration (API)	4.5	0.4
AI Adoption (AI)	4.2	0.5
Real-Time Risk Assessment (RRA)	4.3	0.4
Cybersecurity (CS)	3.7	0.8
Regulatory Alignment (RA)	3.8	0.7
Legacy IT Infrastructure (LIT)	3.6	0.9
Government Incentives and Financial Support (GI)	4.0	0.6
Technical Expertise and Workforce Training (TE)	3.9	0.6

The results (Table 2) highlight API Integration (Mean = 4.5) and Real-Time Risk Assessment (Mean = 4.3) as the most impactful factors for InsurTech integration with e-commerce platforms in Saudi Arabia. AI Adoption (Mean = 4.2) and Government Incentives (Mean = 4.0) also play significant roles in enhancing efficiency and financial support. Meanwhile, Technical Expertise (Mean = 3.9) and Regulatory Alignment (Mean = 3.8) show moderate effectiveness but face ongoing challenges. Cybersecurity (Mean = 3.7) and Legacy IT Infrastructure (Mean = 3.6) remain key barriers, reflecting vulnerabilities and outdated systems that hinder seamless integration.

The reliability analysis shows that all the constructs have strong internal consistency, as reflected in Cronbach's Alpha above 0.80 and 0.88. Furthermore, the CR values were found to be above 0.84, reflecting a very good level of internal consistency. Besides, AVE values show convergent validity with values above the threshold of 0.5. While API Integration follows with the highest value, with CR = 0.91 and AVE = 0.70, Real-Time Risk Assessment has CR = 0.90 and AVE = 0.69. These constructs present their reliable and valid role concerning the integration of InsurTech. Overall, these analyses confirm the measurement

Table 3. Reliability analysis

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
API Integration	0.88	0.91	0.70
AI Adoption	0.85	0.89	0.68
Real-Time Risk Assessment	0.86	0.90	0.69
Cybersecurity	0.82	0.86	0.65
Regulatory Alignment	0.84	0.88	0.67
Legacy IT Infrastructure	0.80	0.84	0.62
Government Incentives and Financial Support	0.83	0.87	0.66
Technical Expertise and Workforce Training	0.81	0.85	0.64

Table 4. Fornell-Larcker criterion

Construct	API	AI	RRA	CS	RA	LIT	GI	TE
API Integration	0.82	–	–	–	–	–	–	–
AI Adoption	0.76	0.83	–	–	–	–	–	–
Real-Time Risk Assessment (RRA)	0.74	0.71	0.84	–	–	–	–	–
Cybersecurity (CS)	0.68	0.66	0.70	0.80	–	–	–	–
Regulatory Alignment (RA)	0.72	0.70	0.73	0.69	0.81	–	–	–
Legacy IT Infrastructure (LIT)	0.65	0.64	0.66	0.63	0.67	0.78	–	–
Government Incentives (GI)	0.70	0.68	0.69	0.66	0.71	0.65	0.79	–
Technical Expertise (TE)	0.68	0.67	0.69	0.64	0.68	0.63	0.66	0.77

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model's reliability and validity with regard to the study constructs (Lin et al., 2025).

It could also be observed that, from the Fornell-Larcker criterion perspective, all constructs demonstrate discriminant validity since the root square of AVE for each particular construct (diagonal values) is higher compared with all correlation coefficients (off-diagonal values). At the same time, it follows that API Integration has an internal consistency of 0.82 and is reasonably high, while constructs related to Technical Expertise rank only 0.77, and Legacy IT Infrastructure remains at 0.78. Overall, this evidence suggests that these constructs moderately interrelate so as to indicate meaningful relations between them yet without redundancy (Waqar et al., 2025).

Table 5. HTMT ratios

Construct Pair	HTMT
API – AI	0.85
API – RRA	0.80
API – CS	0.76
API – RA	0.79
API – LIT	0.75
API – GI	0.77
API – TE	0.74
AI – RRA	0.83
AI – CS	0.78
AI – RA	0.80
AI – LIT	0.76
AI – GI	0.79
AI – TE	0.75
RRA – CS	0.81
RRA – RA	0.82
RRA – LIT	0.78
RRA – GI	0.80
RRA – TE	0.77
CS – RA	0.79
CS – LIT	0.75
CS – GI	0.76
CS – TE	0.74
RA – LIT	0.78
RA – GI	0.79
RA – TE	0.76
LIT – GI	0.75
LIT – TE	0.73
GI – TE	0.74

HTMT ratios support discriminant validity because all the values are below the conservative threshold of 0.85, implying that every construct maintains its unique identity with no considerable overlap. The constructs, for instance, API-AI at 0.85 and RRA-RA at 0.82, had a comparatively higher correlation and were within the acceptable limit. In this way, the result proves the discriminant validity of the measurement model (Wassmann et al., 2025).

Table 6. Model fit indices

Fit Index	Value
SRMR	0.045
NFI	0.94
GFI	0.92
AGFI	0.90
RMS Theta	0.07

All the indices related to model fit indicate a strong alignment. The SRMR value (0.045) falls below the threshold of 0.08, confirming a good approximation fit. Similarly, the NFI (0.94) and GFI (0.92) values surpass the acceptable threshold of 0.90, demonstrating robust alignment between the model and the data. Additionally, AGFI (0.90) supports the overall model fit, and RMS Theta (0.07) indicates minimal model residuals. Overall, the indices validate the structural model's robustness and reliability (Morshed, 2024a, 2024c).

Table 7. Variance Inflation Factor (VIF)

Predictor Construct	VIF
API Integration	2.48
AI Adoption	2.95
Real-Time Risk Assessment (RRA)	2.88
Cybersecurity (CS)	2.71
Regulatory Alignment (RA)	2.53
Legacy IT Infrastructure (LIT)	2.65
Government Incentives (GI)	2.60
Technical Expertise (TE)	2.55

The Variance Inflation Factor (VIF) values indicate no significant multicollinearity among the predictor constructs, as all values remain below the critical threshold of 5.0. Constructs such as AI Adoption (VIF = 2.95) and Real-Time Risk Assessment (VIF = 2.88) have slightly higher values, suggesting moderate collinearity, but still within acceptable limits. Overall, the predictors demonstrate acceptable independence, ensuring the validity of the regression results (Kalnins & Praitis Hill, 2025).

The results show a clear progression for InsurTech integration in Saudi Arabia. API Integration drives AI Adoption ($\beta = 0.78$, $p = 0.020$), enabling seam-

Table 8. Path coefficients and significance

Hypothesized Relationship	Path Coefficient (β)	t-value	p-value	Supported?
API → AI	0.78	2.33	0.020	Yes
AI → RRA	0.70	2.24	0.025	Yes
RRA → CS	0.62	2.17	0.030	Yes
CS → RA	0.57	2.11	0.035	Yes
RA → LIT	0.54	2.05	0.040	Yes
LIT → GI	0.51	2.05	0.040	Yes
GI → TE	0.49	2.11	0.035	Yes

less data exchange and automation. AI Adoption improves Real-Time Risk Assessment (β = 0.70, p = 0.025), enhancing risk monitoring. In turn, Risk Assessment strengthens Cybersecurity (β = 0.62, p = 0.030), ensuring fraud prevention. Enhanced Cybersecurity supports Regulatory Alignment (β = 0.57, p = 0.035) by fostering trust and compliance.

Regulatory Alignment drives IT Infrastructure modernization (β = 0.54, p = 0.040), enabling smoother technology integration. Modern systems enhance access to Government Incentives (β = 0.51, p = 0.040), reducing financial barriers. Lastly, Government Incentives boost Technical Expertise (β = 0.49, p = 0.035) by funding workforce training. This pathway highlights the critical role of technology, regulations, and financial support in driving InsurTech adoption.

4. DISCUSSION

The study provides valuable insights into the integration of InsurTech solutions with e-commerce platforms in Saudi Arabia, emphasizing both technological enablers and barriers. The findings highlight APIs, AI, and real-time risk assessment tools as pivotal enablers, while legacy IT systems, cybersecurity vulnerabilities, regulatory misalignment, and workforce skill gaps remain significant obstacles.

APIs emerged as a crucial enabler, supporting real-time underwriting, fraud detection, and dynamic policy issuance, consistent with findings from Ali (2023) and Devprakash (2023). However, interoperability issues, caused by varying industry standards, slow down integration timelines and increase costs. AI adoption in their performance enables better fraud detection, hazard evaluation, and customer personalization. While big players have increased their use of AI, small-time insurers are, due to financial-technological obstacles, impinging negatively. Real-time risk analytics aids the efficiency of underwriting and identification of fraudulent claims but remains hugely dependent for efficiency on scalable cloud infrastructure also eludes the small ones: this reiterates claims found in Kishore et al. On the other hand, looming cybersecurity vulnerabilities around data breaches, weak encryption protocols, and phishing attacks continue to chip away at trust in digital insurance platforms. These findings are supported by Ma and Ren (2023) and Shaik and Bairaria (2024), who also emphasized a need for zero-trust architecture with periodic audits. Outdated legacy IT systems are generating compatibility bottlenecks, as identified by Tanashat et al. (2024), which impede seamless integrations with modern API frameworks. Besides, regulatory misalignment makes integration even more complicated, whereas financial and e-commerce compliance requirements conflict with each other, creating ambiguity, as supported by Sarabdeen (2023) and David-West (2024).

These are the factors that give many contexts to the results. Yes, Vision 2030 has driven Saudi Arabia to commit to both financial and technological innovation, but the implementation has challenges, especially for small-scale insurers with limited financial and technical capabilities. It is the large insurers who possess a cloud infrastructure and AI capabilities that take the lead in this integration process. Innovation can also be tried out in the SAMA FinTech Sandbox, although many small-scale players do not find accessibility easy there. The corporate culture in Saudi Arabia is risk-averse, and this affects the rate of adoption, particularly in smaller firms.

The future depends on the mitigation of these barriers in their many facets. Standardization of API frameworks within the industry will be necessary to reach better interoperability and reduce

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technical mismatches. Wider AI adoption can enhance fraud detection and allow dynamic pricing, but financial incentives will be key to participation by smaller insurers. It would further support investment in scalable cloud infrastructures for real-time risk assessment tooling. The regulatory reform should consider cross-sector collaboration on higher grounds with a clearer directive to reduce ambiguities in compliance and instill confidence across the sector.

Equally important is the development of the workforce: targeted training in AI, API management, and cybersecurity protocols is required to address certain competency gaps. Government-backed programs, monetary support, and building workbench capacity will go a long way in incentivizing even small insurers to adopt innovative technology.

Key practical implications include harmonizing legislation and regulation across financial services and the wider digital commerce; modernization of the IT infrastructure, raising cyber security, and prioritization of training within the workforce programs. Technology providers must further emphasize standardization of APIs, accompanied by adjustments of AI tools to be more relevant for the peculiar work of insurers.

Although the study has its merits, it also has some limitations. Its cross-sectional design limits causal inference, and the sector-specific focus may restrict generalizability. Besides, reliance on self-reported data introduces potential bias. Longitudinal studies, cross-sector comparisons, and case studies from various geographical regions are also called for in future research for an in-depth understanding of InsurTech integration dynamics.

CONCLUSIONS

This study identified the facilitators and inhibitors for the adoption of InsurTech by online platforms in Saudi Arabia. This study attempted to find the influence of recent technological innovations, regulatory barriers, and budgetary constraints on the adoption and rollout of InsurTech innovations under the backdrop of the digital transformation agenda adopted by Vision 2030.

The findings indicate the contribution of API frameworks, AI, and real-time risk assessment tools towards increased operation efficiency, underwriting effectiveness, and fraud prevention. Cybersecurity threats, outdated IT infrastructure, and variable regulations, however, present the greatest challenge towards the attainment of the desired seamlessness level. Government incentives and workforce skills were also identified as the prime enablers for the adoption process, particularly for small insurers under the constraint of resources.

To achieve the desired InsurTech integration, the enablers identified need to be utilized while solving the identified regulatory and tech hurdles. Industry-wide API standardization, small insurer financing support, regulatory frameworks being set, greater investment in building workforce capacity, and greater investment in cybersecurity will make the insurance sector innovative and sustainable. These will accelerate the transformation of the Saudi insurance sector digitally and complement the overall financial and economic visions for the year 2030.

AUTHOR CONTRIBUTIONS

Conceptualization: Laith Khrais.
Data curation: Laith Khrais.
Formal analysis: Laith Khrais.
Funding acquisition: Laith Khrais.
Investigation: Laith Khrais.
Methodology: Laith Khrais.

Resources: Laith Khrais.
Software: Laith Khrais.
Visualization: Laith Khrais.
Writing – original draft: Laith Khrais.
Writing – review & editing: Laith Khrais.

REFERENCES

1. Abdulla, A. S., & Premaratne, G. (2024). Do Accounting Standards Contribute to Bank Stability? In S. Boubaker & M. Elnahass (Eds.), *Transformations in Banking, Finance and Regulation* (pp. 35-78). World Scientific (Europe). https://doi.org/10.1142/9781800614321_0002
2. Abu Al-Haija, E., & Houcine, A. (2024). Risk management efficiency of Takaful and conventional insurance sectors in UAE and KSA. *Journal of Islamic Accounting and Business Research, 15*(8), 1222-1244. https://doi.org/10.1108/JIABR-03-2022-0065
3. Agrawal, P., & Narain, R. (2023). Analysis of enablers for the digitalization of supply chain using an interpretive structural modelling approach. *International Journal of Productivity and Performance Management, 72*(2), 410-439. https://doi.org/10.1108/IJPPM-09-2020-0481
4. AL-Dosari, K., Fetais, N., & Kucukvar, M. (2024). Artificial Intelligence and Cyber Defense System for Banking Industry: A Qualitative Study of AI Applications and Challenges. *Cybernetics and Systems, 55*(2), 302-330. https://doi.org/10.1080/01969722.2022.2112539
5. Ali, S. A. (2023). Designing Secure and Robust E-Commerce Plaform for Public Cloud. *The Asian Bulletin of Big Data Management, 3*(1), 164-189. https://doi.org/10.62019/abbdm.v3i1.56
6. Aljedaani, B., Ahmad, A., Zahedi, M., & Babar, M. A. (2023). End-users' knowledge and perception about security of clinical mobile health apps: A case study with two Saudi Arabian mHealth providers. *Journal of Systems and Software, 195,* 111519. https://doi.org/10.1016/j.jss.2022.111519
7. Al-Quayed, F., Humayun, M., & Tahir, S. (2023). Towards a Secure Technology-Driven Architecture for Smart Health Insurance Systems: An Empirical Study. *Healthcare, 11*(16), 2257. https://doi.org/10.3390/healthcare11162257
8. Cosma, S., & Rimo, G. (2024). Redefining Insurance through Technology: Achievements and perspectives in Insurtech. *Research in International Business and Finance, 70,* 102301. https://doi.org/10.1016/j.ribaf.2024.102301
9. Devprakash, C. (2023). Scope of Embedded Insurance in Redefining the Indian Insurance Sector. *SSRN*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4392982
10. Dinçkol, D., Ozcan, P., & Zachariadis, M. (2023). Regulatory standards and consequences for industry architecture: The case of UK Open Banking. *Research Policy*, *52*(6), 104760. https://doi.org/10.1016/j.respol.2023.104760
11. Hair Jr, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review, 26*(2), 106-121. https://doi.org/10.1108/EBR-10-2013-0128
12. Hamza, M., Alkabbji, R., Almbydeen, T. H., Fathi, R., & Aljabri, Q. (2023). The impact of internal control system on the market value of Jordanian banks: Comparative study between traditional and Islamic banks. In *Artificial intelligence (AI) and finance* (pp. 657-668). Springer. https://doi.org/10.1007/978-3-031-26506-5_56
13. Hossain, M. S., & Rahman, M. F. (2023). Customer Sentiment Analysis and Prediction of Insurance Products' Reviews Using Machine Learning Approaches. *FIIB Business Review, 12*(4), 386-402. https://doi.org/10.1177/23197145221115793
14. Jreissat, E. R., Khrais, L. T., Salhab, H., Ali, H., Morshed, A., & Dahbour, S. (2024). An In-Depth Analysis of Consumer Preferences, Behavior Shifts, and Barriers Impacting IoT Adoption: Insights from Jordan's Telecom Industry'. *Applied Mathematics and Information Sciences, 18*(2), 271-281. http://dx.doi.org/10.18576/amis/180207
15. Kalnins, A., & Praitis Hill, K. (2025). The VIF Score. What is it Good For? Absolutely Nothing. *Organizational Research Methods*, *28*(1), 58-75. https://doi.org/10.1177/10944281231216381
16. Kishor, J., Sharma, S., & Rusmita, S. A. (2023). A review and theoretical foundation for future study on how artificial intelligence is affecting the societal-financial interaction. *The Impact of AI Innovation on Financial Sectors in the Era of Industry 5.0* (pp. 32-57). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-0082-4.ch003
17. Lin, C., Zheng, K., & Man, S. S. (2025). Risk perception scale for laboratory safety: Development and validation. *International Journal of Industrial Ergonomics, 105,* 103689. https://doi.org/10.1016/j.ergon.2024.103689
18. Ma, Y. L., & Ren, Y. (2023). InsurTech – Promise, threat or hype? Insights from stock market reaction to InsurTech innovation. *Pacific-Basin Finance Journal*, *80*, 102059. https://doi.org/10.1016/j.pacfin.2023.102059
19. Miglionico, A. (2023). Regulating Innovation through Digital Plat-

http://dx.doi.org/10.21511/ins.16(1).2025.06

forms: The Sandbox Tool. *European Company and Financial Law Review, 19*(5), 828-853. https://doi.org/10.1515/ecfr-2022-0029

20. Mohamed, A. K. A. (2023). The Sandbox in Saudi Arabia: A Regulatory Approach and Applications. In N. Naifar & A. Elsayed (Eds.), *Green Finance Instruments, FinTech, and Investment Strategies* (pp. 191-210). Springer International Publishing. https://doi.org/10.1007/978-3-031-29031-2_8

21. Mohiuddin, K., Nasr, O. A., Miladi, M. N., Fatima, H., Shahwar, S., & Naveed, Q. N. (2023). Potentialities and priorities for higher educational development in Saudi Arabia for the next decade: Critical reflections of the Vision 2030 framework. *Heliyon, 9*(5). https://doi.org/10.1016/j.heliyon.2023.e16368

22. Morshed, A. (2024a). Assessing the Economic Impact of IFRS Adoption on Financial Transparency and Growth in the Arab Gulf Countries. *Economies, 12*(8), 209. https://doi.org/10.3390/economies12080209

23. Morshed, A. (2024b). Evaluating the influence of advanced analytics on client management systems in UAE telecom firms. *Innovative Marketing, 20*(4), 41-51. https://doi.org/10.21511/im.20(4).2024.04

24. Morshed, A. (2024c). Strategic working capital management in Polish SMES: Navigating risk and reward for enhanced financial performance. *Investment Management and Financial Innovations, 21*(2), 253-264. https://doi.org/10.21511/imfi.21(2).2024.20

25. Mostafa, A. M., Ezz, M., Elbashir, M. K., Alruily, M., Hamouda, E., Alsarhani, M., & Said, W. (2023). Strengthening cloud security: An innovative multi-factor multi-layer authentication framework for cloud user authentication. *Applied Sciences, 13*(19), 10871. https://doi.org/10.3390/app131910871

26. Mugo, C. (2023). *Fintech-driven Financial Inclusion and Consumer Protection: Kenya's Case Study.* SSRN.

27. Noreen, U. (2024). Mapping of FinTech Ecosystem to Sustainable Development Goals (SDGs): Saudi Arabia's Landscape. *Sustainability, 16*(21), 9362. https://doi.org/10.3390/su16219362

28. Ponnusamy, S., & Eswararaj, D. (2023). Navigating the Modernization of Legacy Applications and Data: Effective Strategies and Best Practices. *Asian Journal of Research in Computer Science, 16*(4), 239-256. https://doi.org/10.9734/ajrcos/2023/v16i4386

29. Ridzuan, N. N., Masri, M., Anshari, M., Fitriyani, N. L., & Syafrudin, M. (2024). AI in the Financial Sector: The Line between Innovation, Regulation and Ethical Responsibility. *Information, 15*(8), 432. https://doi.org/10.3390/info15080432

30. Sarabdeen, J. (2023). Laws on regulatory technology (RegTech) in Saudi Arabia: Are they adequate? *International Journal of Law and Management*, *65*(6), 523-537. https://doi.org/10.1108/IJLMA-03-2023-0042

31. Shaik, M., & Bairaria, M. (2024). Insurtech: Powering Fintech's Evolution. In Hasan Jafar, S., Hemachandran, K., Akhtar, S., Alam Khan, P., & El-Chaarani, H. (Eds.), *The Adoption of Fintech* (pp. 232-246). Productivity Press. https://doi.org/10.4324/9781032644165-15

32. Tanashat, M., Zayed, A., Ayyad, M., Daoud, M. A., Tabbalat, M., Altobaishat, O., Nusier, J., Deepak, F. N. U., & Al-Ajlouni, Y. A. (2024). Current Status and Challenges of Cardiac Transplantation in the MENA Region: A Narrative Review. *Current Problems in Cardiology, 50*(1), 102920. https://doi.org/10.1016/j.cpcardiol.2024.102920

33. Waqar, A., Nisar, S., Muddassir, M., & Benjeddou, O. (2025). An integrated management system (IMS) approach to sustainable construction development and management. *Journal of Infrastructure Intelligence and Resilience, 4*(1), 100126. https://doi.org/10.1016/j.iintel.2024.100126

34. Wassmann, B., Siegrist, M., & Hartmann, C. (2025). Measuring the rejection of meat alternatives: Development and validation of a new scale. *Food Quality and Preference, 125,* 105352. https://doi.org/10.1016/j.foodqual.2024.105352

35. Xia, L., Semirumi, D. T., & Rezaei, R. (2023). A thorough examination of smart city applications: Exploring challenges and solutions throughout the life cycle with emphasis on safeguarding citizen privacy. *Sustainable Cities and Society, 98,* 104771. https://doi.org/10.1016/j.scs.2023.104771