Designing a Model for Implementing Technologies in Insurance: A Qualitative Study

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A r t i c l e   I n f o

A B S T R A C T

Objective: The primary objective of this study is to present a paradigmatic model for the adoption and utilization of insurance technologies (InsurTech) in domestic insurance companies with a special emphasis on open innovation.

Methodology: This qualitative research utilized a grounded theory approach. Data were collected through semi-structured interviews with 12 experts, including university professors in the field of insurance, senior managers of insurance companies, stakeholders, and policyholders. Theoretical sampling was used, and the interviews continued until theoretical saturation was reached. Data analysis involved three stages of coding: open coding, axial coding, and selective coding, using MAXQDA software. In total, 150 open codes, 21 category codes, and 6 final axial codes were identified.

Findings: The results revealed that the adoption and utilization of insurance technologies in domestic insurance companies are influenced by several main components, including knowledge management, behavioral factors, practical factors, infrastructure, technology perception, and managerial factors. The study also highlighted the significance of open innovation in accelerating the transformation of the insurance industry. The findings are consistent with previous studies by Sionani et al. (2023), Wang (2021), and Kuitanovich (2021), which emphasize that technology adoption is a multi-dimensional phenomenon influenced by perceptions, attitudes, beliefs, and engagement levels of individuals and organizations.

Conclusion: This study concludes that the adoption of insurance technologies, supported by open innovation, is essential for the digital transformation of the insurance sector. Factors such as managerial behavior, customer engagement, technological infrastructure, and knowledge management play critical roles in the successful implementation of these technologies.

Keywords: *Insurance technologies, InsurTech, open innovation, digital transformation, grounded theory, insurance companies, technology adoption.*

1   Introduction

In the modern era, innovation coupled with technology has become two essential elements necessary for many industries and businesses. In the insurance industry, these two elements are also vital, and insurance managers must recognize their significance and role. Insurers are undoubtedly aware of the potential capacities of innovation to enhance their businesses. They understand that innovation helps them quickly outpace their competitors. However, due to the constant pressure from disruptive forces, they prefer to focus on operational innovation rather than pursuing a growth-oriented innovative strategy (Shoghi Aghjeh Mashhad et al., 2023).

For global insurance companies, the concepts of digital transformation and disruptive innovation have gradually become less ambiguous, to the extent that today these concepts are viewed as high-priority initiatives for execution and are on the agenda of senior leaders. New competitive threats, ongoing cost pressures, outdated technologies, increasing regulatory requirements, and unfavorable financial performances are among the drivers that make significant changes and new business models inevitable. In addition to these drivers, advancements enabled by the power of technology put further pressure on insurance companies, making it essential for nearly every insurer worldwide—regardless of size, structure, or specific circumstances—to immediately plan for change and include digital transformation on their agenda (Sionani et al., 2023).

Changes in customer expectations and demographic shifts necessitate innovation in the insurance industry. The adoption of technology and digital transformation in the insurance sector, the industrial revolution in insurance, and the creation and maintenance of a value-based relationship with customers are key drivers behind the emergence of InsurTech. These companies aim to transform the business model of the insurance industry and offer innovative solutions related to the customer value chain. Some of these innovations include the digital distribution of insurance products, the automation of operational processes to enhance efficiency, encouraging customers to adopt healthy lifestyles (preventing losses), offering personalized insurance products, providing micro-insurance policies, and delivering value-added services alongside insurance policies. These innovations are made possible through the use of advanced technologies, a focus on improving customer experience, an agile culture, and the utilization of data analytics tools for smart business decision-making. Examples of these technologies in the insurance industry include artificial intelligence, big data analytics, the Internet of Things, drones, robotics, virtual and augmented reality, wearable smart devices, MedTech and smart healthcare, genetics, and blockchain (Kelley & Wang, 2021; Wang, 2021).

InsurTech, or insurance technologies, is one of nine subfields of FinTech that leverages big data, artificial intelligence, and the Internet of Things to collect and analyze customer information for better insurance services tailored to each customer's needs. Insurance technologies significantly contribute to the delivery, distribution, and management of insurance services through the innovative application of technology. Moreover, these emerging technologies and innovative business models have the potential to bring about extensive changes in the insurance industry's business operations. In another definition, InsurTech often includes the adoption of modern financial technologies and FinTech solutions by insurance companies, enabling them to reach new customers and offer more suitable and personalized products and services to both existing and new clients (Akhareti, 2020).

The emergence of insurance technology has provided an opportunity to enhance the sales of insurance services by gaining the trust of the public and industries. This has allowed individuals, businesses, and entrepreneurs to increase the security of their business and economic activities. Notably, the global outbreak of COVID-19 in the past two years has intensified the shift toward investing in insurance technology and InsurTech startups, opening a new chapter in the use of online insurance services worldwide (Parsamanesh et al., 2021).

Many insurance companies have witnessed not only the profound impact of insurance technology on creating fundamental changes in business patterns, processes, and risk management practices but also the influence on the profitability and survival of traditional insurers. These companies have come to realize that collaborating with these fresh yet powerful competitors is the only way to sustain their resilience in this environment. Today, the use of insurance technology holds a special place in both developed and developing countries due to its ability to enhance business value and improve operations, making it a competitive advantage for insurance companies (Bahrami et al., 2022; Gharakhani & Pourhashemi, 2022; Taghva & Noori, 2016).

Economic entities, including InsurTech insurance companies, must focus on profit generation to maintain their market presence and expand services. Profitability is directly

linked to attracting and retaining customers. The use of new and diverse services to ensure customer satisfaction and retention can play a pivotal role in attracting and ultimately increasing public trust and investment in insurance. With the rapid growth of information and communication technology, fundamental changes have occurred in business operations, and insurance companies have not been exempt from this, undergoing major shifts in managerial methods and information-based, system-driven businesses (Akhareti, 2020).

In recent years, the presence of startups and InsurTech companies, initially entering the insurance sector through the sale of insurance policies, has led to some changes in this domain. With proper leadership, these startups can design innovative products and services, driving new developments in the industry. Their potential and capabilities can be harnessed practically, enabling InsurTech to drive transformation or solve issues throughout the value chain by utilizing technology with a customer-centric approach to create value (Bahadori et al., 2017).

Insurance technologies offer numerous benefits, including improved efficiency and effectiveness, the development of products and services that meet the current needs of policyholders, cost reduction, increased customer loyalty, and, as a result, the creation of long-term relationships. Furthermore, the use of the latest technologies and the extensive implementation of big data analytics have led to a reduction in risk and better detection of fraud, which has long been a fundamental challenge for the insurance industry (Parsamanesh et al., 2021).

Open innovation refers to the deliberate commercialization and absorption of internally developed ideas within an organization's external environment. In open innovation systems, the dynamics of the system shape and drive growth and development (Nurse-Clarke & Joseph, 2022). The core idea of open innovation is that an organization opens its innovation process to other companies, individuals, research institutions, universities, customers, and suppliers to ensure the flow of ideas both inside and outside the organization. In doing so, the organization can benefit from external resources for exploration and internal resources for exploitation (Pour Sadegh, 2017). To measure the variable of open innovation, three components were used: organizational readiness, collaborative capabilities, and absorptive capacity. Organizational readiness refers to factors present in innovative organizations related to dynamic capabilities for change, process design, and technology improvement.

Collaborative capabilities are at the core of the open innovation debate and can be described as the ability to integrate and leverage organizational factors to build capacity and create organizational capacity for open innovation (Kelley & Wang, 2021).

Therefore, considering the role of innovations, particularly open innovations, which create opportunities for various insurance companies to utilize technological advancements at different levels, the main concern of the researcher is: what are the most important factors influencing the adoption and utilization of insurance technologies (InsurTech) in domestic insurance companies, and what role do open innovations play in this regard? The objective of this study is to present a paradigmatic model for the adoption and use of insurance technologies (InsurTech) with an emphasis on open innovation.

2   Methods and Materials

Considering the aim and nature of this study, the research employed a qualitative method, conducted through interviews with experts. The approach followed was grounded theory. The statistical population consisted of university professors in the field of insurance, senior managers of insurance companies, stakeholders, and policyholders. In this section, theoretical sampling was used. In theoretical sampling, events are sampled rather than individuals. Even when individuals are consulted, the primary goal is to explore events. Although there is no specific rule for sample size in qualitative strategies, it is suggested that for homogeneous groups, 6 to 8 units, and for heterogeneous groups, 12 to 20 units, be included. The interviews continued until theoretical saturation was reached. In this study, saturation was achieved after interviewing 12 experts (university professors in the field of insurance, senior managers of insurance companies, stakeholders, and policyholders).

Sampling was conducted based on the logic of qualitative research and was done purposefully. Two sampling methods were employed: purposive sampling and snowball sampling. In qualitative research, purposive sampling is commonly used to obtain the most relevant information, hence the researcher selected participants who were "rich in information." This means that, following the principle of qualitative research, samples were chosen that provided a strong representation of the phenomenon under study. The participants were selected from university professors in the field of management and senior managers of construction

companies who were willing to be interviewed. The qualitative part of the study was based on the grounded theory method, with three types of coding—open, axial, and selective—conducted using the MAXQDA software. Grounded theory, also known as data-driven theory or grounded theory method, is a general, inductive, and interpretive research method developed by Barney Glaser and Anselm Strauss in 1967.

3   Findings and Results

Assigning the closest concept to the smallest meaningful unit of each section of the collected data is referred to as coding. Generally, each concept has dimensions, and each dimension has a range. In this study, using grounded theory for the analysis of the qualitative data collected, three stages of coding were carried out: open coding, axial coding, and selective coding. The main task at this stage was identifying and determining concepts, which was done through open coding. In this study, a set of categories was created during open coding by reviewing the interview data. In the next

stage, axial coding identified one of these categories (the core category) in each group as the focal point of the exploratory process, and all other categories in that group were theoretically related to it. Selective coding described the research process, how categories were integrated and refined, and, in other words, the progression of the research process. The art of the grounded theorist lies in discovering and defining new concepts rather than merely linking existing concepts to the data. In this study, the researcher repeatedly reviewed the collected data for open coding and considered it from various perspectives. In this phase, the researcher attempted to identify the latent concepts within the data through continuous review. This stage is called "open" because the researcher freely names the concepts without restriction. In open coding, the researcher, with an open mind, names the concepts without limiting their number. The goal of open coding is to break down the collected data into the smallest possible conceptual components, a task that was effectively accomplished in this study.

Table 1

Open and Secondary Coding of Research Factors

Row	Interview Codes	Initial Coding	Category Coding	Axial Coding
1	Q1, Q11, Q12	Employee training	Employee Behavior	Behavioral Factors
2	Q2	Individual capability		
3	Q6, Q7, Q12	Proper management principles		
4	Q1, Q11, Q12	Determining and aligning administrative policies		
5	Q2	Collaborative meetings		
6	Q6, Q7, Q12	Setting precise monitoring criteria		
7	Q3	Organizational goal transparency	Manager Behavior	
8	Q7	Creating a technological culture		
9	Q1, Q12	Information transfer		
10	Q2	Managerial level relations through technology		
11	Q3	Manager-client relations		
12	Q1, Q11, Q12	Manager-employee relations		
13	Q2	Participative management		
14	Q6, Q7, Q12	Benefits of adoption	Client Behavior	
15	Q12	Penetration power		
16	Q11, Q12	Revising relationships		
17	Q2, Q7, Q12	Better information dissemination		
18	Q3	Collecting client information		
19	Q7	Database development		
20	Q1, Q12	Information and communication systems	Shareholder Behavior	
21	Q2	Financial document disclosure		
22	Q3	Technology-based reporting		
23	Q3	Shareholder evaluation		
24	Q7	Creating electronic shareholder identity		
25	Q1, Q12	Budget	Technological Organization	Management Factors
26	Q2	Costs		
27	Q3	Business intelligence		
28	Q2, Q7, Q12	Cost reduction		
29	Q1, Q2, Q3, Q7, Q9	Efficiency improvement		
30	Q5, Q7, Q8	Precise and quick information access		

IJIMOB

Haddad Oskouee et al.   International Journal of Innovation Management and Organizational Behavior 3:1 (2023) 192-200

31	Q9	Organizational agility		
32	Q3, Q11, Q12	Quality of innovative services	Technology Development Indicators	
33	Q3, Q4, Q5, Q6, Q7, Q8, Q11	Control mechanisms		
34	Q4, Q11	Proper organizational functioning		
35	Q1, Q4, Q5, Q8, Q11, Q12	Service development		
36	Q2, Q3, Q5, Q7, Q8, Q9, Q10, Q11	Technology application development		
37	Q1, Q10, Q12	Functional principles		
38	Q1, Q4, Q5, Q8, Q9, Q10	Turning innovation into opportunity		
39	Q5, Q7, Q8, Q11	Collaborative networks	Technology-Based Feedback	
40	Q7	Negative effects of insurance technologies		
41	Q2	Positive effects on transparency		
42	Q1, Q11	New clients		
43	Q11, Q12	Simplified access		
44	Q2, Q7, Q12	Innovative opportunities	Innovative Management	
45	Q2	Use of internal innovations		
46	Q3, Q4, Q5, Q6, Q7, Q8, Q11	External innovations		
47	Q4, Q11	Evaluation system		
48	Q1, Q4, Q5, Q8, Q11, Q12	Innovation-based management		
49	Q2, Q3, Q5, Q7, Q8, Q9, Q10, Q11	Innovation promotion		
50	Q1, Q10, Q12	Identifying applicable technologies	Technology Awareness	Technology Perception
51	Q7	Perceived risk of insurance technologies		
52	Q1	Trust		
53	Q1, Q2, Q5, Q6, Q10, Q11, Q12	Expected performance		
54	Q1, Q2, Q5, Q10, Q12	Facilitating operations		
55	Q1, Q2, Q3	Insurance technology usefulness		
56	Q1, Q2, Q5, Q6, Q9, Q10	Importance of technology in insurance		
57	Q1, Q4, Q5, Q6, Q7, Q8	Information dissemination technologies		
58	Q2, Q7, Q12	Technology for product and service presentation		
59	Q1	Technology access		
60	Q1, Q11	Insurance customer awareness	Technology Attitude	
61	Q11, Q12	Legal and regulatory factors		
62	Q2, Q7, Q12	Advertising		
63	Q1, Q2, Q3	Public awareness		
64	Q1, Q2, Q5, Q6, Q9, Q10	Positive attitude towards the company		
65	Q1, Q4, Q5, Q6, Q7, Q8	Ethical values		
66	Q9, Q11, Q12	Increased use of insurance services		
67	Q4, Q5, Q6, Q9	Budget and cost control	Budget and Cost Control	Technology Adoption
68	Q3	Support		
69	Q1, Q11	Ethical considerations		
70	Q11, Q12	Service purchase		
71	Q2, Q7, Q12	Creating new insurance needs		
72	Q2	Expanding previous purchases		
73	Q1, Q5	Insurance application usage		
74	Q1, Q11	Electronic adoption		
75	Q1, Q2, Q3, Q4, Q9	External knowledge transfer	Knowledge Transfer	Knowledge Management
76	Q1, Q7, Q8	Information transfer to clients		
77	Q7	Internal organizational knowledge transfer		
78	Q9, Q12	Technology and knowledge training		
79	Q1, Q4, Q5, Q6, Q10, Q11, Q12	Practical managerial training		
80	Q1, Q2, Q4, Q6, Q7, Q8, Q10, Q12	Work unit integration		
81	Q1, Q11	Organizational level knowledge exchange		
82	Q11, Q12	Knowledge receipt and dissemination	Knowledge Development	
83	Q2, Q7, Q12	Changing laws and regulations		
84	Q1	New insurance services		
85	Q3, Q4, Q7, Q10	Completing applied knowledge		
86	Q1, Q3, Q5	Technology performance		
87	Q1, Q5, Q10	Organizational goals		
88	Q1, Q2, Q3, Q10	Knowledge replication within the organization		

No.	Codes	Concept	Sub-category	Category
89	Q2, Q7, Q12	Creating insurance journals		
90	Q1	Creating insurance-related bulletins		
91	Q3, Q6, Q9	Publishing necessary financial documents		
92	Q1, Q2, Q7, Q12	Publishing stock status information		
93	Q1, Q2, Q5, Q6, Q9	Use of research teams	Knowledge Acquisition	
94	Q12	Applied research		
95	Q9	Constructive external interaction		
96	Q1, Q2, Q5	Environmental pressures		
97	Q3, Q4	Imposed and subjective opinions		
98	Q5	Government and parliament resolutions		
99	Q2	Case studies		
100	Q7, Q12	Insurance applications	Technology	Infrastructure
101	Q9	Security		
102	Q1, Q2, Q5, Q6, Q9, Q12	Information safety		
103	Q6, Q8, Q9, Q10	User safety		
104	Q2	Insurance company size		
105	Q1	Insurance service variety		
106	Q2, Q5, Q8, Q11	Technology compatibility		
107	Q9, Q10	Ethical values	Ethical Values	Human Factors
108	Q1, Q2, Q3, Q4, Q5, Q12	Organizational climate	Organizational Environment	
109	Q1, Q3, Q5, Q6, Q7, Q9	Common mistakes		
110	Q2	Technology expertise		
111	Q2, Q7, Q12	Professional skills		
112	Q1	Employee effectiveness		
113	Q3, Q6, Q9	Expectations		
114	Q1, Q2, Q7, Q12	Job-related knowledge		
115	Q9, Q12	Job rotation		
116	Q2	Hardware equipment	Hardware Equipment	Equipment and Resources
117	Q3, Q4, Q5	Software equipment		
118	Q1, Q11, Q12	Usability		
119	Q5	Staff expertise		
120	Q6, Q7, Q12	Support expertise		
121	Q12	Supplementary resources		
122	Q1, Q2, Q3, Q4, Q5, Q7, Q10, Q11, Q12	Organizational structure		
123	Q1, Q4, Q5, Q6, Q7, Q8, Q10, Q12	Organizational complexities		
124	Q11, Q12	Improvement opportunities		
125	Q9	Technology-based behavior	Skills	Practical Factors
126	Q6, Q7, Q12	Social responsibility		
127	Q12, Q15, Q16, Q17	Virtual community		
128	Q2, Q7, Q12	Media advertising		
129	Q1	SEO knowledge		
130	Q3, Q6, Q9	Content production skills in insurance		
131	Q1, Q2, Q7, Q12	Human resource skills		
132	Q2	Application use		
133	Q9	Technological culture	Employee Effectiveness	
134	Q1, Q2, Q5, Q6, Q9	Application of modern knowledge		
135	Q5, Q6, Q7, Q12	Report documentation		
136	Q9, Q12	Evaluation development		
137	Q1, Q4, Q5, Q8, Q11, Q12	Employee activity development		
138	Q1, Q3, Q5, Q7, Q8, Q9	Activity scope expansion		
139	Q10, Q11, Q12	Employee relationship development		
140	Q1, Q3, Q5, Q8, Q9, Q10	Efficiency improvement in evaluations		
141	Q6, Q7, Q8, Q11	Accurate communication of laws and regulations	Organizational Structure	
142	Q9, Q11	Database creation		
143	Q2	Evaluation system		
144	Q2	Opportunities		
145	Q9	Insurance technology threats		
146	Q1, Q2, Q3	Risk evaluation		
147	Q1, Q2, Q5, Q6, Q9, Q10	Media relations	Media relations	Communications
148	Q1, Q4, Q5, Q6, Q7, Q8, Q10, Q11	Shareholder communications		
149	Q2, Q7, Q12	Vertical communications		
150	Q1	Communication network		

IJIMOB

Haddad Oskouee et al.   International Journal of Innovation Management and Organizational Behavior 3:1 (2023) 192-200

In axial coding, the process of assigning codes to the concepts present in the data moves beyond the fully open phase and becomes more focused. In this research, after conducting open coding, the researcher identified the main themes in the data set, and the subsequent coding was performed around these themes. Additionally, in this study, during selective coding, the researcher strengthened the coding process by considering the codes and concepts identified in the previous two stages. Coding is successful only when accompanied by continuous interaction with the data.

The researcher consistently recorded thoughts and interpretations during data collection. Each data note was labeled with a date and title to prevent confusion amidst numerous records. These notes played a crucial role in advancing the research, and experience has shown that consistency in creating these notes significantly contributes to the success of the research.

At this stage, the research picture becomes clearer to the researcher than ever before. The final task of grounded theory is to translate the emerging image for others. The constructed theory enables the formulation of hypotheses for future research to test. Grounded theory is not for hypothesis testing but a method for generating them.

Based on the research findings, the model for the adoption and utilization of insurance technologies in domestic insurance companies, with an emphasis on open innovation, includes 150 open codes, 21 category codes, and 6 final axial codes, which are presented in Figure 1.

Figure 1

Model of Adoption and Utilization of Insurance Technologies in Domestic Insurance Companies with an Emphasis on Open Innovation
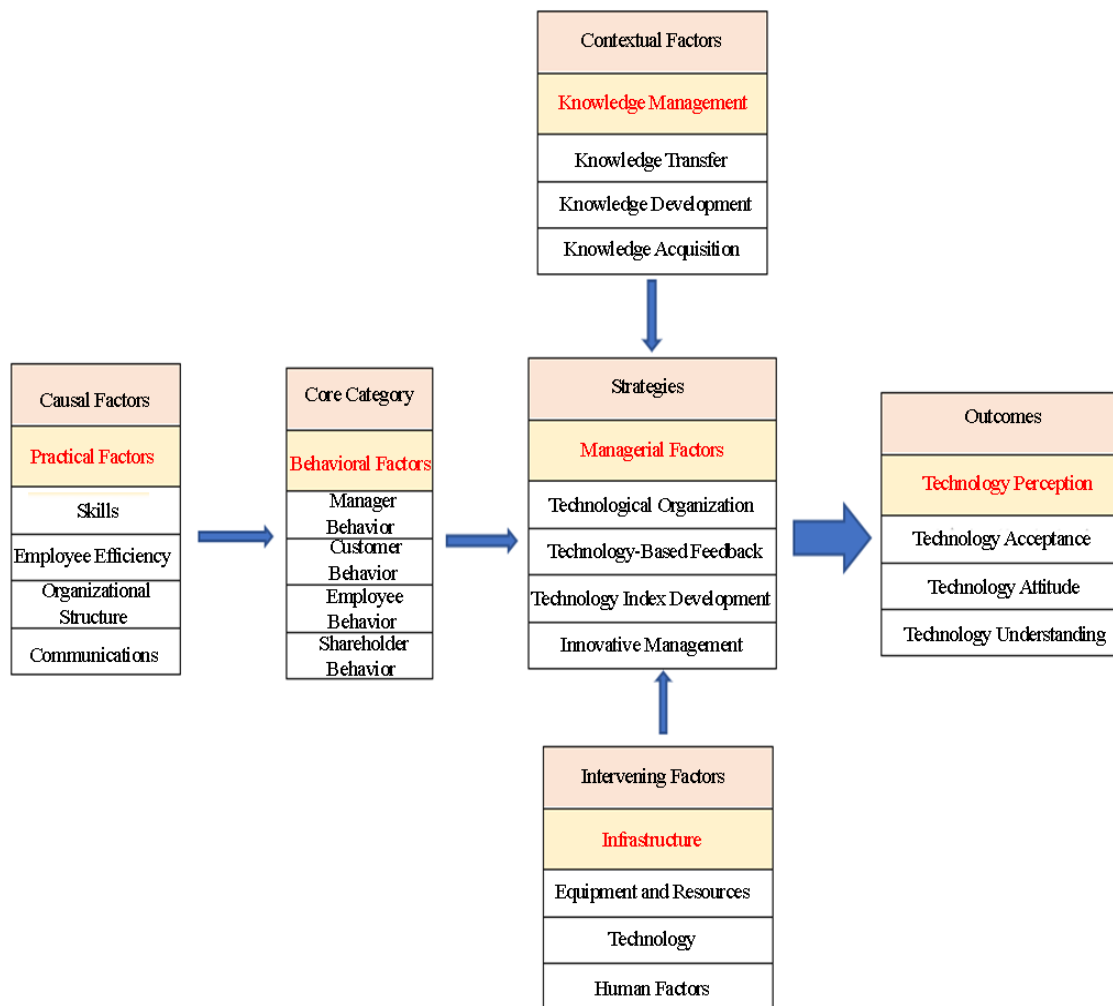
4   Discussion and Conclusion

The results showed that the model for the adoption and utilization of insurance technologies in domestic insurance companies includes the main components of knowledge management, practical factors, behavioral factors, infrastructure, technology perception, and management factors. These results align with the findings prior studies (Kelley & Wang, 2021; Sionani et al., 2023; Wang, 2021). Technology adoption is a multi-dimensional phenomenon that encompasses a wide range of key variables such as perceptions, beliefs, attitudes, and individual characteristics, as well as their level of engagement with technology. Some researchers believe that the attitude of organizations and managers toward adopting new technology within an organization has a critical impact on its practical adoption. Many studies in this field have contributed to providing a comprehensive theoretical basis by interpreting the determining factors and mechanisms of user adoption. Additionally, the findings in this area highlight the significant role of differences in values, desires, attitudes, personal perspectives, and intellectual preferences, as well as adaptability in the process of adopting new technology (Nurse-Clarke & Joseph, 2022).

For global insurance companies, the concepts of digital transformation and disruptive innovation have gradually become less ambiguous, to the extent that today these concepts are seen as high-priority initiatives for implementation and are on the agenda of senior leaders. New competitive threats, ongoing cost pressures, outdated technologies, increasing regulatory requirements, and unfavorable financial performances are among the drivers that make significant changes and new business models inevitable. Insurance companies in the rapidly evolving innovative economy face challenges that classical, traditional knowledge paradigms cannot solve (Kuzieva, 2020).

Thus, it can be stated that today, the practical use of processes related to marketing, advertising, sales, and business intelligence has become so crucial that its role in various consumer and non-consumer industries, especially in the insurance industry, is being scrutinized by experts. Digital transformation in the insurance industry is made possible by insurance technologies. In fact, insurance technology adapts the traditional structure of the insurance industry to the digital era, and this transformation is being driven by emerging InsurTech companies. InsurTech is a mega-trend in the insurance industry that will revolutionize the sector. It will create a new structure or ecosystem in the insurance industry. The most important form of insurance technology is blockchain, due to its role in the development of smart contracts, followed by big data analytics and the Internet of Things, which can bring high levels of transparency and accuracy to the industry. InsurTech allows customers to use insurance services beyond time and place limitations with the help of tools like smartphones. Since the core function of insurance globally has always been risk management, managers in this sector have been more cautious about embracing technological innovations under the banner of InsurTech, which has led to slower growth in innovative technology services in the insurance sector compared to other FinTech fields (Kelley & Wang, 2021).

On the other hand, innovation is a fundamental factor in creating competition at the global level, leading to organizational growth and ensuring future success. It acts like an engine that enables companies to maintain continuous efficiency in the global economy. Therefore, innovation is a critical topic in the study of economics, business, technology, sociology, and engineering. Furthermore, the ability of companies to discover and exploit external innovations, business capabilities, and opportunities with commercialization potential, which align with the company's development strategies, is of great importance (Pour Sadegh, 2017).

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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