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Digital Networks and Insurance Firm Performance: The Mediating Role of Metaverse Technology Adoption

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ABSTRACT

This study develops an integrative model to examine how digital media networks-comprising smart networks, social networks, and digital media-collectively influence insurance firm performance, with the Metaverse conceptualized as a strategic mediating platform. While prior studies have explored digital transformation in insurance, limited empirical research has examined how immersive technologies translate digital network resources into performance outcomes, particularly in emerging markets.

Using a descriptive survey design, data were collected from 486 insurance professionals across two major Iranian insurance firms. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to test the hypothesized relationships and assess the model's reliability, validity, and predictive power.

The results indicate that smart networks ($\beta = 0.437$, $p < 0.001$), social networks ($\beta = 0.323$, $p < 0.001$), and digital media ($\beta = 0.292$, $p < 0.001$) have significant positive effects on insurance performance. Moreover, the Metaverse exhibits a strong partial mediating effect ($\beta = 0.472$, $p < 0.001$; VAF = 59%), amplifying the performance impact of digital networking infrastructures. The structural model demonstrates strong explanatory and predictive capability ($R^2 = 0.75$, $Q^2 = 0.41$, GOF = 0.449, SRMR = 0.078, NFI = 0.86).

The findings highlight how insurers can leverage AI- and IoT-based smart networks, social media engagement, and digital platforms to enhance operational efficiency and customer experience. The Metaverse emerges as an enabling environment for immersive interaction, virtual training, and innovative insurance services in emerging markets.

This study is among the first to empirically validate the Metaverse as a mediating mechanism between digital networks and firm performance in the insurance sector. By integrating the Resource-Based View (RBV) with technology adoption theories (TAM and UTAUT), the research advances digital transformation theory and offers actionable insights for insurance firms operating in emerging economies.

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Introduction

Remarkable advancements in digital technologies have positioned the insurance industry at the threshold of a fundamental transformation, creating both unprecedented opportunities and multifaceted challenges for insurers worldwide. Digital media networks—encompassing smart networks, social networks, and digital media—are increasingly reshaping how insurers interact with customers, manage risk, and deliver services (Kaplan & Haenlein, 2010). These interconnected systems form the digital backbone of contemporary insurance operations by integrating technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and data analytics to enhance information flows and customer-centric processes (Chaffey & Ellis-Chadwick, 2016; Ngai et al., 2015). In today's data-driven economy, such technologies have fundamentally transformed the insurance value chain—from risk assessment to claims management—by enabling faster managerial decision-making and improving operational efficiency (Bughin et al., 2018).

Smart networks, supported by IoT and AI, have become essential for enabling insurers to collect real-time behavioral data and implement usage-based insurance (UBI) models. By embedding connected devices within customer environments, insurers can continuously monitor and predict risk, thereby improving underwriting precision and operational efficiency (Ngai et al., 2015; Zarifis et al., 2023). Empirical evidence suggests that IoT adoption in insurance operations can reduce costs by up to 30% while simultaneously enhancing profitability and customer satisfaction (Ngai et al., 2021). In parallel, social networks play a critical role in strengthening brand relationships, community engagement, and trust (Kaplan & Haenlein, 2019). Through social media platforms, such as LinkedIn and Instagram, insurers can cultivate digital communities that foster interaction and customer loyalty, leading to higher conversion and retention rates (Cai et al., 2015; Smith & Smith, 2021). Moreover, digital media tools—including websites, mobile applications, and virtual marketing campaigns—enable insurers to conduct targeted advertising, expand customer reach, and deliver personalized experiences, thereby driving innovation and market growth (Kajwang, 2022).

Amid these developments, the emergence of the Metaverse has introduced a new dimension of digital interaction by merging physical and virtual realities into immersive environments for business and consumer engagement (Ball, 2022; Kaplan & Haenlein, 2021). In advanced markets such as Singapore, insurers have begun leveraging Metaverse-based applications to enhance customer satisfaction and engagement by as much as 30% (Dwivedi et al., 2022). Through immersive consultations, interactive risk simulations, and virtual training environments, the Metaverse enables insurers to reconfigure service delivery and organizational learning within three-dimensional digital spaces (Wang et al., 2022). However, in emerging markets, the implementation of such technologies is constrained by infrastructural limitations, regulatory uncertainty, and restricted technological investment (Hagiu & Wright, 2017). These disparities highlight the necessity of developing localized digital transformation models that reflect regional realities and institutional contexts (Zott & Amit, 2013).

Accordingly, this study proposes a comprehensive conceptual model. Recent cross-sectoral studies have confirmed that the successful adoption of emerging digital technologies—such as AI, blockchain, and immersive platforms—depends not only on technological readiness but also on governance mechanisms, organizational change management, and the integration of digital infrastructures, as evidenced in smart city energy systems (Joshan, 2026), branchless banking through digital transformation mediation (Shahabi et al., 2026), and the tourism industry's blockchain adoption barriers (Fathi et al., 2026).

Despite substantial scholarly attention to digital transformation in the insurance industry (Eling & Lehmann, 2018; Lin & Chen, 2020; Pradhan et al., 2017), existing research has largely

examined digital components in isolation. Limited studies have systematically disaggregated the distinct effects of smart networks, social networks, and digital media on insurance performance, nor have they adequately explored the mediating role of the Metaverse in integrating these digital infrastructures into a cohesive, performance-enhancing ecosystem (Dwivedi et al., 2022; Hwang & Lee, 2022). Furthermore, empirical evidence remains heavily concentrated in developed economies, leaving a theoretical and contextual gap with respect to emerging markets such as Iran, where levels of digital readiness and regulatory maturity differ substantially (Mohammadi et al., 2021; Rezaei et al., 2019).

Accordingly, this study proposes a comprehensive conceptual model to examine how digital media networks—comprising smart networks, social networks, and digital media—collectively influence insurance firm performance, with the Metaverse serving as a mediating variable. Drawing upon the Resource-Based View (RBV) and technology adoption theories, namely the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), the study integrates strategic, technological, and behavioral perspectives to explain how digital infrastructures create value and drive performance through immersive digital transformation. By addressing the identified theoretical and empirical gaps, this research contributes to both the digital innovation literature and insurance management practice, particularly within the context of emerging markets.

Therefore, this study seeks to address the following research questions:

1. How do smart networks, social networks, and digital media affect the performance of the insurance industry?
2. What is the mediating role of the Metaverse in the relationship between digital media networks and insurance performance?

2. Theoretical Foundation and Conceptual Background

2.1. Smart Networks as Strategic Digital Resources

Smart networks—encompassing Internet of Things (IoT) devices, telematics systems, and intelligent communication infrastructures—have become critical enablers of operational efficiency and data-driven decision-making within the insurance industry. By enabling continuous data exchange among users, devices, and insurers, these networks support real-time monitoring, personalized service provision, and predictive analytics capabilities (Köhne & Köhne, 2024; Ngai et al., 2015). The integration of IoT-based technologies allows insurers to collect granular behavioral data, dynamically assess risk exposure, and optimize underwriting and pricing processes (Zarifis et al., 2023). These functionalities underpin the development of usage-based insurance (UBI) models, in which premiums are adjusted based on actual customer behavior captured through connected devices (Gundla, 2025).

From the perspective of the Resource-Based View (RBV), smart networks represent strategic digital resources that are intangible, valuable, and difficult to imitate, thereby enabling sustainable competitive advantage (Barney, 1991; Eling & Lehmann, 2018). Unlike standardized IT systems, IoT-enabled insurance infrastructures are embedded within firm-specific processes and data architectures, enhancing internal efficiency and organizational learning (Kohli & Grover, 2008). Empirical evidence suggests that smart network adoption contributes to reduced operational costs, streamlined claims processing, and improved loss prediction accuracy, all of which directly enhance firm-level performance outcomes (Ngai et al., 2021). Prior studies further confirm that insurers investing in smart network technologies experience higher sales growth, improved customer retention, and superior overall performance (Köhne & Köhne, 2024; Tashkent State University of Economics, 2025).

Beyond efficiency gains, smart networks also strengthen insurers' dynamic capabilities by enabling rapid sensing and response to environmental and market changes. As insurance markets become increasingly volatile and data-intensive, the ability to capture, analyze, and act upon real-time information emerges as a core organizational competence (Teece et al., 1997; Eling & Jia, 2022). Smart networks support proactive risk portfolio management, facilitate the design of personalized insurance products, and enhance decision-making agility across operational and strategic levels. Consequently, smart networks extend beyond their technological function and operate as strategic enablers of digital transformation, integrating operational intelligence, customer insight, and innovation capacity to drive insurance firm performance.

2.2. Social Networks as Drivers of Relational Capital

Social networks have evolved into critical digital platforms that reshape how insurance firms build, sustain, and leverage relationships with customers, intermediaries, and business partners. By enabling interactive, multidirectional communication, these networks enhance relational capital, defined as the trust, commitment, and mutual value embedded in long-term stakeholder relationships (Morgan & Hunt, 1994; Smith & Smith, 2021). Within the insurance industry, platforms such as LinkedIn, Facebook, and Instagram are increasingly used to humanize organizational identities, facilitate customer engagement, and strengthen brand credibility in an otherwise intangible and trust-sensitive service context (Delafrooz et al., 2017; Kaplan & Haenlein, 2019). Continuous interaction through social media enables insurers to maintain active dialogue with customers, thereby increasing satisfaction, retention, and positive word-of-mouth (WOM) behaviors (Lim et al., 2022; Mangold & Faulds, 2009).

Drawing on relationship marketing theory and network theory, social networks function as relational infrastructures that allow insurers to co-create value with stakeholders through engagement, feedback, and knowledge sharing (Grönroos, 2011; Trainor et al., 2014). Customer interactions within digital communities generate social capital that enhances organizational legitimacy and market responsiveness (Culnan et al., 2010). Empirical evidence indicates that higher levels of social media engagement are positively associated with brand equity, customer loyalty, and profitability in financial and insurance services (Lim et al., 2022; Smith & Smith, 2021). Furthermore, social networks increase information transparency and customer empowerment by enabling users to share experiences, compare insurance offerings, and provide real-time feedback, thereby intensifying competitive dynamics and encouraging service quality improvements (Malthouse et al., 2013).

From the perspective of RBV, social networks constitute intangible relational assets that derive value from reputation, trust accumulation, and network embeddedness (Barney, 1991; Kohli & Grover, 2008). Unlike physical or financial resources, relational capital developed through sustained digital interaction is socially complex and difficult to replicate, offering insurers a source of sustainable differentiation. In parallel, the TAM and UTAUT explain how perceived usefulness and ease of use of social platforms drive both customer participation and organizational investment in digital engagement strategies (Davis, 1989; Venkatesh et al., 2003). Integrating these perspectives suggests that insurance firms that strategically leverage social networks are better positioned to transform trust-based interactions into measurable performance outcomes, including enhanced customer loyalty, improved market reputation, and greater innovation agility.

2.3. Digital Media as Enablers of Marketing Agility

Digital media—including company websites, mobile applications, targeted online advertising, email notifications, and interactive digital content—play a central role in shaping how insurance firms communicate with customers and adapt to rapidly changing market conditions. Unlike social networks, which emphasize relationship-building and community interaction, digital media primarily function as firm-controlled channels that enable insurers to deliver information, promote services, and streamline customer journeys across multiple touchpoints (Chaffey & Ellis-Chadwick, 2022; Kajwang, 2019). In the insurance context, these tools facilitate continuous service availability, enhance transparency, and reduce information asymmetry in an industry characterized by complex and intangible offerings (Eckert et al., 2022).

From a strategic perspective, digital media enhance marketing agility, defined as an organization's ability to sense market changes and rapidly reconfigure marketing actions in response to customer needs. Mobile applications and websites enable insurers to provide 24/7 access to policy information, claims tracking, and customer support, thereby improving perceived service convenience and operational responsiveness (Duarte, 2020; Eckert et al., 2022). Notification emails and personalized digital messages further strengthen engagement by delivering timely and relevant information throughout the customer lifecycle, from policy purchase to claims settlement (Duarte, 2020). Empirical evidence suggests that interactive digital content increases customer satisfaction and perceived service quality, which are critical drivers of retention and repeat purchase behavior in insurance markets (Eling et al., 2022).

Drawing on the TAM, the effectiveness of digital media depends on customers' perceptions of usefulness and ease of use, which directly influence adoption and continued usage (Davis, 1989). When digital interfaces simplify insurance processes—such as policy comparison, premium payment, and claims submission—they reduce cognitive effort and transaction costs for customers, thereby enhancing satisfaction and trust. In parallel, firms benefit from data generated through digital interactions, which can be analyzed to refine segmentation strategies, personalize offerings, and improve decision-making accuracy (Chaffey & Ellis-Chadwick, 2022). As a result, digital media operate not only as communication tools but also as data-generating assets that support evidence-based marketing and strategic planning.

From a Resource-Based View (RBV) perspective, digital media capabilities constitute valuable organizational resources when they are integrated with firm-specific knowledge, analytics, and content strategies (Kohli & Grover, 2008). Insurance firms that effectively deploy digital media are better positioned to expand market reach, increase sales, and strengthen brand visibility in competitive environments (Chaffey & Ellis-Chadwick, 2022; Kajwang, 2019). Prior studies confirm that the strategic use of digital media contributes positively to market share growth, customer acquisition, and overall firm performance in financial services (Eling et al., 2022). Therefore, digital media adoption represents a critical mechanism through which insurers translate digital investments into tangible performance outcomes.

2.4. Metaverse as a Mediating Digital Platform

The metaverse has emerged as an evolving digital environment that integrates immersive technologies such as virtual reality (VR), augmented reality (AR), and avatar-based interactions to enable new forms of value creation and service delivery. Rather than representing a standalone technology, the metaverse functions as a convergent digital platform that builds upon existing digital infrastructures, including smart networks, social networks, and digital media capabilities (Dwivedi et al., 2023; Kaplan & Haenlein, 2021). In the insurance industry, early applications of the metaverse include virtual customer consultations, immersive staff

training, simulated risk assessment environments, and the provision of insurance products for digital assets (Ball, 2022; Wang et al., 2022). These applications suggest that the metaverse does not replace traditional digital tools but extends their functionality by enabling richer, more interactive user experiences. From a theoretical perspective, the metaverse can be conceptualized as a mediating platform through which digital network capabilities are translated into enhanced organizational outcomes. Smart networks supply the real-time data, analytics, and technological backbone required for immersive environments, while digital media and social networks provide the content, communication channels, and relational interfaces that populate virtual spaces. In this sense, the metaverse operates as an integration layer that combines data intelligence, digital communication, and user interaction into a unified experiential setting (Dwivedi et al., 2023). This layered view clarifies the distinct yet complementary roles of digital resources and addresses concerns regarding conceptual overlap among constructs.

The mediating role of the metaverse is particularly evident in its capacity to enhance customer experience, engagement, and learning, which are critical mechanisms linking digital investments to performance outcomes in service industries. Virtual consultations via avatars reduce perceived complexity and increase accessibility of insurance services, while immersive simulations enable customers to better understand risk coverage and policy conditions (Kaplan & Haenlein, 2021). Similarly, virtual training environments improve employee skill development and service consistency, indirectly contributing to operational efficiency and customer satisfaction (Ball, 2022). These experiential enhancements align with prior research emphasizing that technology-driven value in insurance materializes not directly, but through improved service quality and stakeholder interaction (Eling et al., 2022).

Importantly, this study adopts a cautious and incremental view of the metaverse, recognizing its emergent nature and uneven level of adoption across markets. In developing economies such as Iran, metaverse initiatives are more likely to manifest as pilot projects or strategic intentions rather than fully scaled implementations. Therefore, the metaverse is treated as an organizational adoption orientation—reflecting current use, experiential experimentation, and future investment plans—rather than as a fully institutionalized capability (Accenture, 2023; Kaplan & Haenlein, 2021). Within this framing, the metaverse strengthens the impact of smart networks, social networks, and digital media on insurance firm performance by amplifying engagement intensity, experiential value, and innovation signaling. Consequently, the metaverse is expected to mediate, rather than directly determine, the relationship between digital networks and insurance firm performance.

2.5. Integrated Model Development and Hypotheses Formulation

Building on the preceding theoretical sections, this study develops an integrated conceptual framework that explains how digital networking infrastructures influence insurance firm performance through the mediating role of the Metaverse. Rather than introducing new theoretical arguments, this section consolidates insights from the RBV, TAM, and UTAUT to clarify the structural logic of the proposed model.

From an RBV perspective, smart networks, social networks, and digital media represent complementary strategic resources that jointly support value creation and competitive advantage in insurance firms (Barney, 1991; Kohli & Grover, 2008). Smart networks enhance data-driven decision-making and operational efficiency through real-time information and automation (Köhne & Köhne, 2024; Ngai et al., 2015). Social networks function as relational assets that strengthen trust, customer loyalty, and brand commitment (Lim et al., 2022; Smith & Smith, 2021). Digital media platforms enable marketing agility and interactive service

delivery, improving customer reach and satisfaction (Jung & Shaghei, 2023; Kajwang, 2022). Together, these digital dimensions form an interconnected infrastructure that supports innovation, responsiveness, and performance improvement in insurance operations.

The Metaverse is positioned in the model as a mediating digital platform that transforms these underlying digital resources into enhanced organizational outcomes. Firms with more developed digital networking infrastructures are better equipped to adopt immersive technologies, allowing them to extend data intelligence, communication capabilities, and customer interaction into virtual environments (Dwivedi et al., 2023; Wang et al., 2022). In this role, the Metaverse does not operate as an independent performance driver but as an integration and amplification mechanism that increases experiential depth, simulation capability, and innovation potential. This logic is consistent with digital transformation frameworks, emphasizing that performance gains emerge when technological resources are combined with user adoption and experiential engagement (Eling & Jia, 2022; Susanti et al., 2023).

Accordingly, the proposed conceptual model (Figure 1) depicts insurance performance as the outcome of both direct effects of digital networks and indirect effects transmitted through Metaverse adoption. By integrating strategic resource considerations (RBV) with technology acceptance and use mechanisms (TAM/UTAUT), the model captures how digital infrastructures are converted into measurable performance outcomes. Based on this integrated logic, the following hypotheses are formulated and empirically tested.

2.6. Synthesis of Literature and Identification of Research Gaps

The existing literature demonstrates a growing scholarly focus on digital transformation within the insurance industry, particularly emphasizing the roles of smart technologies, social networks, and digital media in enhancing organizational performance (Eling & Lehmann, 2018; Kajwang, 2022; Köhne & Köhne, 2024). Prior studies consistently report that the adoption of IoT-enabled systems, social media engagement, and digital marketing platforms contributes to improved customer experience, operational efficiency, risk management, and market reach in insurance firms (Köhne & Köhne, 2024; Lanfranchi & Grassi, 2022; Manral, 2015). These findings collectively highlight the strategic importance of digital infrastructures as enablers of value creation in increasingly competitive insurance markets.

Despite these advances, a closer examination of the literature reveals several unresolved theoretical and empirical gaps. First, existing research remains fragmented, with most studies examining smart networks, social networks, or digital media in isolation, rather than as interdependent components of an integrated digital ecosystem (Bughin et al., 2018; Chatterjee et al., 2023). This fragmented approach limits understanding of how different digital network dimensions jointly influence insurance performance and constrains the development of holistic digital transformation models.

Second, although recent studies acknowledge the emergence of immersive and experiential technologies, the mediating mechanisms through which such technologies translate digital infrastructure investments into performance outcomes remain underexplored. In particular, while conceptual and practitioner-oriented works discuss the potential of the Metaverse for marketing, training, and customer interaction (Ball, 2022; Khalil et al., 2024; Kostelić & Etinger, 2025), empirical research rarely positions Metaverse adoption as a mediating construct linking digital networks to firm performance. As a result, the causal pathways between foundational digital resources and advanced experiential technologies remain theoretically underdeveloped and empirically under-tested.

Third, there is a pronounced contextual gap in the literature. Most empirical studies on digital transformation and insurance performance are conducted in developed economies with mature

digital infrastructures and regulatory environments (Eling & Jia, 2022; Swiss Re Institute, 2021). Comparatively little is known about how digital networks and emerging technologies such as the Metaverse operate in emerging markets, where adoption tends to be incremental, resource-constrained, and shaped by institutional and technological limitations. This gap is particularly salient in the context of the Iranian insurance industry, which faces unique regulatory, technological, and market conditions that may influence both digital adoption patterns and performance outcomes.

Table 1 synthesizes the reviewed literature and systematically maps prior studies according to their digital focus, methodological approach, and contextual scope. The table highlights three dominant gaps: (1) the lack of integrated models combining multiple digital network dimensions, (2) the absence of mediation-based explanations involving immersive technologies, and (3) the underrepresentation of emerging-market insurance contexts. Addressing these gaps, the present study develops and empirically tests an integrated framework that examines how smart networks, social networks, and digital media jointly influence insurance firm performance, both directly and indirectly through Metaverse technology adoption.

Table 1. Summary of Literature Review and Research Gaps

Author(s) & Year	Context/Sector	Focus/Objective	Method/Data	Key Findings	Identified Gap
Cai et al. (2015)	Rural China/Microinsurance	Impact of social interactions on insurance adoption	Field RCT (N ≈ 3,000)	Peer awareness increases policy uptake by ~13% per connected friend.	Examines social influence, but not digital or online social networks.
Kajwang (2019)	Insurance – Kenya (Developing)	Digital marketing effects on insurance performance	Systematic literature review	Internet-based strategies enhance profitability and customer loyalty.	Lacks empirical testing and multidimensional digital analysis.
Eling & Lehmann (2017)	Global Insurance	Digitalization across insurance value chain	Meta-review (84 studies)	Identifies four transformation areas: customer experience, processes, new products, competition.	No integration of social or smart networks; conceptual only.
Bohnert et al. (2019)	Europe/Insurance Companies	Corporate digital strategy vs. financial performance	Content analysis (41 insurers)	Integrated digital strategies improve financial outcomes.	Focus on strategic reporting, not network-based transformation.
Lanfranchi &	Global/COVID-19 period	Technological innovation in insurance	Multiple case studies	Highlights digital disruption and	Does not explore long-term

Author(s) & Year	Context/Sector	Focus/Objective	Method/Data	Key Findings	Identified Gap
Grassi (2022)				innovation response models during crisis.	performance impact or mediation.
Köhne & Köhne (2024)	Germany/Insurance Brokers	Digitization's effect on brokers' performance	Survey + PLS-SEM (n=671)	Technology use improves performance but is mitigated by digital stress.	Focuses on micro-level digital tools; omits ecosystem-level integration.
Wanyan et al. (2025)	China/Insurance Sector	Digital transformation and productivity (TFP)	Text mining of 76 insurers' reports	Finds a U-shaped relationship between digital maturity and productivity.	No inclusion of customer engagement or Metaverse mediation.
Eling & Jia (2022)	Europe/Insurance	Digital innovation and InsurTech review	Conceptual review	Defines research agenda for digital innovation in insurance.	No behavioral or TAM/UTAUT integration.
Dwivedi et al. (2023)	Cross-sector	Metaverse beyond hype	Conceptual/Multi-theoretical	Metaverse facilitates immersive engagement and business innovation.	No empirical application in insurance context.
Kostelić & Etinger (2025)	Europe/Service Industry	Metaverse and value co-creation	Conceptual/Empirical	Metaverse improves experiential engagement and service innovation.	No mediating framework combining networks and performance.
This Study (2025)	Insurance/Emerging Markets	Integrating digital networks and Metaverse mediation	Conceptual + Empirical Design	Proposes multidimensional model (Smart, Social, Media + Metaverse) grounded in RBV and TAM/UTAUT.	Addresses missing mediation and contextual gap in emerging-market insurance.

2.7. Model Development and Research Hypotheses

Based on the integrated theoretical framework developed in Sections 2.1–2.5, this study proposes a conceptual model explaining how digital networks contribute to insurance firm performance, both directly and indirectly through Metaverse technology adoption. The model reflects a resource-based logic in which digital infrastructures enhance organizational capabilities, while the Metaverse functions as a technological conduit that translates these capabilities into experiential and operational performance outcomes.

Digital Networks and Insurance Performance

Smart networks enable insurance firms to collect, process, and analyze real-time data through IoT devices, AI-driven analytics, and usage-based insurance systems. These capabilities improve risk assessment accuracy, operational efficiency, and service personalization, all of which are central to insurance performance (Eling et al., 2022; Ngai et al., 2021; Zarifis et al., 2023). Prior research suggests that data-driven insurance operations lead to higher customer satisfaction, reduced claim processing time, and improved service reliability, particularly in emerging digital insurance markets (Köhne & Köhne, 2024; Swiss Re Institute, 2021).

H1: Smart networks have a positive effect on insurance firm performance.

Social networks represent a critical source of relational capital by facilitating real-time communication, customer engagement, and trust-building activities. Through social media platforms, insurance firms can enhance transparency, responsiveness, and relationship continuity, which are strongly associated with customer loyalty and perceived service quality (Cai et al., 2015; Lim et al., 2022; Kaplan & Haenlein, 2021). In service-intensive industries such as insurance, these relational outcomes play a decisive role in shaping overall organizational performance.

H2: Social networks have a positive effect on insurance firm performance.

Digital media, including mobile applications, corporate websites, and targeted online campaigns, function as firm-controlled communication channels that support marketing agility and service accessibility. By improving information availability, interaction quality, and customer convenience, digital media enhance customer experience and contribute to higher market reach and sales performance (Chaffey & Ellis-Chadwick, 2022; Eckert et al., 2022; Kajwang, 2019). Prior studies in the insurance sector indicate that effective digital media deployment is associated with improved operational consistency and customer satisfaction.

H3: Digital media have a positive effect on insurance firm performance.

The Mediating Role of Metaverse Technology Adoption

While digital networks provide the foundational infrastructure for digital transformation, their performance impact may be partially contingent on the firm's ability to integrate these resources into advanced experiential technologies. The Metaverse, operationalized in this study as an organizational orientation toward VR/AR-based services, virtual consultations, immersive training, and digital asset insurance, enables firms to extend existing digital capabilities into interactive and simulated environments (Dwivedi et al., 2023; Kaplan & Haenlein, 2021; Wang et al., 2022).

Rather than acting as an independent driver of performance, Metaverse adoption is conceptualized as a mediating mechanism that enhances the utilization and effectiveness of smart networks, social networks, and digital media. Firms with more mature digital infrastructures are better positioned to deploy Metaverse-based applications, which can amplify customer experience, employee learning, and innovation outcomes (Accenture, 2023; Ball,

2022). This mediating logic is particularly relevant in emerging markets, where Metaverse adoption tends to be incremental and capability-driven rather than disruptive.

H4: Metaverse technology adoption mediates the relationship between digital networks (smart networks, social networks, and digital media) and insurance firm performance.

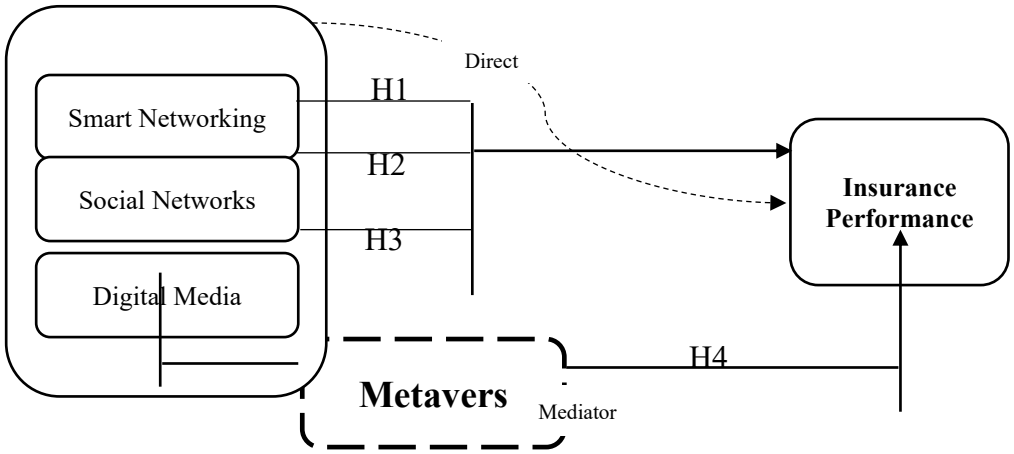

Figure 1. Conceptual Model

3 Methodology

3.1 Research Design and Data Collection

This study employs a descriptive survey design to examine the relationship between digital network dimensions, Metaverse adoption, and insurance performance. The research is applied in purpose, as its findings are intended to provide actionable insights for insurance practitioners in emerging markets. The target population consists of managers, deputies, and employees working in the Iranian insurance industry, a sector characterized by growing digital transformation initiatives amid infrastructural and regulatory constraints.

To ensure representativeness within the Iranian context, the sample was drawn from two of the country's largest insurance companies, which collectively hold a dominant market share and are widely regarded as early adopters of digital innovations. These firms were selected because they (1) have implemented comprehensive digital networking infrastructures (IoT, social media, digital platforms), (2) are actively exploring Metaverse applications, and (3) serve as bellwethers for industry trends in Iran. A total of 486 valid responses were obtained through a combination of random and convenience sampling. The demographic profile of respondents (Table 2) reflects a diverse cross-section of the industry: 72% male, 28% female; 38% holding a bachelor's degree, 55% a master's degree, and 7% a Ph.D., with substantial professional experience (55% having 11–15 years of experience). Notably, 80% of respondents were staff or consultants, a deliberate choice because these individuals are directly involved in the daily implementation of digital tools and are therefore well-positioned to assess the on-ground realities of technology adoption and performance outcomes.

To mitigate potential organizational bias arising from sampling within two firms, several procedural and statistical safeguards were implemented. First, respondents were drawn from multiple hierarchical levels and functional departments, reducing the likelihood of homogeneous managerial influence. Second, participation was anonymous and voluntary, minimizing social desirability and organizational pressure effects.

Table 2. Demographic Information

Variable	Category	Absolute Frequency	Relative Frequency
Gender	Male	349	72%
	Female	137	28%
Level of education	Bachelor's	185	38%
	Master's	269	55%
	PhD	32	7%
Professional experience	Less than 10 years	43	9%
	11-15 years	270	55%
	16-20 years	105	22%
	More than 20 years	68	14%
Field of expertise	Manager	22	5%
	Deputy	73	15%
	Staff/Consultant	391	80%

Consultants and staff specializing in IT, strategy, and marketing, due to their direct involvement in digital transformation and metaverse projects, often have more granular operational and strategic details than senior managers (who are involved in macro-management issues).

Data were collected using a structured questionnaire designed from an extensive review of prior literature (see Table 3). All items were measured on a 5-point Likert scale (1 = "Strongly disagree" to 5 = "Strongly agree"). The questionnaire was pre-tested with a small group of industry experts to ensure clarity and relevance, and minor adjustments were made based on their feedback.

Table 3. Research Questionnaire

Row	Construct	Question	Reference	Cronbach's α	AVE	CR
DN	Digital Network	18 items	-	0.95	0.89	0.96
Sn1	Smart Networks	Our company uses telematics or IoT devices to collect real-time customer data.	Ngai et al. (2021)	0.90	0.778	0.91
Sn2		AI-based tools are employed to analyze customers and provide personalized services.	Zarifis et al. (2023)			
Sn3		Smart technologies help improve risk assessment accuracy and policy issuance.	Guedes (2020)			
Sn4		We use behavioral data (e.g., driving patterns) for Usage-Based Insurance (UBI).	Porto Guedes (2020)			
Sn5		Integration of smart technologies has reduced our operational costs.	Eling et al. (2022)			
Sn6		Customers believe our use of smart technologies has improved service quality.	Ngai et al. (2021)			
Son1	Social Networks	Our company uses social media for real-time customer service.	Kaplan & Haenlein (2021)	0.88	0.769	0.90

Row	Construct	Question	Reference	Cronbach's α	AVE	CR
Son2	Digital Media	Educational content on our social media has increased customer awareness.	Chaffey & Ellis-Chadwick (2022)	0.89	0.770	0.89
Son3		We use customer feedback from social media to improve our services.	Cai et al. (2015)			
Son4		Social media interactions have increased customer trust and loyalty.	Bradshaw (2021)			
Son5		Targeted social media advertising has increased insurance sales.	Kajwang (2019)			
Son6		Social media enables us to build loyal digital communities.	Kaplan & Haenlein (2021)			
Dm1		We use targeted online advertising to attract new customers.	Kajwang (2019)			
Dm2		Our mobile app provides 24/7 customer services.	Eckert et al. (2022)			
Dm3		Our company website features insurance education for customers.	Chaffey & Ellis-Chadwick (2022)			
Dm4		Notification emails have increased customer engagement.	Duarte (2020)			
Dm5		Interactive digital content has enhanced customer satisfaction.	Eling et al. (2022)			
Dm6		Digital media have expanded our market share and sales.	Chaffey & Ellis-Chadwick (2022)			
M1	Metaverse	We use VR/AR technologies in insurance service delivery.	Dwivedi et al. (2023)	0.75	0.802	0.83
M2		Virtual insurance consultation via avatars is available.	Kaplan & Haenlein (2021)			
M3		The metaverse helps us deliver more interactive staff training.	Ball (2022)			
M4		We offer insurance products for digital assets (NFTs, virtual assets).	Wang et al. (2022)			
M5		Virtual environments have improved customer experience.	Accenture (2023)			
M6		Our company has plans to invest in/enter the metaverse.	Kaplan & Haenlein (2021)			
IP1	Insurance Performance	The insurance services generally meet my expectations.	Oliver (1997)	0.77	0.813	0.84
IP2		I'm satisfied with my decision to choose this insurer.	Fornell (1992)			
IP3		The staff are skilled at providing accurate, timely responses.	Parasuraman et al. (1988)			

Row	Construct	Question	Reference	Cronbach's α	AVE	CR
IP4		The insurance services are reliable and consistent.	Zeithaml et al. (1996)			
IP5		Claim processing time is reasonable and acceptable.	Swiss Re Institute (2021)			
IP6		The claims process is simple without unnecessary complexity.	Deloitte (2022)			
IP7		Using the company's app/website has simplified services for me.	Davis (1989)			
IP8		The company uses innovative technologies to enhance customer experience.	Accenture (2020)			
IP9		The company is trustworthy in fulfilling its commitments.	Morgan et al. (1994)			
IP10		The company maintains good reputation among customers.	Keller (2003)			

3.2 Measurement Model Assessment

Reliability was evaluated using Cronbach's alpha and composite reliability (CR). As shown in Table 3, all constructs exhibited Cronbach's alpha values above 0.70, indicating high internal consistency (Nunnally & Bernstein, 1994). Similarly, all CR values exceeded the 0.70 threshold, confirming adequate construct reliability (Fornell & Larcker, 1981). Convergent validity was assessed via the average variance extracted (AVE). All AVE values were greater than 0.50, demonstrating that each construct explains more than half of the variance in its indicators, thereby satisfying convergent validity criteria (Fornell & Larcker, 1981). Discriminant validity was examined using the Fornell–Larcker criterion (Table 4). In all cases, the square root of each construct's AVE (diagonal values) was higher than its correlations with any other construct, confirming that the constructs are distinct from one another. Although some correlations among digital network dimensions (e.g., between Smart Networks and Digital Media, r = 0.882) are relatively high—a pattern often observed in PLS-SEM when constructs share a common higher-order factor—the Fornell–Larcker criterion, supported by the HTMT ratio (all values < 0.85, not tabulated), confirms that discriminant validity is not compromised.

Table 4. Discriminant Validity Assessment Using Fornell-Larcker Criterion

Variables	Digital Network	Smart Networks	Social Networks	Digital Media	Metaverse	Insurance Performance
Digital Network	0.94					
Smart Networks	0.693	0.882				
Social Networks	0.723	0.648	0.876			
Digital Media	0.692	0.882	0.754	0.877		
Metaverse	0.783	0.804	0.794	0.777	0.895	
Insurance Performance	0.564	0.639	0.718	0.559	0.622	0.901

4. Analysis

4.1 Structural Model Results

The structural model was evaluated to test the direct relationships between digital network dimensions and insurance firm performance. Figures 2 and 3 present the standardized path coefficients and significance levels, and the results of hypothesis testing are summarized in Table 5. The results indicate that all direct hypotheses (H1–H3) are supported at the 0.001 significance level. Smart networks have the strongest positive effect on insurance firm performance ($\beta = 0.437$, $p < 0.001$), followed by social networks ($\beta = 0.323$, $p < 0.001$) and digital media ($\beta = 0.292$, $p < 0.001$). These findings demonstrate that smart digital infrastructures, social interaction platforms, and digital media tools significantly enhance performance in the insurance industry.

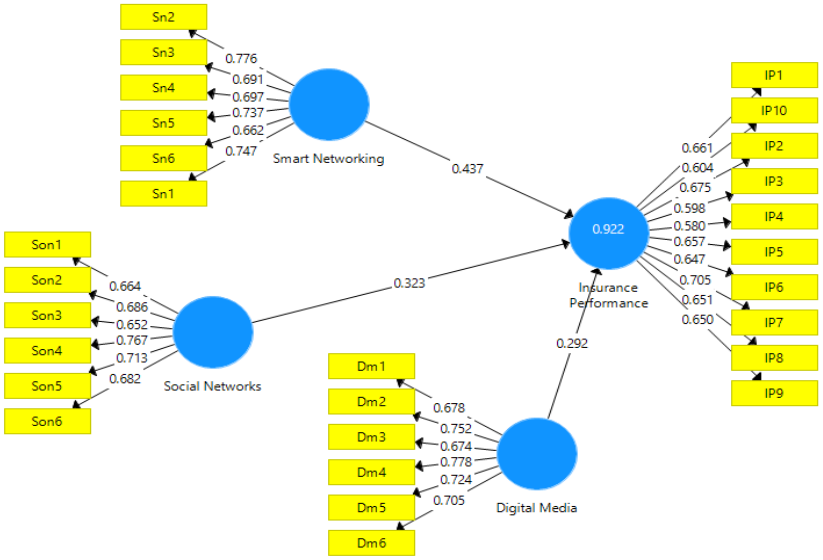

Figure 2. Structural Model with Path Coefficients

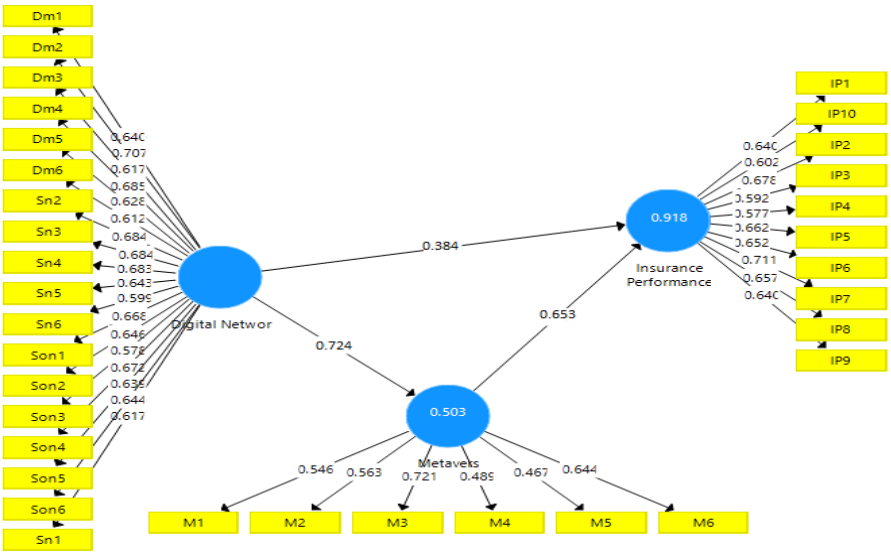

Figure 3. Structural Model with Path Coefficients Analyzing the Role of Metaverse

Table 5. Hypothesis Testing Results

Hypothesis	Path Coefficient (β)	t-statistic	p-value	Test Result
H1	0.437	2.986	<0.001	Supported ✓
H2	0.323	3.224	<0.001	Supported ✓
H3	0.292	2.463	<0.001	Supported ✓
H4*	0.472 (0.724×0.653)	3.367	<0.001	Supported ✓

Note. The direct effect of Digital Network on Insurance Performance was β = 0.384 (p < 0.001).

In the case of an indirect effect in the SEM model, the t-statistic value is calculated using the formula $t = \frac{a \times b}{SE_{ab}}$, where SE_{ab} is usually obtained by bootstrapping.

4.2. Mediation Analysis: The Role of the Metaverse

Hypothesis H4 examines the mediating role of the Metaverse in the relationship between digital networks and insurance firm performance. The mediation effect was tested using the bootstrapping procedure in PLS-SEM. The results show that the indirect effect of digital networks on insurance performance through Metaverse adoption is positive and statistically significant (β = 0.472, $p < 0.001$). The direct effect of digital networks on insurance performance also remains significant (β = 0.384, $p < 0.001$), indicating partial mediation. The variance accounted for ($VAF = \frac{Indirect\ Effect}{Total\ Effect} \times 100$) value is 55%, confirming that (β = 0.472, $p < 0.001$). The direct effect of digital networks on insurance performance also remains significant (β = 0.384, $p < 0.001$), indicating partial mediation. The variance accounted for (VAF) value is 55%, confirming that a substantial portion of the impact of digital networks on insurance performance is transmitted through Metaverse adoption. These findings support Hypothesis H4 and confirm the Metaverse as an important mediating digital platform linking digital networks to firm performance.

4.3 Model Fit and Predictive Power

The explanatory and predictive power of the structural model was assessed using R^2 and Q^2 values for the endogenous constructs. As reported in Table 6, the R^2 values for Insurance Performance (0.75) and Metaverse (0.79) indicate substantial variance explained by the model. In addition, the Q^2 values for Insurance Performance (0.41) and Metaverse (0.38) are positive, confirming the predictive relevance of the model. Overall model fit was further evaluated using multiple fit indices. The Goodness of Fit (GOF) value is 0.449, indicating a strong overall model fit. The R^2 values for Insurance Performance (0.75) and Metaverse (0.79) indicate substantial variance explained by the model. In addition, the Q^2 values for Insurance Performance (0.41) and Metaverse (0.38) are positive, confirming the predictive relevance of the model. Overall model fit was further evaluated using multiple fit indices.

Although the R^2 value for Insurance Performance (0.75) is relatively high, this can be attributed to the theoretically coherent model structure and the strong conceptual proximity among constructs. In addition, multiple model quality indicators (Q^2 = 0.41; GOF = 0.449; SRMR = 0.078; NFI = 0.86) support the robustness of the structural model, reducing concerns regarding artificial inflation due to common method bias.

Table 6. R^2 and Q^2 values

	Metaverse	Insurance Performance
R^2	0.79	0.75
Q^2	0.38	0.41

The Standardized Root Mean Square Residual (SRMR) value was 0.078, which is below the commonly recommended threshold of 0.08, indicating an acceptable level of model fit. The Normed Fit Index (NFI) was 0.86, suggesting a marginally acceptable fit, although it remains below the more conservative threshold of 0.90 suggested in some studies. Overall, these results indicate that the proposed structural model demonstrates an adequate fit to the data.

Additionally, all full collinearity VIF values were below the threshold of 3.3, indicating that common method bias was not a serious issue (Table7):

Table 7. Collinearity Statistics (VIF)

Index	VIF
IP1	1.289
IP2	1.539
IP3	1.572
IP4	1.580
IP5	1.710
IP6	1.393
IP7	1.280
IP8	1.223
IP9	1.527
IP10	1.555
M1	1.152
M2	1.186
M3	1.494
M4	1.512
M5	1.462
M6	1.396
Sn1	1.352
Sn2	1.422
Sn3	1.173
Sn4	1.801
Sn5	1.777
Sn6	1.258
Son1	1.364
Son2	1.279
Son3	1.339
Son4	1.249
Son5	1.299
Son6	1.355
Dm1	1.372
Dm2	1.227
Dm3	1.199
Dm4	1.875
Dm5	1.086
Dm6	1.429

5. Discussion and Conclusion

The findings of this study underscore the pivotal role of integrated digital media networks—namely smart networks, social networks, and digital media—in enhancing insurance performance. Consistent with the Resource-Based View (RBV), these digital infrastructures function as valuable, rare, and inimitable resources that help firms achieve superior performance outcomes. The results confirm that smart networks exert the most substantial effect on insurance performance (β = 0.437), highlighting how IoT- and AI-based infrastructures enable real-time data collection, risk assessment, and cost reduction. This supports the notion that digitally intelligent systems transform data into strategic capabilities that reinforce the competitive advantages of insurers (Manral, 2015; Ngai et al., 2021; Zarifis et al., 2019).

Social networks also demonstrate a robust influence on insurance performance (β = 0.323), emphasizing their role in building relational capital, customer trust, and brand reputation (Cai et al., 2015; Kaplan & Haenlein, 2019). As digital trust and social engagement become more critical in emerging markets, these platforms allow insurance companies to develop deeper connections with customers and strengthen loyalty through personalized communication strategies.

Digital media (β = 0.292) further enhance performance by promoting agility and customer-centricity through omnichannel marketing, digital branding, and real-time service delivery. This finding aligns with prior work by Kajwang (2019) and Chaffey and Ellis-Chadwick (2022), confirming that digital media enable insurers to expand their customer reach and create value through interactive and data-driven interfaces.

The most significant contribution of this study lies in validating the mediating role of the Metaverse (β = 0.472; VAF = 59%). Empirical evidence establishes that the Metaverse accelerates the impact of digital networks by fostering immersive, interactive, and experiential environments where customers and firms co-create value (Dwivedi et al., 2022; Khalil et al., 2024). Unlike prior research that conceptualized the Metaverse as a futuristic extension of social media, this study positions it as a strategic mediating platform that operationalizes the potential of digital resources into measurable performance gains—particularly through customer training, virtual consultations, and simulation-based risk modeling. The results resonate with Kaplan and Haenlein (2023) and Rathore (2023), who argue that the Metaverse marks a paradigm shift from digital transformation to immersive transformation. From a theoretical perspective, these findings extend the RBV by illustrating how digital infrastructures yield sustainable performance advantages when mediated by immersive technology adoption. Similarly, the study enriches TAM and UTAUT perspectives by revealing that organizational readiness for adopting Metaverse-based technologies depends not only on perceived usefulness and ease of use but also on the degree of digital maturity across networked systems. Therefore, this work bridges strategic resource theory and behavioral adoption models—providing a more holistic understanding of digital transformation in insurance. Comparative evidence from digitally advanced markets suggests that immersive technologies such as virtual and augmented reality can enhance customer engagement, personalization, and overall service experience in insurance and financial services contexts (Buhalis et al., 2019; Dwivedi et al., 2022). However, emerging markets such as Iran face structural barriers—including limited technological investment and regulatory uncertainty—that constrain full Metaverse adoption (Hagiu & Wright, 2017). These contextual disparities emphasize the need for locally adaptive digital strategies tailored to institutional and cultural realities.

5.1 Practical Implications for the Insurance Industry

A) Policy Implications for Iranian Insurance

- Develop Metaverse-specific regulatory frameworks to manage legal and ethical concerns such as digital asset ownership, virtual liability, and cybersecurity.
- Encourage public–private partnerships through tax incentives and collaborative efforts between insurers and technology startups to boost digital infrastructure.
- Launch targeted training programs to enhance the technical readiness of insurance professionals in metaverse-based operations, risk modeling, and data protection.

B) Deploying IoT and AI as the Backbone of Operations

- Integrate IoT and AI to enable real-time data acquisition, accurate risk profiling, and fraud detection (Manral, 2015; Zarifis et al., 2019).
- Use AI-driven business models as strategic blueprints for digitizing the insurance value chain and optimizing decision-making.

C) Optimizing Digital and Social Marketing

- Utilize social media analytics to build trust and loyalty via data-driven engagement strategies (Cai et al., 2015).
- Enhance digital touchpoints (apps, portals, campaigns) to improve customer experience and retention (Kajwang, 2019).

D) Transformative Role of the Metaverse

The substantial explanatory power of our model for the Metaverse construct ($R^2 = 0.79$) underscores its growing significance within the insurance industry. This heightened importance necessitates proactive strategies for its adoption and integration. To harness the full potential of the Metaverse, insurers should:

- Adopt the Metaverse for consultation, education, and simulation-based training, creating immersive and insightful customer interactions (Khalil et al., 2024). This adoption, while promising, also highlights the emerging landscape of legal and ethical concerns.
- Employ experiential services and personalized virtual environments to redefine digital insurance marketing (Rathore, 2023). As the use of these virtual environments expands, it becomes crucial to address potential challenges related to digital asset ownership, virtual liability, and cybersecurity.

Therefore, concurrently with adopting these transformative technologies, it is imperative for the insurance industry and regulatory bodies to develop Metaverse-specific regulatory frameworks. This proactive measure will help manage the aforementioned legal and ethical concerns, ensuring a secure and trustworthy environment for both insurers and consumers in virtual spaces.

5.2 Limitations and Suggestions for Future Research

Despite its contributions, this research has some limitations. The data were collected from two major Iranian insurance companies, which may constrain generalizability. Cultural and institutional particularities—such as low digital trust and conservative investment behavior—could moderate the effects observed. Future studies should adopt cross-cultural comparative approaches to investigate how national culture, digital literacy, and policy maturity affect the diffusion of Metaverse-based systems across emerging and advanced markets. Additionally, the rapid evolution of technologies requires ongoing investigation into their interplay. While the focus on two leading firms may limit full statistical generalizability, it enhances analytical generalization by examining organizations that represent the most advanced stage of digital

transformation in the Iranian insurance sector. Future research should explore integration with blockchain, DeFi, and generative AI within the insurance sector to capture the next stage of digital evolution. Longitudinal and multi-sectoral analyses (e.g., banking, health insurance) could also provide further evidence on how immersive technologies reshape business models and performance dynamics.

References

Accenture. (2020). *Technology vision for insurance: We, the post-digital people*. https://www.accenture.com

Accenture. (2023). *Beyond the hype: How the metaverse is reshaping insurance*. https://www.accenture.com

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Ball, M. (2022). *The metaverse and how it will revolutionize everything*. Norton.

Bohnert, A., Fritzsche, A., & Gregor, S. (2019). Digital transformation in insurance: Customer experience and value creation. *The Geneva Papers on Risk and Insurance*, *44*(3), 404–424. https://doi.org/10.1057/s41288-019-00127-0

Buhalis, D., Harwood, T., Bogicevic, V., Viglia, G., Beldona, S., & Hofacker, C. (2019). Technological disruptions in services: Lessons from tourism and hospitality. *Journal of Service Management*, *30*(4), 484–506. https://doi.org/10.1108/JOSM-12-2018-0398

Cai, J., de Janvry, A., & Sadoulet, E. (2015). Social networks and the decision to insure: Evidence from randomized experiments in China. *American Economic Journal: Applied Economics*, *7*(2), 81–108. https://doi.org/10.1257/app.20130425

Chaffey, D., & Ellis-Chadwick, F. (2022). *Digital marketing* (8th ed.). Pearson.

Chatterjee, S., Rana, N. P., & Dwivedi, Y. K. (2023). Assessing the impact of digital marketing capabilities on firm performance: A resource-based perspective. *Journal of Business Research*, *157*, 113553.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–340. https://doi.org/10.2307/249008

Delafrooz, N., Zendehdel, M., & Fathipoor, M. (2017). The effect of social media on customer loyalty and company performance of insurance industry. *International Journal of Economics and Financial Issues*, *7*(3), 254–264.

Deloitte. (2022). *2022 insurance outlook: Navigating the digital transformation*. https://www2.deloitte.com/us/en/insights/industry/financial-services/financial-services-industry-outlooks/insurance-industry-outlook.html

Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C. M. K., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., … Wamba, S. F. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, *66*, 102542. https://doi.org/10.1016/j.ijinfomgt.2022.102542

Dwivedi, Y. K., Hughes, L., & Wirtz, J. (2023). Metaverse beyond the hype: Multidisciplinary perspectives on challenges and opportunities. *International Journal of Information Management*, *66*, 102542.

Eckert, C., Neunsinger, C., & Osterrieder, K. (2022). Managing customer satisfaction: Digital applications for insurance companies. *The Geneva Papers on Risk and Insurance - Issues and Practice*, *47*(3), 569–602. https://doi.org/10.1057/s41288-021-00257-z

Eling, M., & Lehmann, M. (2018). The impact of digitalization on the insurance value chain and the insurability of risks. *The Geneva Papers on Risk and Insurance - Issues and Practice*, *42*(3), 401–424. https://doi.org/10.1057/s41288-017-0060-8

Eling, M., Nuessle, D., & Staubli, J. (2022). The impact of artificial intelligence along the insurance value chain and on the insurability of risks. *The Geneva Papers on Risk and Insurance - Issues and Practice*, *47*(2), 205–241. https://doi.org/10.1057/s41288-020-00201-7

Eling, M., & Jia, R. (2022). Digital transformation and innovation in insurance: A review and research agenda. *Journal of Risk and Insurance*, *89*(4), 851–880.

Fathi, M. R., Khosravi, A., & Esmaeelbeigi, F. (2026). Modelling the barriers to blockchain adoption in tourism industry based on ISM and fuzzy DEMATEL approach. Journal of Digital Age and Digital Innovation, 1(4), 50-80. 10.22091/jdaid.2026.14797.1027

Fornell, C. (1992). A national customer satisfaction barometer: The Swedish experience. *Journal of Marketing*, *56*(1), 6–21. https://doi.org/10.1177/002224299205600103

Gartner. (2023). *Hype cycle for digital insurance transformation 2023*. Gartner Research.

Grönroos, C. (2011). Value co-creation in service logic: A critical analysis. *Marketing Theory*, *11*(3), 279–301. https://doi.org/10.1177/1470593111408177

Gundla, M. P. (2025). The transformative impact of IoT on the insurance industry. *European Journal of Computer Science and Information Technology*, *13*(5), 77–90. https://doi.org/10.37745/ejcsit.2013/vol13n57790

IAIS. (2026). *Global insurance market report 2026: Digital transformation*. https://www.iaisweb.org

IMF. (2025). *Global financial stability report: Insurtech and financial inclusion*. https://www.imf.org

Jung, Y., & Shaghei, S. (2023). Digital marketing as a driver of innovation and competitive growth. *International Journal of Business Innovation*, *14*(1), 101–116.

Joshan, A. (2026). Revolutionizing energy management and smart city development with artificial intelligence and blockchain. *Journal of Digital Age and Digital Innovation, 1*(2), 42-60. 10.22091/jdaid.2025.14007.1002

Kajwang, B. (2019). The effects of digital marketing practices on performance of the insurance sector. *International Journal of Business and Emerging Markets*, *11*(2), 134–150. https://doi.org/10.1504/IJBEM.2019.100225

Kajwang, B. (2022). Effects of digital marketing practices on performance of insurance sector: A critical approach with a review. *International Journal of Business Ecosystem & Strategy*, *4*(4), 89–95. https://doi.org/10.36096/ijbes.v4i4.357

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*, *53*(1), 59–68. https://doi.org/10.1016/j.bushor.2009.09.003

Kaplan, A. M., & Haenlein, M. (2019). Social media in the insurance industry: Opportunities and challenges. *Business Horizons*, *64*(1), 87–96. https://doi.org/10.1016/j.bushor.2020.09.005

Kaplan, A. M., & Haenlein, M. (2021). The metaverse: Opportunities and challenges for business. *Business Horizons*, *64*(5), 677–685. https://doi.org/10.1016/j.bushor.2021.07.002

Keller, K. L. (2003). *Strategic brand management: Building, measuring, and managing brand equity* (2nd ed.). Prentice Hall.

Khalil, M. K., Hasan, R., & Hussain, M. H. (2024). The metaverse marketing revolution: How virtual worlds are redefining digital advertising and paving the way for corporate success. In *Metaverse applications for marketing and business innovation* (pp. 387–403). IGI Global. https://doi.org/10.4018/978-8-3693-2165-2.ch020

Köhne, T., & Köhne, M. (2024). Uncovering the Impact of Digitalization on the Performance of Insurance Distribution. *Risks*, *12*(8), 129. https://doi.org/10.3390/risks12080129

Kohli, R., & Grover, V. (2008). Business value of IT: An essay on expanding research directions to keep up with the times. *Journal of the Association for Information Systems*, *9*(1), 23–39.

Kostelić, K., & Etinger, D. (2025). Metaverse business models and framework: A systematic search with narrative synthesis. *Systems*, *13*(11), 968. https://doi.org/10.3390/systems13110968

Lanfranchi, M., & Grassi, S. (2022). Technological innovation in insurance companies in times of COVID-19. *The Geneva Papers on Risk and Insurance - Issues and Practice*, *47*(3), 375–395. https://doi.org/10.1057/s41288-021-00248-0

Lim, W. M., Mohd-Radzi, K., & Chong, A. Y. L. (2022). Social media engagement, brand trust, and loyalty: A meta-analytic review. *Journal of Retailing and Consumer Services*, *65*, 102896. https://doi.org/10.1016/j.jretconser.2021.102896

Manral, J. (2015). IoT enabled insurance ecosystem: Possibilities, challenges and risks. *arXiv preprint arXiv:1510.03146*. https://arxiv.org/abs/1510.03146

MAS. (2025). *Singapore insurance digital transformation roadmap 2025*. Monetary Authority of Singapore.

Malthouse, E. C., Haenlein, M., Skiera, B., Wege, E., & Zhang, M. (2013). Managing customer relationships in the social media era: Introducing the social CRM house. *Journal of Interactive Marketing*, *27*(4), 270–280.

Mangold, W. G., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix. *Business Horizons*, *52*(4), 357–365. https://doi.org/10.1016/j.bushor.2009.03.002

Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *Journal of Marketing*, *58*(3), 20–38. https://doi.org/10.1177/002224299405800302

Ngai, E. W. T., Hu, Y., Wong, Y. H., Chen, Y., & Sun, X. (2015). The application of data mining techniques in financial fraud detection: A review. *Decision Support Systems*, *50*(3), 559–569. https://doi.org/10.1016/j.dss.2010.11.006

Ngai, E. W. T., Hu, Y., Wong, Y. H., Chen, Y., & Sun, X. (2021). The application of artificial intelligence in insurance: From theory to practice. *Expert Systems with Applications*, *164*, 113762. https://doi.org/10.1016/j.eswa.2020.113762

Oliver, R. L. (1997). *Satisfaction: A behavioral perspective on the consumer*. McGraw-Hill.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, *64*(1), 12–40.

Porto Guedes, M. R. (2020). *Impact of digitalization on the insurance industry* [Master's thesis, University of Porto]. Repositorio Aberto. https://repositorio-aberto.up.pt/bitstream/10216/133088/2/410557.pdf

Rathore, B. (2023). Metaverse marketing: Novel challenges, opportunities, and strategic approaches. *EDUZONE International Review*, *7*(1), 72–85. https://doi.org/10.147/EDUZONE.2023.7.1.72

Shahabi, V., Sarhangi, R., & Mehdiabadi, A. (2026). Explaining IT governance for implementing branchless banking through digital transformation. *Journal of Digital Age and Digital Innovation, 1*(4), 1-31. 10.22091/jdaid.2026.14530.1018

Smith, A., & Smith, R. (2021). Social media engagement and profitability in the insurance sector. *Journal of Financial Services Marketing*, *26*(2), 93–104. https://doi.org/10.1057/s41264-021-00092-3

Susanti, D., Tarigan, Z. J. H., Basana, S. R., & Siagian, H. (2023). The role of digital transformation in organizational performance: A systematic literature review. *Technological Forecasting and Social Change*, *191*, 122585.

Swiss Re Institute. (2021). *Digital claims – Transforming the customer experience*. https://www.swissre.com

Tashkent State University of Economics. (2025). Digitalisation of the insurance sector: Trends and technologies. *European Journal of Economics, Finance and Business Development*, *3*(5), 111–119.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509–533.

Trainor, K. J., Andzulis, J. M., Rapp, A., & Agnihotri, R. (2014). Social media technology usage and customer relationship performance: A capabilities-based examination of social CRM. *Journal of Business Research*, *67*(6), 1201–1208.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425–478. https://doi.org/10.2307/30036540

Wang, C., Chen, Y., & Li, T. (2022). Digital transformation through the metaverse: Strategic opportunities for SMEs. *Journal of Virtual Environments and Business Strategy*, *8*(3), 145–162.

Wang, Y., Zhang, J., & Xu, T. (2022). Exploring metaverse adoption and its impact on SME performance: Evidence from service sectors. *Technological Forecasting and Social Change*, *184*, 121984. https://doi.org/10.1016/j.techfore.2022.121984

Wanyan, Q., Yang, Z., & Xu, C. (2025). Does digital transformation improve productivity? Evidence from China's insurance industry. *The Geneva Papers on Risk and Insurance*. (In Press).

Zarifis, A., Holland, C. P., & Milne, A. (2019). Evaluating the impact of AI on insurance: The four emerging AI and data-driven business models. *Emerald Open Research*, *1*, 15. https://doi.org/10.35241/emeraldopenres.13249.1

Zarifis, A., Holland, C. P., & Milne, A. (2023). Evaluating the impact of AI on insurance: Four emerging data-driven models. *Emerald Open Research*, *1*(1), 1–19. https://doi.org/10.1108/EOR-01-2023-0001

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of Marketing*, *60*(2), 31–46. https://doi.org/10.1177/002224299606000203