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FROM SOCIAL MEDIA TO METAVERSE: THE EVOLUTION OF CRISIS COMMUNICATIONS IN PUBLIC RELATIONS -A SYSTEMATIC LITERATURE REVIEW (2020–2025)

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ABSTRACT

This study provides a systematic literature review (SLR) on the evolving landscape of how public relations utilizes social media and Metaverse in crisis communication management. Covering the pivotal period from 2020 to 2025, the review analyzes how the shift from Web 2.0 to Web 3.0 has redefined organizational response strategies. In accordance with PRISMA guidelines, the findings indicate that while social media continues to dominate the "response" phase of crises through real-time sentiment analysis, Metaverse has emerged as a superior tool for both the "pre-crisis" (training and simulation) and "post-crisis" (reputation rebuilding) phases. The study identifies three key trends: the integration of AI-powered predictive analytics into social media platforms, the emergence of "virtual crisis rooms" in interactive environments, and the growing emphasis on the ethical governance of digital identities. However, significant gaps remain regarding regulatory frameworks and the digital divide. This study contributes to the public relations literature by providing a comprehensive synthesis of emerging research on immersive communication environments and by identifying key theoretical and practical directions for integrating metaverse technologies into crisis communication strategies.

KEYWORDS: Public Relations - Metaverse - Virtual Reality- Social Media-Crisis Management -Reputation-Communication.

1. INTRODUCTION

In recent years, the rapid development of digital technologies has reshaped how organizations communicate with their audiences, manage their reputation, and respond to crises. Among these technological advancements, Metaverse—an immersive virtual environment powered by extended reality (XR), artificial intelligence, and blockchain technology—stands out as a transformative platform with profound implications for public relations and crisis management. Metaverse creates shared virtual spaces where individuals interact through digital avatars, transcending traditional geographical and temporal boundaries. This development presents both opportunities and challenges for communications professionals seeking to build trust, engage stakeholders, and respond effectively during critical events. (Wei, L., & Xiaoyu, C. 2025).

Crisis management has always been a central function in public relations, focusing on immediate, transparent, and reliable communication to mitigate risks and protect reputation during adverse events. Traditional crisis communication models, such as situational communication theory, emphasize strategic response frameworks that are appropriate to the level of responsibility and the threat the crisis poses to reputation. These models highlight the importance of proactive planning, precise messaging, and stakeholder trust in addressing reputational challenges. (Adi, T. W., & Arijanti, S. 2025).

Integrating Metaverse technologies into crisis management expands the scope of these traditional approaches by providing immersive simulation environments that enable stakeholders to interact in real time, plan scenarios, and make decisions collaboratively. (Nwamekwe, C. O., & Nwabunwanne, E. C. 2025). Researchers have confirmed that crisis managers can use Metaverse platforms to design virtual worlds that enhance organizational resilience and improve preparedness through crisis simulation scenarios, rapid information verification, and the visualization of complex data. This capability helps bridge the gap between digital simulations and real-world response practices, thereby improving organizational learning and operational readiness.

Public relations professionals in metaverse environments face unique challenges, including the rapid flow of information, decentralized communication channels, and the need for constant monitoring across virtual spaces. (Elgammal, N., *et al.* 2025). The boundless nature of metaverse

amplifies risks, such as disinformation and identity theft, while simultaneously offering opportunities to enhance stakeholder engagement. (Al-Kfairy, M., *et al.* 2025).

Therefore, understanding how to strategically leverage metaverse in crisis management not only enriches the theoretical frameworks of public relations, but also provides practical insights for organizations navigating an increasingly sophisticated digital communications landscape.

The importance of this study lies in the accelerating digital transformation within the public relations environment, and scarcity of theoretical frameworks explaining these transformations. Despite the growing of research on social media crisis communication, limited scholarly attention has been given to the integration of immersive environments such as the metaverse within public relations crisis management frameworks. Therefore, this study aims to systematically review existing literature (2020–2025) to identify how emerging immersive technologies are reshaping crisis communication strategies and to highlight future research directions, and to understand the extent to which this technological integration can address reputational risks and institutional crises,

2. RESEARCH OBJECTIVES

This study aims to achieve the following objectives:

1. Monitoring temporal and spatial development; Tracking the growth of scientific output related to crisis communication management, and identifying the most influential countries and scientific platforms in this field during the study period.
2. Classifying thematic; Identifying the main issues and topics that research has focused on (such as trust building, reputation management, digital twins, and artificial intelligence) to determine research priorities.
3. Analyzing technological shifts; Revealing how public relations strategies have transitioned from the traditional use of social media to the advanced use of metaverse and virtual reality technologies.
4. Evaluating research methodologies and tools; Identifying the scientific methodologies (descriptive, experimental, systematic review) and tools used in previous studies to assess the maturity of research practice in this field.
5. Identifying research gaps; Identifying aspects that have not received sufficient attention in research (such as ethical and legal dimensions) to provide a roadmap for future researchers.

6. Looking to the future; Presenting a proposed theoretical framework for the complementary relationship between social media, metaverse, and artificial intelligence in formulating sustainable digital public relations strategies.

3. RESEARCH METHODOLOGY

3.1 Research Design

This study employs a Systematic Literature Review (SLR) approach to synthesize and evaluate the evolving roles of the Metaverse and social media in crisis management and public relations. Unlike a traditional narrative review, an SLR follows a structured, transparent, and reproducible protocol. This study adheres to the PRISMA guidelines to minimize researcher bias and ensure the systematic identification of all relevant high-quality literature published between 2020 and 2025.

3.2 Search Strategy and Information Sources

A comprehensive electronic search was conducted across four major multidisciplinary and specialized databases: Scopus, Web of Science, IEEE Xplore, and Google Scholar. The search string utilized a combination of Boolean operators (AND, OR) to capture variations of key terms. The primary search query was structured as follows: (Metaverse OR Immersive Technology OR Virtual World) AND (Social Media OR Digital Platform) AND (Crisis Management OR Crisis Communication) AND (Public Relations OR PR)

3.3 Inclusion and Exclusion Criteria

To maintain a focused and relevant dataset, specific eligibility criteria were established:

- **Inclusion Criteria:**

- (1) Peer-reviewed journal articles and conference proceedings.
- (2) Studies published between January 2020 and December 2025
- (3) Research focusing on the strategic application of Web 2.0 or Web 3.0 in organizational crises
- (4) Articles published in English or Arabic with full-text availability.

- **Exclusion Criteria:**

- (1) Non-peer-reviewed sources such as blog posts, editorials, and trade magazines
- (2) Studies focusing exclusively on the technical architecture of the Metaverse without addressing PR or communication strategy
- (3) Theses and dissertations to avoid unverified data.

3.4 Study Selection and Data Extraction

The selection process followed a multi-stage screening approach:

Identification: Automated removal of duplicate records across databases.

Screening: Title and abstract screening to eliminate irrelevant studies.

Eligibility: Full-text assessment of the remaining papers based on the predefined IC/EC.

Inclusion: Final selection of studies for qualitative and quantitative synthesis.

A standardized Data Extraction Form was developed to facilitate thematic synthesis. Extracted data included: author/year, technological focus (Social Media vs. Metaverse), crisis typology (Natural, Corporate, Health), theoretical framework employed, and core strategic findings.

3.5 Quality Assessment and Synthesis

The quality of the selected studies was assessed based on their methodological rigor and contribution to the field of strategic communication. A meta-analysis was conducted using thematic analysis, classifying the findings into technological, strategic, and ethical dimensions of crisis management in the age of advanced technology.

4. RESULTS

The selected set of fifty-five studies (2020–2025) represents a multidisciplinary synthesis combining digital communications, cyber psychology, and strategic management. These studies are characterized by a radical technological shift, moving from text-based, reactive crisis management models, prevalent during the COVID-19 pandemic (2020), to proactive, interactive, AI-driven frameworks emerging in the new metaverse era (2024–2025). More than just a collection of individual findings, these studies constitute a timeline tracing the transition of corporate reputation from physical and social media spaces to decentralized virtual environments.

The research presented in the table is characterized by its exceptional recency and timeliness. As Table (1) all publications concentrated in the first quarter of 2025. This indicates a rapidly accelerating research trend toward anticipating the future of corporate communication. The listed titles reveal a radical shift in public relations and crisis management tools, moving from traditional models to those entirely reliant on emerging technologies, primarily Metaverse, artificial intelligence (AI), and blockchain. The table also demonstrates geographical and academic diversity, encompassing publishing platforms from global publishers and peer-reviewed

journals in countries such as the United States, Switzerland, the United Kingdom, South Korea, Indonesia, and Nigeria, thus lending a global dimension to the phenomenon under study. Thematically, the table combines practical aspects, such as reputation management and crisis

management via social media, with normative and ethical considerations of communication in virtual environments. This makes it a comprehensive reference for the technological variables impacting the contemporary communication landscape, aligning with the objective of this study.

Table 1: Shows the studies (2020–2025).

NO	Author(s) and Year	Research Title	Journal / Publisher	Country of Publication
1	Wei, L., & Xiaoyu, C. (2025)	Immersive Creativity: Redefining Artistic Expression in the Metaverse Era	International Journal of Art, Design, and Metaverse	South Korea
2	Adi, T. W., & Arijanti, S. (2025)	Reputational risk in the social media era: Case study in Indonesia	Oikonomia: Journal of Management Economics	Indonesia
3	Nwamekwie, C. O., et al. (2025)	Immersive Digital Twin Integration in the Metaverse	Journal of Engineering Research and Applied Science	Turkey
4	Elgammal, N., et al. (2025)	How Will Metaverse Technologies Affect the PR Profession?	Springer Nature Switzerland (Book Chapter)	Switzerland
5	Al-Kfairy, M., et al. (2025)	Navigating ethical dimensions in the metaverse	IEEE Access	USA
6	Binlibdah, S. (2025)	The effectiveness of crisis communication strategies in PR	Edelweiss Applied Science and Technology	USA
7	Zhan, E. S., et al. (2025)	Does AI-generated care-based message increase trust in government? The pivotal role of AI knowledge in government crisis response.	International Journal of Strategic Communication	UK
8	Swain, S., et al. (2025)	Building Trust in the Metaverse: Blockchain for Social Networks	IEEE (Conference Proceedings)	USA
9	Wardiani, W. (2025)	Exploring Crisis Communication in the Digital Age	Humanexus: Journal of Humanistic Studies	Indonesia
10	Kausar, F., et al. (2025)	Review on Blockchain-Based Trust in Metaverse	Cryptography	Switzerland
11	Aljedani, N., et al. (2025)	AI-Social Media Integration for Crisis Management	Applied Sciences	Switzerland
12	George, K. J., et al. (2025)	Communicating Sustainable Development in the Era of AI: An Evaluation of PR Strategies of Select PR Firms in Akwa Ibom State.	Int. Journal of Global Sustainable Research	Nigeria
13	Dzreke, S., & Dzreke, S. E. (2025)	The Dual-Edged Sword: Social Media's Impact	Int. Journal for Research in Applied Science	India
14	Li, Q. (2025)	AIGC Empowers Film and Television Education: Technology-Driven Reconstruction of Teaching Paradigms and Sustainable Communication of Global Culture	Journal of Sociology and Education	China
15	Gündüzyeli, B. (2025)	The role of social media and artificial intelligence (AI) in enhancing digital marketing resilience during crises.	Sustainability	Switzerland
16	Mialkovska, L., et al. (2025)	Crisis Management in the Media Sector: Analyzing Brand Communication Strategies and Public Relations Technologies.	J. of Management Practices, Hum. & Soc. Sci.	Pakistan
17	Celestin, M., & Sujatha, S. (2024)	Assessing the role of social media in fostering customer relationships, marketing, and crisis management	Int. Journal of Interdisciplinary Research	India
18	Hagelstein, J., et al. (2024)	Ethical challenges of digital communication: a comparative study of public relations practitioners in 52 countries	International Journal of Communication	USA
19	Agarwal, V., & Puppala, V. (2024)	Navigating the social media maze: assessing the evolving relevance of public relations in a digital landscape	Public Administration and Law Review	Ukraine
20	Al Hadeed, A. Y., et al. (2024)	Role of public relations practices in content management: the mediating role of new media platforms	Frontiers in Sociology	Switzerland
21	Smaliukienė, R. (2024)	Creativity in crisis communication: a systematic review	Creativity Studies	Lithuania
22	Koli, K. (2024)	The role of social media in crisis communication	ISAR Journal of Arts and Humanities	India

23	Fakhriyah, F. (2024)	Virtual reality-based learning environments for enhancing interpersonal communication and decision making in crisis management training	Journal of Blended and Technical Education	Indonesia
24	Zhiyuan, L. D., et al. (2023)	Crisis management and communication in public relations	Int. Journal for Multidisciplinary Research	India
25	Petridou, E., et al. (2023)	Immersive simulation and experimental design in risk and crisis management: Implications for learning	J. of Contingencies and Crisis Management	UK
26	Abboodi, B., et al. (2023)	Social networks in crisis management: A literature review to address the criticality of the challenge	Encyclopedia	Switzerland
27	Ma, Y., & Xue, L. (2023)	Corporate social irresponsibility: a contingent social media crisis management perspective	Management Decision	UK
28	Liu, R., et al. (2023)	Crisis management experience from social media: public response to the safety crisis of imported aquatic products in China during the pandemic	Foods	Switzerland
29	Awan, K. A., et al. (2023)	Blockchain-based trust management for virtual entities in the metaverse: A model for avatar and virtual organization interactions	IEEE Access	USA
30	Awan, K. A., et al. (2023)	Enhancing performance and security in the metaverse: Latency reduction using trust and Enhancing performance and security in the metaverse: Latency reduction using trust and reputation management	Electronics	Switzerland
31	Conges, A., et al. (2023)	Situational awareness and decision-making in a crisis situation: A crisis management cell in virtual reality	Int. Journal of Disaster Risk Reduction	Netherlands
32	Azudin, N., et al. (2023)	Social media approach to crisis communication during the COVID-19 pandemic: A case study of Saudi Arabia.	SEARCH Journal of Media and Communication	Malaysia
33	Baroroh, D. K., et al. (2022)	Immersive TImmersive Technologies in Indonesia faces "new normal" COVID-19echnologies in Indonesia "new normal"	International Journal of Technology	Indonesia
34	Varelas, S. (2022)	Virtual immersive platforms as a strategic innovative destination marketing tool in the COVID-19 era.	Sustainability	Switzerland
35	Bukar, U. A., et al. (2022)	How advanced technological approaches are reshaping sustainable social media crisis management and communication: A systematic review	Sustainability	Switzerland
36	Diddi, P., & Wei, L. (2022)	Crisis management on social media: Effect of pre-crisis inoculation strategy and midst-crisis organizational interactivity	Public Relations Review	USA
37	Zhou, Y., et al. (2022)	Social media efficacy in crisis management: effectiveness of non-pharmaceutical interventions to manage COVID-19 challenges	Frontiers in Psychiatry	Switzerland
38	Chon, M. G., & Kim, S. (2022)	Dealing with the COVID-19 crisis: Theoretical application of social media analytics in government crisis management	Public Relations Review	USA
39	Chen, R. (2022)	Ready, communicators: Communications and public relations in the metaverse	McMaster Journal of Communication	Canada
40	Xu, Z., & Zhang, M. (2022)	The "ultimate empathy machine" as technocratic solutionism? Audience reception of the distant refugee crisis through virtual reality	The Communication Review	UK
41	Bibri, S. E. (2022)	The social shaping of the metaverse as an alternative to the imaginaries of data-driven smart Cities: A study in science, technology, and society	Smart Cities	Switzerland
42	Xu, Q. A., et al. (2022)	A systematic review of social media-based sentiment analysis: Emerging trends and challenges	Decision Analytics Journal	Netherlands
43	Ogie, R. I., et al. (2022)	Social media use in disaster recovery: A systematic literature review	Int. Journal of Disaster Risk Reduction	Netherlands
44	Abbas, J., et al. (2021)	The role of social media in the advent of COVID-19 pandemic: crisis management, mental health challenges and implications	Risk Management and Healthcare Policy	New Zealand
45	Herrera, L. C., et al. (2021)	Principles for the arrangement of social media listening practices in crisis management	Springer (Conference)	Germany
46	Eismann, K., et al. (2021)	Opening organizational learning in crisis management: On the affordances of social media.	Journal of Strategic Information Systems	Netherlands
47	Tavra, M., et al. (2021)	The role of crowdsourcing and social media in crisis mapping: a case study of a wildfire reaching Croatian City of Split	Geoenvironmental Disasters	Germany
48	Mehta, A. M., et al. (2021)	A process view of crisis misinformation: How public relations professionals detect, manage, and evaluate crisis misinformation	Public Relations Review	USA

49	Zhao, H. (2020)	Explicating the social constructionist perspective on crisis communication and crisis management research:	Journal of Public Relations Research	USA
50	Jugo, D., et al. (2020)	Crisis communication consulting: rethinking the role of PR firms in solving organizational crises	Corporate Communications	UK
51	Gulnerman, A. G., et al. (2020)	New age of crisis management with social media	Springer (Urban Studies)	Germany
52	Mirbabaie, M., et al. (2020)	Social media in times of crisis: Learning from Hurricane Harvey for the coronavirus disease 2019 pandemic response	Journal of Information Technology	UK
53	Xu, J. (2020)	Does the medium matter? A meta-analysis on using social media vs. traditional media in crisis communication	Public Relations Review	USA
54	Benaben, F., et al. (2020)	An AI framework and a metamodel for collaborative situations: Application to crisis management contexts	J. of Contingencies and Crisis Management	UK
55	Imran, M., et al. (2020)	Using AI and social media multimodal content for disaster response and management: Opportunities, challenges, and future directions	Information Processing & Management	UK

4.1 Researches Methodologies:

Upon reviewing the targeted studies, the researchers identified the following key observations:

Methodologies vary, including descriptive, content analysis, exploratory, and experimental approaches, and are detailed as follows:

- **Qualitative and Exploratory Studies.** These studies utilize in-depth interviews or case studies to understand the lived experiences of public relations practitioners. For example, Study 4 employed a qualitative approach by reviewing the lived experiences of public relations practitioners. Studies 2, 8, and 13 used case studies to apply crisis management strategies to specific brands or countries. Study 9 adopted an exploratory approach to examine the experiences of public relations practitioners in international crises. Study 20 employed a qualitative review and analysis approach to public relations communication in presenting its findings. Finally, Study 45 used an analytical approach from the perspective of social constructivist theory.
- **Quantitative and Survey Studies.** These studies rely on questionnaires to collect data from samples of the public or practitioners. Examples include Study 6, which adopted a comparative approach between traditional and digital communication strategies; Study 7, which used an experimental approach to measure the impact of AI-generated messages on trust; Study 12, which employed an evaluative approach to public relations strategies; Study 14, which chose a survey approach to measure the impact of social media on consumer trends; and Study 15, which applied a survey approach to assess the role of public relations in the digital landscape.
- **Systematic Literature Reviews** rely on identifying and analyzing previous literature to draw general conclusions or build theoretical

models. Examples include Studies 5, 10, 21, 26, 30, 37, and 38, which focused on systematic literature reviews of blockchain, metaverse, and sentiment analysis; Study 16, a systematic review of creativity in crisis communication; and Study 53, a meta-analysis comparing traditional and social media.

- **Experimental and Technical Frameworks** focus on building technical models or testing virtual environments. Studies 1, 3, 24, 25, and 29 employed a technical experimental approach to build "digital twin" or "blockchain" models in Metaverse. Studies 18, 25, and 27 utilized an experimental approach based on immersive simulation in virtual reality environments for risk management. Additionally, Study 49 applied a metamodel approach to an artificial intelligence framework for crisis management.
- **Content & Sentiment Analysis Studies:** Studies No. 11, 33, 37, and 55 focused on the methodology of content analysis and sentiment analysis using artificial intelligence algorithms for social media. Meanwhile, Study No. 42 focused on the methodology of crisis mapping through crowdsourced sources and social media.

4.2 Geographical Analysis of Research Contributions (2020-2025)

The geographical distribution of publishing platforms demonstrates a broad global diversity, reflecting the growing international interest in this emerging field of research. Switzerland leads the list of publishing countries with 11 research papers, followed by the United States with 10, and the United Kingdom with 8. Other countries with significant presence include Indonesia and India, each with 4 papers, Germany with 3, and the Netherlands with 2. The geographical scope extends to countries across various continents, including Canada, China,

Malaysia, South Korea, Turkey, Nigeria, Pakistan, Ukraine, Lithuania, and New Zealand, each with one paper. This geographical reach confirms that metaverse and artificial intelligence studies in public

relations are not confined to a specific geographic region, but rather constitute a global research phenomenon involving major academic institutions and international publishing houses. **Figure 1**

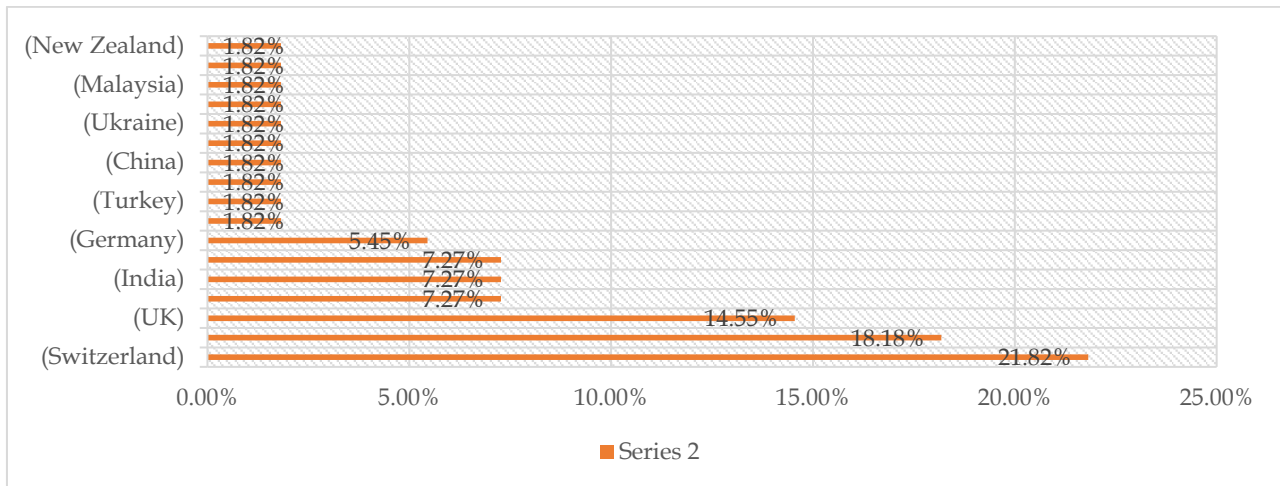


Figure 1: Geographical Analysis of Research Contributions (2020-2025).

4.3 Distribution of Research Studies by Year (2020-2025).

An analytical reading of figure (2) the research timeline reveals a massive knowledge surge and a steady increase in academic interest in metaverse and artificial intelligence within the public relations environment. The year 2025 represents the peak in research output, accounting for approximately 31% of all references. This relatively recent focus reflects a "scientific response" to the rapid technological transformations that have established themselves as the new communication reality. Looking at previous years, we find a relatively stable output during 2022,

2023, and 2024, ranging between 16% and 20%. This period witnessed the theoretical groundwork for integrating immersive technology into crisis management. Meanwhile, 2020 and 2021 represent a "preliminary phase," each representing a meager 7.3%, as the focus at that time was on the traditional uses of social media before the current maturity of virtual world technologies and generative artificial intelligence. This time distribution confirms that the current research is based on a very modern scientific foundation, which raises its scientific value in keeping pace with the latest developments in digital communication thought.

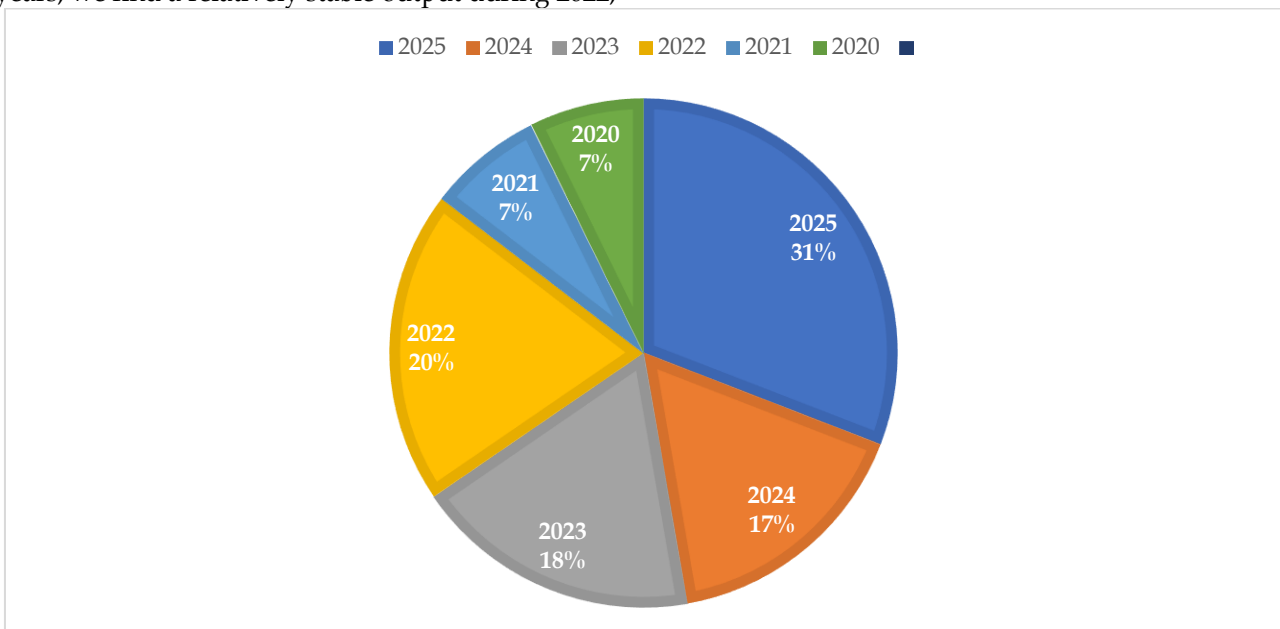


Figure 2: Distribution of Research Studies by Year (2020-2025).

4.4 Thematic Focus

Based on the analysis of the results, **Figure (3)** researchers were able to categorize research interests during the period 2020-2025 into key themes reflecting the intersection of public relations, metaverse, and social media in the context of crisis management:

First theme: Metaverse and immersive technologies in public relations strategies.

Studies within this theme (1, 3, 4, 5, 8, 10, 24, 25, 29, 30, 34, 35, 36, 39, 40, and 41) focused on the application of metaverse and immersive technologies in public relations strategies. They concentrated on the innovative aspects of using metaverse, digital twins, and virtual reality as future tools for public relations practice, while also exploring how these technologies might transform the profession. Sub-themes within this theme included immersive creativity, digital twins for supply chain management, and practitioners' future perspectives on metaverse.

Second theme: Artificial Intelligence (AI) applications in crisis prediction and response

Studies (2, 6, 7, 11, 12, 14, 15, 16, 37, 38, 42, 49, and 50) addressed the role of artificial intelligence and machine learning in analyzing big data derived from social media, building technical models to aid decision-making during disasters, examining AI-generated messages and their impact on government trust, and integrating AI with social media for crisis management.

Third theme: Reputation and Risk Management Across Social Media Platforms

Studies (9, 13, 15, 17, 19, 20, 22, 23, 27, 28, 31, 33, 45, 46, 51, 53) focused on identifying the traditional and modern challenges facing brands and organizations in the digital age, and how social media can be used as a tool to mitigate risks or as an arena for crises. They also examined reputational risks, strategies for "inoculating" against crises before they occur, and the role of social media in strengthening customer relationships.

Fourth theme: Digital Communication Ethics and Misinformation Management

Studies (5, 14, 18, 43, 44, 48) explored privacy-related practices and behaviors in the digital realm, and the ethical challenges that public relations practitioners may face when dealing with misinformation in digital spaces. In addition to the ethical dimensions of metaverse, and how professionals can detect and evaluate misinformation.

Fifth Theme: The Role of Digital Technology in Managing Disaster and Health Crises (COVID-19)

The most distinctive feature of the studies in this theme (21, 26, 32, 42, 47, 52, 54, and 55) is their focus on the applied aspect, examining the effectiveness of social media and modern technologies in confronting major crises such as the COVID-19 pandemic, hurricanes, and forest fires, the use of social media in disaster recovery, and crisis mapping using crowdsourced data.

This classification demonstrates that recent research (2024-2025) has shifted from simply "being present on social media" to "engaging and intelligent interaction."

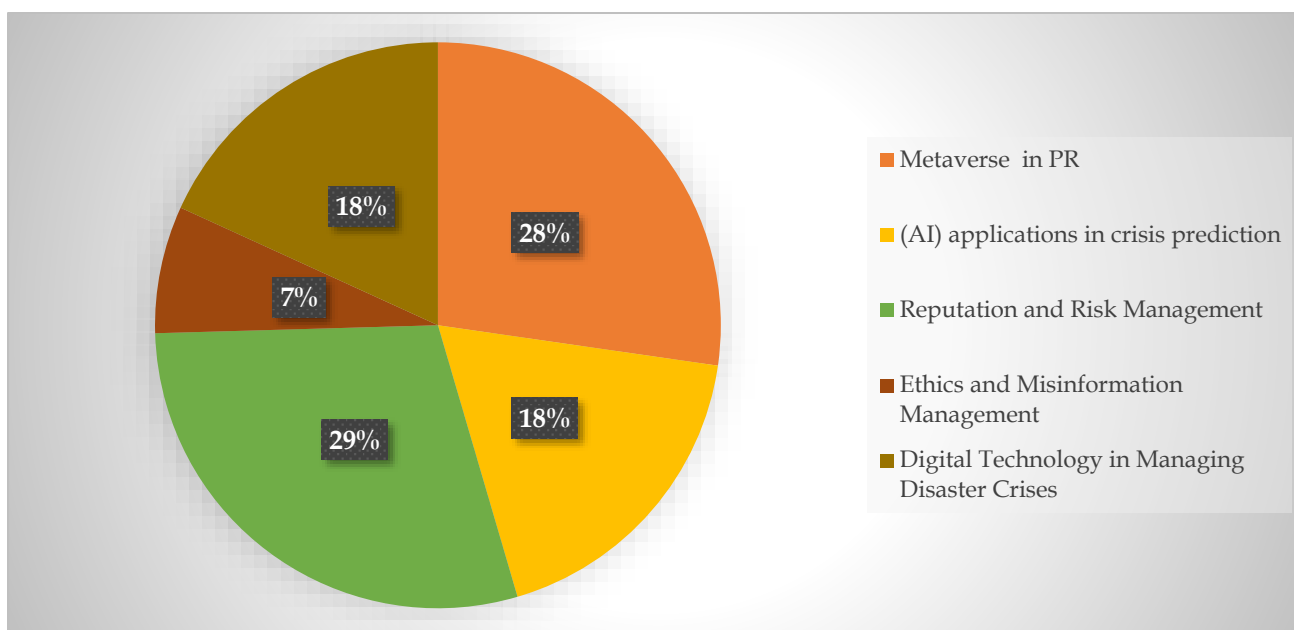


Figure 3: Thematic Focus.

Despite the significant research momentum witnessed in recent years in the fields of metaphysics and artificial intelligence, a closer examination of the subject distribution reveals a notable lack of studies addressing the ethical and legal dimensions of communication in virtual environments. Studies in this area constitute only 7.27% of the total observed scholarly output. Furthermore, most research focuses on purely technical or strategic aspects, with relative neglect of how to build long-term public trust when using avatars to represent institutions during acute crises. In addition, the academic literature lacks sufficient comparative studies examining the differences in public response to crises between traditional social media platforms and the metaphysical world, making this area a fertile ground for further research and investigation.

4.5 From traditional digitization to immersive and intelligent communication.

Based on the results, public relations underwent a radical transformation from "traditional digitization" to "immersive and intelligent communication within 2020 -2025. This evolution can be summarized in the following points:

- **The Establishment and Crisis Response Phase (2020-2021)**

The focus was on social media: Research during this period primarily focused on the role of social media platforms in managing health crises (such as COVID-19) and natural disasters.

Early frameworks for integrating artificial intelligence into disaster response and multimedia content analysis began to emerge. Studies focused on how crises were socially constructed through traditional digital media.

- **The Shift Towards Immersive Technologies Phase (2022-2023)**

Research began in 2022 discussing the readiness of public relations practitioners to enter the world of metaverse and shape data-driven smart cities, moving from mere "publishing" to "simulation." Virtual reality was used to train crisis management teams and measure public response to humanitarian crises. The importance of blockchain technology emerged as a tool for building trust and managing virtual identities (avatars) within metaverse.

- **The Maturity and Full Integration Phase (2024-2025)**

This period (especially 2025) witnessed a major research surge. 31% of studies addressed metaverse

and artificial intelligence as essential tools in public relations. Applications evolved to include the integration of "digital twins" to enhance supply chain resilience and proactively manage corporate crises. Studies began to examine the impact of AI-generated, care-based messages on increasing public trust during government crises. The urgent need to discuss the complex ethical challenges in virtual environments became apparent, a focus of recent research.

According to these studies, public relations has moved from the stage of communication via social media (2020), to the stage of interaction via simulation and virtual reality (2022), reaching the stage of intelligent integration into metaverse (2025), where communication has become faster, more immersive, and more personalized thanks to artificial intelligence algorithms.

4.6 Use of Social Media in Crisis Communication

Social media is a cornerstone of modern communication systems during crises, fundamentally transforming how organizations interact with their audiences in times of turmoil. Its communicative importance lies in its ability to transcend time barriers and provide platforms for live broadcasting and instant responses, giving public relations practitioners a golden opportunity to control the initial narrative of events. (Kaur, A., Kaur, G., & Sandhu, R. 2026). These platforms also enable "digital listening" to accurately monitor public opinion trends, which helps in the early detection of crises before they escalate.

Furthermore, social media serves as an effective tool for managing corporate reputation and restoring trust through direct human interaction and transparent information dissemination. With technological advancements, integrating social media with artificial intelligence and metaverse has become essential to enhance communication flexibility and ensure that awareness messages reach target audiences with high accuracy amidst rapidly evolving digital challenges. (Abokhoza, R., et al. 2024)

Studies highlighting the importance of social media in enhancing public relations and crisis management have noted its significant evolution from mere information dissemination channels to sophisticated analytical and interactive tools for crisis management. Studies (6, 13, 17) focused on the role of these platforms in strengthening customer relationships and maintaining brand loyalty during periods of disruption. Research (21, 22, 30, 38) demonstrated that systematically reviewing social media networks helps organizations identify potential risks and proactively address communication gaps before they escalate. The importance of social media as a tool for

communication intelligence was further emphasized in studies (32, 33, 37, 39) that analyzed the effectiveness of non-pharmaceutical interventions and monitored public sentiment during major health crises such as the COVID-19 pandemic. Furthermore, research (40, 42, 47, 50) has revealed the ability of these media to enhance natural disaster response through "digital listening" technologies and interactive maps that rely on real-time audience data. Finally, very recent studies (11, 14, 16) have confirmed that the future of crisis management lies in the integration of social media and artificial intelligence to increase the resilience of digital marketing and ensure the continuity of corporate communication in the face of rapidly evolving challenges.

4.7 Metaverse Communication and its Implications

The period between 2022 and 2025 witnessed a pivotal shift in public relations literature towards adopting "immersive communication" as a strategic tool for crisis management. Studies (1, 3, 4, 5, 34, 35) focused on how metaverse redefines the concepts of organizational interaction and the formation of virtual identities during times of disruption. A key practice highlighted in these studies was the use of "digital twins" to simulate and proactively manage crisis scenarios in supply chains to prevent organizational breakdowns (3). Studies (8, 10, 24, 25) also pointed to the vital practice of integrating blockchain technology within metaverse environments to ensure the security of virtual identities and build trust in immersive social networks, thereby mitigating the risks of falsification and misrepresentation during a crisis. From a practical standpoint, research (18, 21, 26, 27) has explored the use of virtual reality (VR) in creating "virtual crisis management cells" that enable officials to make collective decisions based on accurate situational awareness and realistic event simulations. VR has also been shown to serve as a technological "empathy" tool, enhancing public response to humanitarian and refugee crises by immersing the audience in the experience (35). Finally, recent studies (5, 18) have emphasized the necessity of practicing "ethical communication" within these spaces to address privacy challenges and behavioral problems that may arise in the virtual environment and exacerbate crises rather than resolve them.

Augmented Reality (AR) represents a highly advanced technological link in corporate communication systems, merging digital elements with the physical world to create interactive communication experiences that transcend the limitations of traditional

screens (Abokhoza, R. R., & Sobieh, Y. M. 2021). Its importance in crisis management and strategic communication is highlighted by its ability to provide live and spatial information, facilitating audience comprehension of complex messages. This is exemplified in Study (1), which pointed to the role of immersive technologies in redefining artistic expression and communication in the metaverse. Research such as Studies (26) and (35) indicate that AR and virtual reality enhance "message effectiveness" by creating a state of digital empathy and emotional connection between the audience and the issues at hand, making it a crucial tool for improving public image and building corporate trust. Furthermore, AR contributes to training public relations personnel in crisis simulations and problem-solving within a secure environment that integrates big data and real-time visuals. This enhances organizational resilience and proactive response capabilities, as demonstrated in studies related to digital twins and smart environments (3).

Furthermore, studies have demonstrated a qualitative shift in how "transnational crises" are addressed using digital technologies. Study (4) focused on the lived experiences of public relations professionals in managing multinational crises, while study (41) explored how social media opens avenues for "organizational learning" during crises to develop more resilient responses in the future. Research (45, 46) also revealed the evolving role of public relations consultancies, which are increasingly reliant on rethinking their traditional strategies to align with the new era of crisis management driven by big data and interactive platforms. In a related vein, study (44) emphasized the importance of a socio-constructivist perspective in understanding how crises are formed and evolve through digital dialogues. This complements the findings of study (53), which conducted a meta-analysis comparing the effectiveness of traditional and social media, confirming that the nature of the medium decisively influences audience attitudes and reactions to the organization's communication message. These studies conclude by stressing that successful digital crisis management depends not only on possessing the technology but also on the ability to systematically detect, manage, and evaluate misinformation, as study (43) demonstrated, to ensure the integrity of the organization's communication position.

The use of metaverse in crisis management results in ethical and governance challenges, such as privacy, inequality, and digital accessibility, which are particularly relevant in crisis and public relations contexts, where trust and legitimacy are essential.

(Kumar, K. M. et al 2026). These concerns indicate the need for future studies to address not only the technical possibilities, but also the organizational, ethical, and justice considerations when applying metaverse techniques to crisis communication frameworks.

5. RECOMMENDATIONS

Based on an analytical review of studies conducted between 2020 and 2025, a set of strategic recommendations can be drawn to improve public relations performance in crisis management by integrating social media and metaverse technologies:

- **Focus on a Virtual Ethical Charter:** We recommend developing an ethical framework or charter to govern public relations work within the metaverse, particularly regarding user data privacy and the falsification of virtual identities during crisis management. Study audience psychology in these environments.
- **Immersion:** We recommend conducting experimental studies to measure the impact of "full immersion" in the metaverse on the audience's response time to corporate apology or clarification messages compared to text-based social media posts.
- **Develop Hybrid Crisis Management Models:** Work on building a communication model that integrates "Generative Artificial Intelligence" (AIGC) for rapid response with "human interaction" in the metaverse to ensure that the crucial human touch is not lost in crisis situations.
- **Enhance "Digital Twins" in Public Relations:** Leverage digital twin technology not only in the industry but also in simulating virtual crises before they occur to train public relations personnel on handling scenarios in a safe environment.
- **Bridging the legislative gap:** We recommend examining the legal challenges related to jurisdiction in metaverse when "defamation" or "breach" crises occur to the reputation of cross-border institutions.
- **Focus on the digital recovery phase.** This means utilizing social media not only during a crisis but also during recovery and reputation rebuilding. This can be achieved by analyzing data from

previous crises (such as COVID-19) to develop new crisis communication models that align with global shifts.

6. FUTURE RESEARCH

Based on an analysis of research trends in targeted studies, which focus intensively on integrating emerging technologies (Metaverse, artificial intelligence, blockchain) into public relations and crisis management practices, proposals for future research can be formulated to enhance public relations' use of AI and Metaverse not only as technical tools but also as means to strengthen credibility and transparency in an increasingly complex digital world. These proposals include:

1. **Studying the ethical and professional standards of public relations practice on decentralized platforms:** This aims to develop a code of ethics to govern organizational behavior within virtual worlds and prevent violations or the falsification of corporate identity.
2. **Measuring the impact of "advanced immersion" on stakeholder trust levels during acute crises,** with the goal of understanding how 3D environments and virtual simulations affect the speed at which the public is persuaded by awareness messages compared to traditional communication methods.
3. **Develop a framework that integrates machine learning with metaverse data for early prediction of digital crises,** aiming to create early warning systems capable of detecting negative "viral spread" in virtual worlds before it reaches public platforms.
4. **Assess the readiness of public relations personnel to transition to "Public Relations 3.0,"** identifying skill gaps in using AIGC (Artificially Generated Content) technologies within crisis operations rooms.
5. **Study the transfer of crises from social media (e.g., Twitter) to metaverse and vice versa,** and how to unify crisis messaging, with the goal of establishing standardized communication protocols to prevent information conflicts across different platforms.
6. **Utilize virtual simulations and virtual field trips to train emergency teams in communication skills under pressure,** exploring how metaverse learning environments can enhance the performance of official spokespeople during disasters.

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